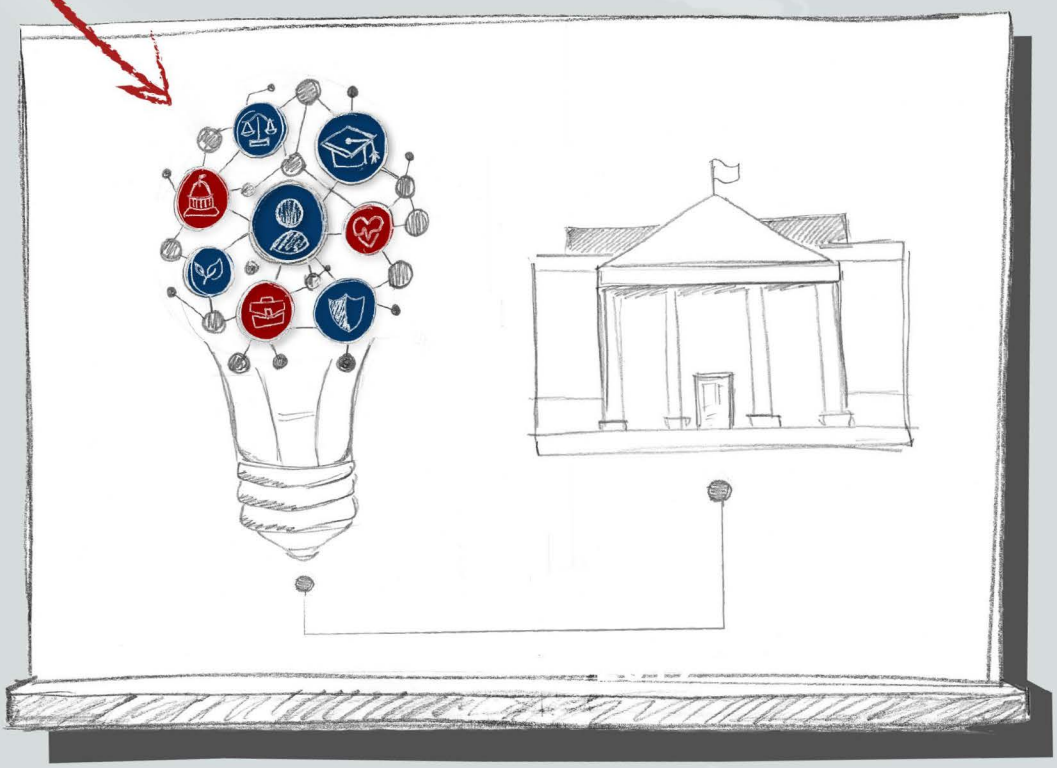
Innovating Government

Redesigning the Executive Branch



Dr. J.J. Walcutt

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The purpose of this publication is to share the goals, ideas, and actions of innovation groups across the executive branch of the U.S. Government. Inspired by the President's Management Agendas across three administrations, the science of human-centered design was used to clarify tools and collaboration methodologies that focus on innovative solutions for improved public-sector functionality. The goal of this book is to highlight implementation options based on a cross-sectional analysis of existing programs.

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INNOVATING GOVERNMENT
RE-DESIGNING THE EXECUTIVE BRANCH

Dr. J.J. Walcutt

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For good ideas and true innovation, you need human interaction, conflict, argument, debate.

MARGARET HEFFERNAN

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It is an honor to serve. It is our duty to serve.

This is book dedicated to all the federal employees who serve our country. Thank you for your efforts, your time, and your brilliance. You are inspiring, exceptional, and appreciated.

SUMMARY

Innovating Government: Re-designing the Executive Branch chronicles the goals, ideas, and actions of innovation groups across the executive branch of the U.S. Government. Inspired by the President's Management Agendas across three administrations, the science of human-centered design was used to elucidate tools and collaboration methodologies that focus on innovative solutions for improved public-sector functionality. The goal of this book is to highlight implementation options based on a cross-sectional analysis of existing programs. Ideas for consideration are highlighted that support a culture of innovation for not only increased efficiency and effectiveness of solutions but to also help breed trust across the nation, encourage opportunities to co-create the future with Americans, and that support educational advancements for increased global competitiveness and defense capabilities. Specific techniques focus on improving communication pathways and cross-department collaboration to reduce overlap, increase effectiveness, and optimize the impact of the U.S. Government to continuously support a nation ready for the future. Input is included from innovation leaders across departments and agencies of the executive branch.

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SECTION 1

INNOVATION IN GOVERNMENT

Innovation (v.) =

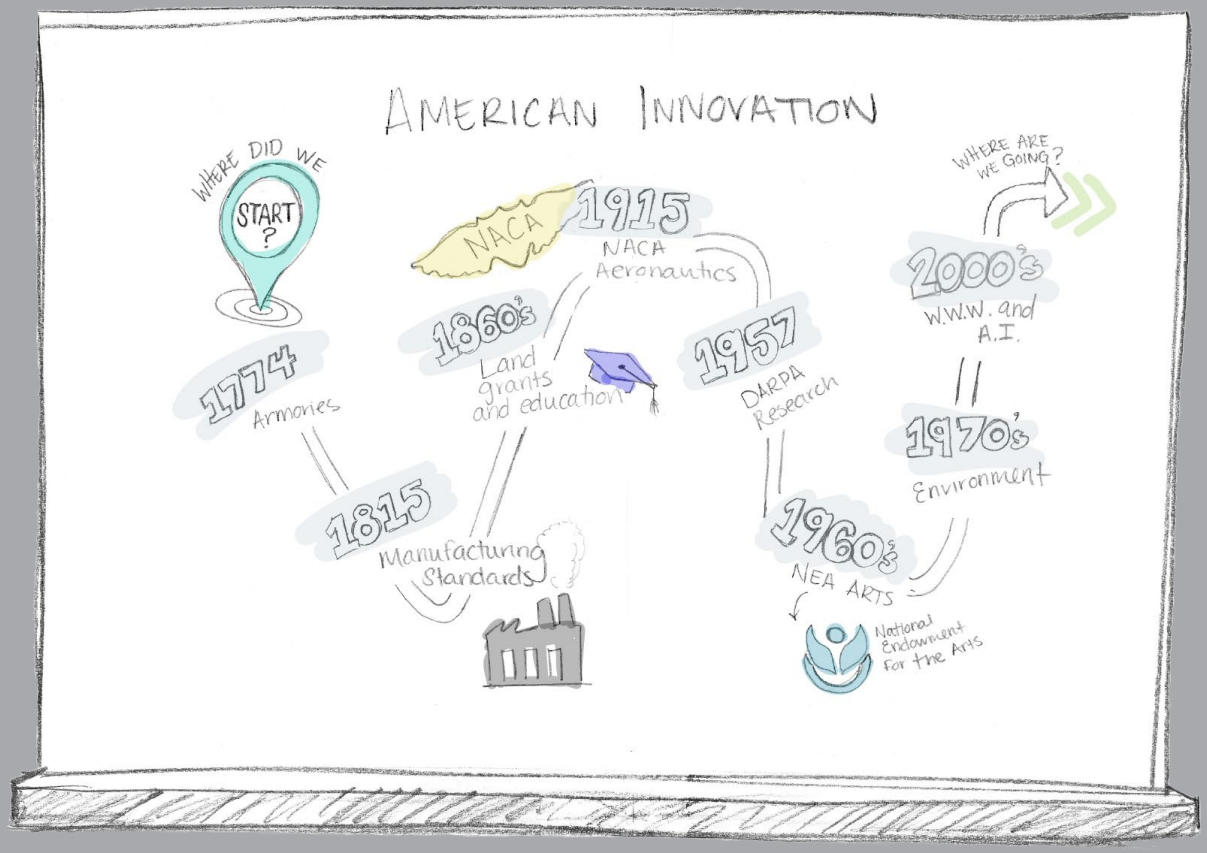
Identifying the lines and working creatively within them.

HISTORY OF INNOVATION IN GOVERNMENT

SUMMARY

Supporting innovation and creativity has been a cornerstone of our democracy since our country's earliest days. Interestingly, during the weeks of heated debate during the Constitutional Convention, one area of consensus was the protection and promotion of invention. Two weeks after its proposal, what came to be known as the intellectual property clause passed unanimously among the convention attendees. It stated that Congress should "promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." While support for encouraging innovation has remained, the approaches have varied. This brief review recaps the ways in which government has alternated between encouraging innovation in the private and other sectors and building the capacity for innovation within the government.

Democracy demands wisdom and vision in its citizens



INTRODUCTION

> **The arts and sciences are essential to the prosperity of the state and to the ornament and happiness of human life. They have a primary claim to the encouragement of every lover of his country and mankind.**
>
> *– George Washington*

Early in 2017, the Congressional Budget Office (CBO) published a blog that discussed how federal policy changes could boost innovation and productivity in the US economy (Musick, 2017). **What the blog failed to mention was the interesting work related to innovation already happening within the federal government and how results and products from those areas could inform policy changes that could benefit the future of the country.** Months of research and conversations with individuals across the government led to an event aimed at creating meaningful connections among those working in innovation. This initial research and the interactions with other innovators only uncovered a fraction of the innovation work being conducted across the government. The event was therefore used to crowdsource a better understanding of the current state of innovation in the federal space and to determine how the community could support one another's diverse efforts.

Although most Americans would probably not consider the government innovative, federal funding is actually responsible for the research and development of many of the country's most well-known technologies. **While federal research and development dollars have led to innovations that have transformed our economy, innovation is increasingly revolutionizing the way the entire government operates.** In fact, federally-supported innovation has been a key driver of economic growth for the United States. Robert Solow, a Nobel Prize-winning economist, found that **"technological and related innovation was the dominant factor—in the 60 percent range—in economic growth"** (Singer, 2014). Nonetheless, the CBO's comments and omissions are not surprising because, to-date, there has been no authority that can speak to the full landscape of innovation that is happening across agencies and the federal workforce.

While knowledge of the types of innovation materializing is important to define, the complexity of the system and the volume of activities being conducted make capturing the entirety of government innovation work a challenge. Just as the government and its agencies' missions are diverse, so too is the innovation network. Yet, without this holistic awareness, it is hard to leverage, collaborate with, or learn from those already involved. It is also difficult to identify gaps. **A better awareness of existing programs and methodologies would help create a culture of innovation and optimize proactive strategies to meet national needs.** But in order to consider the possibilities that will be revealed through this book, it is necessary to first look back at the nation's founding and the role that innovation has played in the United States Government since the beginning.

BRIEF HISTORY OF INNOVATION IN GOVERNMENT

For the United States, continuing its historical role of encouraging innovation both inside and outside of government, along with maintaining a connection between the two is necessary to remain relevant, effective, and globally competitive.

At the inception of our country, innovation was, out of necessity, focused primarily on building different capabilities. The United States Armories are one of the first examples of early innovation sponsored by the government. In 1794, the first two armories were built so that the United States would not have to depend on foreign trade for weapons. At first, civilian positions were created with the option of subcontracting out the work of building weapons. However, in 1815, the leaders of the armories started to hire inventors directly as a means for the government to build its own weapons and push new developments in weapons-based warfare. Their approach paid off in ways probably not originally imagined and resulted in the development of a system of manufacturing and organizational management that became known as the "American Standard of Manufacturing." It has since transformed industries outside of defense and has been celebrated across the world.

During the Civil War, many new technologies were created—from surveillance balloons to new types of guns—as many believed that these innovations could help end the war. As such, many inventors, scientists, and engineers lobbied the

Aerial View of the National Institutes of Health
Credit: Courtesy of the National Institutes of Health.
https://www.flickr.com/photos/historyatnih/30331376672/

government to create an advising organization that would be focused on "any subject of science or art." **This resulted in the creation of the National Academies of Sciences in 1863, which would work at the direction of government agencies to carry out different projects across scientific fields.** During this same time, the health and wellbeing of the war's injured and veterans led to the increased capacity for the government to take on the research and development in the medical and biological sciences. It created and expanded the mandate of the predecessor to the modern-day **National Institutes of Health**—which was first known as the Marine Hospital Service and then became the Public Health and Marine Hospital Service—**to allow for many important medical discoveries within government-owned and operated laboratories.**

These efforts increased the capacity for innovation through research and development within the government. Yet, much work was also done during these early years to encourage important partnerships with states and universities to ensure that research and training was being encouraged outside of government and across the country to support the economy. **The Morrill Acts of the 1860s gave free federal lands, also known as land grants, to states to create universities to train citizens in manufacturing and agricultural practices.** These resulted in the Hatch Act of 1887, which established experiment stations at these institutions to marry the teaching of practices to the research of practices. These institutions, of which 76 still remained in 2008, continue to be responsible for numerous important discoveries and patents.

Interestingly, the development of physical science and engineering laboratories was largely built by private entrepreneurs during this early period, led by Thomas Edison. These labs were focused on emerging, yet complex technological systems. **But much debate around standards and the compatibility of different systems**

necessitated the government to step in to create the National Bureau of Standards in 1901, which has become the National Institute for Standards and Technology. While the Bureau was created to act as a referee and ensure fairness, similar to other organizations built by the government at this time, its role quickly expanded to also conduct its own cutting edge research. On the eve of the first World War, the United States had a network of public laboratories focused on topics that spanned many disciplines. Yet, the World Wars would grow the scope and size of these laboratories and other investments to encourage groundbreaking innovations within the government and in the private sector (IEEEUSA, 2011a).

Prior to World War I, Thomas Edison encouraged the creation of a consulting board for the U.S. Navy to prepare for war. **The Naval Consulting Board, established in 1915, was then led by Edison and a number of other leading industrial researchers.** While they were initially commissioned to review citizen inventions and fund research, their largest contribution was the recommendation to build in-house research capabilities at the Navy. This resulted in the creation of the Naval Research Laboratory. Congress appropriated funds for the lab in 1916, but the lab did not actually open until 1923. At the same time, investment into aeronautics research was happening, and the National Advisory Committee on Aeronautics (NACA) was developed as an addition to the Navy's appropriation bill in 1915. NACA was originally a group of volunteers from the government and the private sector who were charged with studying flight and providing practical solutions for both military and civilian aircraft. NACA quickly went

Thomas Edison marches with the Naval Consulting Board in a New York City Preparedness Parade, May 13, 1916; NPS Photo (National Park Service)

from organizing research at existing university and government laboratories to opening its own laboratory in 1920. After the wars, NACA became a part of the National Aeronautics and Space Administration (NASA), and has continued to deliver some of the most groundbreaking research and products, including the ability to put man on the moon. Both of these initiatives greatly expanded the investment in government owned and operated laboratories that delivered solutions important to the needs of the World Wars.

Expecting the second World War to be more high-tech, many believed that it would require the efforts and expertise of both military and civilian researchers to develop the necessary defense products and systems. This resulted in the National Defense Research Committee (NDRC) in 1940. NDRC was tasked with coordinating the research and development of advanced warfare products. Using grants to civilian and private sector institutions, NDRC funded projects that met military needs. Common recipients were university institutions and private sector labs. **By the end of the war in 1945, NDRC had given out more than $450 million dollars in grants, and this model of funding civilian research has continued and grown as the NDRC became the National Science Foundation in 1950.**

At the same time, in 1939, NDRC commissioned a group to look at the potential for a new type of highly destructive bomb, and by the end of the review, the group encouraged additional research to be focused on the creation of what would become the atomic bomb. Recognizing the next project would be a large undertaking that would have infrastructure needs, the NDRC gave what would come to be known as the Manhattan Project to the Army Corps of Engineers. This creation of a new city in Oak Ridge, Tennessee and the development of a number of new laboratories across the U.S. is an example of how the government continued to encourage the creation of government-owned and run laboratories for this particular research and development effort (Hochheiser, 2011).

In the immediate period after the World Wars, research and development was consolidated into a number of different institutions, including the National Institutes of Health (for health-related research), Office of Naval Research (for physical science research), Atomic Energy Commission (for nuclear weapons and power), and the National Science Foundation (general research and educational activities) (The National Academies, 1995). **In fact, shortly before the war, a decision was made to ensure that all the talent involved in these research and development efforts would not be lost post-war. Thus, the creation of what would become the Federally Funded Research and Development Centers**

(FFRDC) was initiated. While the number of the FFRDCs has fluctuated over the years, they have remained an important addition to and continuation of the federal government's efforts to invest in and spur innovation (IEEEUSA, 2011B).

Then, with the surprising launch of Sputnik by the Soviet Union, the government quickly developed a new agency to respond. It became known as the Defense Advanced Research Projects Agency (DARPA, 1957), and it was designed to be a flexible agency that would invest in high-risk, high-reward technology developments that could become part of the Department of Defense's arsenal of innovations (Singer, 2014).

The decades during and post-Cold War have seen continued investment in research and development at fairly consistent levels, but at times with different emphases. For example, the late 1960s brought investment in the arts. Thus, **in 1965, the National Endowment for the Arts (NEA) was created "to nurture American creativity, to elevate the nation's culture, and to sustain and preserve the country's many artistic traditions."** In the act creating the NEA, Congress declared "A high civilization must not limit its efforts to science and technology alone but must give full value and support to the other great branches of man's scholarly and cultural activity" (Bauerlein and Grantham, 2009). **Alternatively, the 1970s saw investments in public and private research in the environment and energy areas.** Throughout the 1980s, government interest in communications systems paved the way to satellite communications and ultimately Global Positioning Systems (GPS). These communications breakthroughs also created the catalyst for the technology revolution of the 1990s and 2000s. The 1990s ushered in an explosion of information made available by the World Wide Web. Its early social media platforms were the connecting force for placing computing and networking power in the hands of users. From the early 2000s into the 2010s, society was impacted by a focus on assistive technologies from Artificial Intelligence (AI) - driven assistants to self-driving cars. Innovations of tomorrow seem poised to be more human centered and directed toward creating efficiencies in every day life.

The National Medal of Arts awarded by the National Endowment for the Arts of the United States, 1984
Source: http://www.nea.gov/

Democracy demands wisdom and vision in its citizens and ... must therefore foster and support a form of education designed to make men masters of their technology and not its unthinking servant.

-20 U.S. Code § 951 - Declaration of findings and purposes

CONCLUSIONS

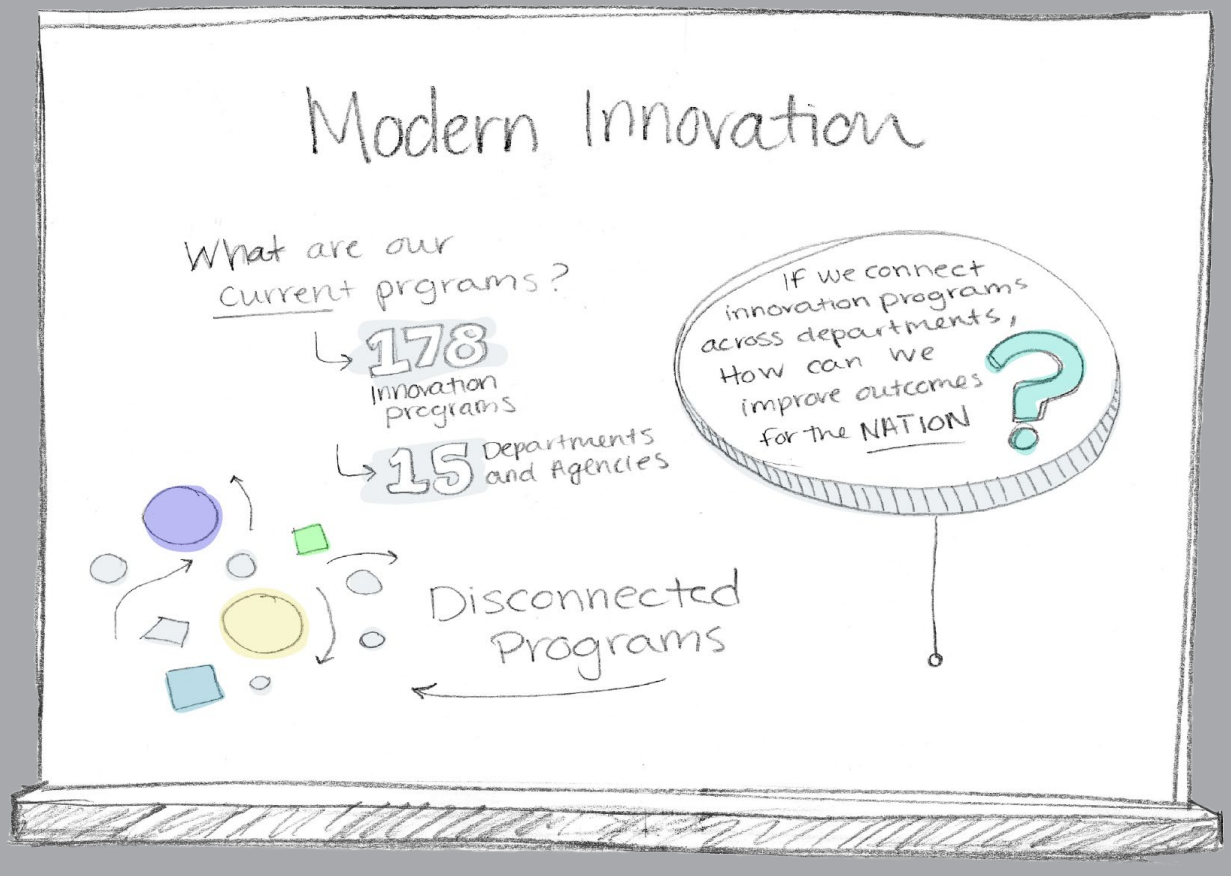
This history of innovation and organizational investments has provided a solid foundation for the nation's future and **it is a major strength of the United States' innovation pipeline (The National Academies, 1995).** The government's continued emphasis on promoting innovation internally and externally is a truly valuable way to keep the country, and the government who leads it, on the cutting edge and constantly looking forward. To that end, with the advent of high-speed digital connectivity, comes the ability to not only continue funding singular innovation projects but to also capitalize on the combined effects and outcomes of these efforts. Working under the assumption that the whole is greater than the sum of the parts, this book elucidates the next chapter of U.S. Government-sponsored innovation. It explores enhanced ways to leverage all of the dynamic and important innovation work happening inside and outside of the government. Ultimately, the goal is to capitalize not only on the singular findings from each group or project but to also a) determine how we can better connect these outcomes to achieve meta-capabilities for the nation and b) apply promising innovative methodologies to optimize the government system.

EXISTING PROGRAMS

SUMMARY

The first Strategy for American Innovation was described in the initial memorandum of 2009 (updated in 2011 and 2015) and in 2017, the Office of American Innovation was started by executive order. In 2018, the *President's Management Agenda* was revised to focus on innovative solutions for improved public-sector functionality, further clarifying implementation across three key goals areas, including IT Modernization, Workforce Development, and Data, Accountability and Transparency, to create an efficient system that highlights optimized solutions for the nation. Inspired by these strategic goals, 179 innovation programs are already in place across the federal government. All 15 departments have at least one innovation program within their ranks with the Department of Defense being the most heavily saturated. This chapter provides a rough overview of the different content-focused programs, and cross-department enabling programs that exist in different pockets of government. It also highlights many of the innovative methodologies and solutions being developed to answer today's national issues.

If we connect innovation programs across departments, can we improve outcomes for the nation?



CURRENT ECOSYSTEM

The innovation ecosystem within the executive branch includes a significant number of programs covering all 15 departments. Program focus areas range from health and safety to teacher quality and conservation. Accordingly, what follows is a summary of all the programs across the departments and a description of their primary goals (see Table 1; a full list can be seen in Appendix I). The overarching goal of these programs is to identify best practices that can be replicated and promising ideas that can be tested and implemented to provide optimal solutions for the nation. Programs generally fall into three categories: research, practitioner support, and enablement. Supporting the first category, significant resources are dedicated to basic and applied research in key topic areas that differ by department. Resources are also provided for practitioner support (e.g., funds for law enforcement and prosecutors to support strategies for combatting the opioid crisis; or support for teachers to implement evidence-based educational practices).

The third set of programs enables the innovation ecosystem. These programs focus on a range of topics that improve business practices like cost-sharing, rapid acquisition, and even teaching federal employees how to use innovation tools to think differently about long-term problems. Although these programs support federal employees and help maximize tax-payer dollars, they are difficult to define in a budget to Congress because they do not focus on a singular issue, requirement, or mandate. However, they provide the glue and catalyze efficiency, effectiveness, and improved return on investment. Unfortunately, this means there are numerous programs infusing innovation into their projects that go unmentioned or unidentified, making it more difficult to track this information. The assumption is that all our programs perform at their best so measuring differences in this case becomes challenging if not impossible (Vogel-Walcutt, Cole, Hill, Yates, Epstein, Teel, & Flinn, 2018). Thus, for scoping purposes, we include programs across the executive branch specifically and intentionally using innovative methodologies to develop high-impact solutions.

Programs by Department

Each department is involved in innovation at a different depth and breadth that reflects the strategic goals and initiatives within their focus areas. The following list of innovation programs has been compiled from four primary sources: Research for NextGen Government (Vogel-Walcutt & Martinez, 2018),

Advancing Government through Collaboration, Education & Action (ACT-IAC, n.d.), studies conducted by the U.S. Air Force (Sovada, 2018), and the Defense Innovation Board (DIB, n.d.). What follows is a high-level description of each department's focus and implementation strategy for encouraging innovation. Results show that primary research is the most common method used for finding new solutions to recurring or current issues that face the nation. Additionally, counsels of innovators and entrepreneurs, public-private partnerships, challenges, and awards are used to stimulate a thinking-outside-the-box mentality. Programs were included that focus directly on innovative ideas or innovative methodologies that are housed within the U.S. Government. Thus, project-level innovations and external partners were excluded but some are highlighted in the section following focusing on specific national issues to elucidate the value and impact of public-private partnerships.

Program Descriptions

- **The Department of Agriculture** has 6 innovation programs focused on a wide variety of topics. At the foundational level, they fund agricultural research through their Small Business Innovation Research program but they also fund resource conservation programs, entrepreneurs focused on food and agricultural science and technology, food value-chains, and developing collaborative farmer networks. At the regulatory level, they have two programs aimed at improving data accessibility and fraud reduction.

- **The Department of Commerce** has 3 primary innovation programs and 2 sub-initiatives focused on cross-border e-commerce resource development and globally-competitive talent, funding high-risk innovative commercialization efforts, and primary research in standards and technology. The Office of Innovation and Entrepreneurship also provides innovation policy expertise to other agencies and the White House.

- **The Department of Education** has the Office of Innovation and Improvement which oversees six key areas of focus: Non-traditional programs, non-public education, charter schools, parental options, teacher quality, and research. There is also the Office of Educational Technology and the Institute of Educational Sciences (IES) which both conduct primary research aiming to further the knowledge, practices, and vision in the learning sciences.

- **The Department of Energy** has seven primary innovation programs and 17 national laboratories that support the department's focus areas of energy innovation, national security, and nuclear regulation. The primary innovation programs are stratified by basic research (Office of Science and Technology) which oversees the national laboratories, high-potential, high-impact energy technology research (Advanced Research Projects Agency-Energy (ARPA-E),

Table 1: Innovation Program Summaries by Department

Department	Programs	Primary Focus Areas
Agriculture	6	Basic research, AgTech and conservation startups, regulatory improvements
Commerce	7	E-commerce support, high-risk commercialization grants, basic research
Education	9	Non-traditional options, evidence-based strategies, parental options
Energy	28	Research and innovation support for renewable energy, national security, and foundational understanding of the universe
Health and Human Services	9	Basic research, biotechnology, behavioral science, models for healthcare and payment
Homeland Security	8	Basic research, recruitment, public-private partnerships focused on border and cyber security, chemical and biological defense, and critical infrastructure; support for basic and applied research informing maritime security
Housing and Urban Development	5	Identifying and supporting designs of innovative housing and community solutions
Interior	6	Data visualization tools and research in environmental topics covering air, land, and water
Justice	9	Financial support for law enforcement to combat the opioid crisis, violent crime, and increase collaboration
Labor	2	Workforce innovation, national workforce support, and apprenticeships
State	3	Management, Business, Global Affairs, and public-private virtual support for diplomats
Transportation	9	Basic research, infrastructure funding, and seed funding for innovative small business in engineering, vehicle-highway interaction, and nanotechnology
Treasury	1	Finance methodology and cost-sharing
Veteran Affairs	6	Department enablement, connectivity across innovators within and outside the department, support for grassroots and external best practices diffusion
Defense	41	Science, technology, readiness, health, warfare coalition, acquisition methodologies, rapid capabilities, branch-specific goals, and cross-branch/public-private partnerships for visionary possibilities
Cross-Department	5	Focused on information-sharing, these programs create communication conduits within the federal government and between U.S. citizens
Government-General	8	Housed in independent agencies (OPM, GSA, FCC, etc.), these programs address both agency strategic missions and provide enabling support across the federal government

- **The Department of Agriculture** has 6 innovation programs focused on a wide variety of top research acceleration (Mission Innovation, NREL, and GAIN), outreach and support (Build4Scale, Innovation Portal, and Loan Programs office).
- **The Department of Health and Human Services** exercises innovation at two key levels: basic research and modeling for payments and care. The department has also developed a Vision 2025 aiming to improve the internal functioning and external access and support within the Social Security Association. Research support provided to improve biotechnology and behavioral science covers a wide range of subtopics. Models for healthcare and payment plans are being investigated to develop new ideas for ensuring that payments to providers can be made efficiently and that methods for providing care can be maintained entirely by the state and at-home care-support models.
- **The Department of Homeland Security** provides basic research support across several areas including borders and maritime security, chemical and biological defense, critical infrastructure, cybersecurity, engineering, explosives, first responders, and unmanned systems. They also fund projects at various academic research programs covering subtopics within these areas. The department additionally supports projects and capabilities to enable improved recruitment of cyber security professionals throughout the nation and connects with start-up technology firms in Silicon Valley to benefit from their methodology expertise in innovation and their advancements in technology.
- **The Department of Housing and Urban Development (HUD)** anchors its innovation efforts in the Transparency and Open Government requirements (2009). Under this memorandum, departments were instructed to connect with groups external to the U.S. Government in order to support and ignite innovative thinking in order to drive toward innovative solutions. HUD is currently working in a number of areas to meet these goals including writing a blog that acts as a bi-directional communication tool with the nation, competitions for housing and community ideas and designs for the future, as well as connecting across the nation and internationally to share resources.
- **The Department of the Interior** conducts most of its innovation through research challenges, awards, and projects. Topic areas focus on air, land, and water. Formal research projects are located in a number of key states but citizens projects are recognized across the nation. Example projects are investigating topics such as coastal acidification, streamflow monitoring, the public library air sensor loan program, and detecting toxic species.

Government innovation also occurs in the justice realm, consistent with the First Step Act, we have introduced several programs as alternatives for incarceration, always with the primary lens on public safety. Further, as innovation principals tell us, we are looking at initiatives where we may even transition duties of our organization to other entities that can do it more efficiently.

- Commissioner Charles T. Massarone, U.S. Parole Commission, Department of Justice

- **The Department of Justice** defines innovation based primarily on the work conducted by practitioners in the field. By supporting law enforcement and first responders to coordinate and collaborate, the goal is to share best practices in areas ranging from prosecution strategies to combatting violent and community-based crime. A significant current focus is to provide support to law enforcement, first responders, mental health professionals, child advocates and mentors, and prosecutors through funds to encourage information-sharing with the ultimate goal of fighting the opioid crisis.

- **The Department of Labor** hosted the Workforce Innovation Fund for many years focused on defining methodologies, designing tools, and sharing best practices for improving public sector working conditions. This fund appears to be currently inactive. However, the Department of Labor's blog highlights many stories about projects using innovation to solve national workforce problems.

- **The Department of State** hosts both an internally enabling team focused on sharing best practices and supporting data-driven solutions as well as an externally facing global team focused on promoting and protecting American entrepreneurship abroad. The Office of Management Policy, Rightsizing, and Innovation's staff focuses on cost containment, workforce efficiency, strategic planning, scaling to global operations, testing technology, and reducing the department's resource footprint. The Office of Commercial and Business Affairs works in three key areas: Commercial Diplomacy, Entrepreneurship, Intellectual Property Enforcement affecting 50% of U.S. Exports and 40% of GDP.

- **The Department of Transportation** supports substantial research, public-private partnerships, and outreach activities to develop the transportation ecosystem of the future. The department oversees 16 laboratories, funds student projects, provides funds to infrastructure development, and seed money to small businesses with innovative ideas. Key areas of research include vehicle-highway interaction, nanotechnology, structures and bridges, and autonomous vehicles.

- **The Department of Treasury**, through the office of Financial Innovation and Transformation, is supporting cross-agency projects to improve the effectiveness and efficiency of financial management. Through cost-sharing methodologies, they are rethinking the use of data and funding streams to promote collaboration and shared resources.

- **The Department of Veterans Affairs** supports its innovation program, center, and network which focuses on developing and supporting innovation throughout the department in a variety of ways. Specifically, the focus is on diffusion of ideas and sustainment of outcomes which are supported by helping employees and providers to drive needs identification and promising solutions for testing. Many awards have also been given to the department for several tools and projects related to healthcare delivery.

- **Cross-department programs** support information sharing within the federal government and externally with U.S. citizens. The Challenge program provides access to U.S. citizens to provide federal-funded solutions to key issues facing the federal government. The Citizen Science program financially supports citizen-driven timely grassroots science projects across the nation. The Federal Laboratory Consortium for Technology Transfer (FLC) is a federally-funded formalized network connecting Federal Research Labs across the nation. The Small Business Innovation Research and Small Business Technology Transfer programs crosses eight departments plus three agencies and provides over $100 million in funding annually. The CENDI program is a federal-employee volunteer program used to share data and publications gained from government-supported research. The website has no active meetings planned, however.

- **General government programs** are housed within independent agency and focus both on agency-specific missions but also cross-department advocacy. For example, the White House's Office of Science and Technology Policy (OSTP) operates as the communication gateway to the President for scientific and technology advances as they relate to policy and budget. The National Aeronautics and Space Administration (NASA)'s Center of Excellence for Collaborative Innovation (COECI) is using crowdsourcing as a tool to generate public-private innovations and has developed a Tournament Lab for internal-only and public-private challenges. The Lab at the Office of Personnel Management (OPM) is an enabling program that builds the capacity of federal employees in human-centered design to support innovation government-wide.

VISION

How can these programs be expanded and how would America benefit? The job of the executive branch is to carry out the mission set forth by the legislative branch. As such, a series of mandates, requirements, or tasks are provided and then the executive branch workers execute work to meet those goals. However, while some tasks are very clear, others are less focused and provide more flexibility in creating solutions. Thus, it is not only important to attend to the specific content goal itself but also the process to achieve it. The solutions can be used as starting points for others and the processes are oftentimes replicable across departments. As such, it is both important to support primary research which creates new solutions to current problems but also to encourage innovative methods for tackling these problems across communities. In other words, **it is not enough to find solutions, we must also optimize how we define and determine the best ways to implement them.** Accordingly, what follows are some examples of both innovative solutions but also methodologies that support implementation. Ultimately, the goal is to tie existing work across the executive branch to the goals set forth by the legislative branch and in key areas affecting the nation while also gathering the innovative methodologies that can be used for replication. Accordingly, what follows are examples of existing programs that are producing answers to current national issues and could inform both solutions as well as act as metholologial examples to replicate.

EDUCATION

Innovative Methodology: Closing the research-practice gap

One of the primary issues facing scientists today is bridging the research-practice gap (Vierling, Schatz, LaFleur, & Lyons, 2018). In short, the gap refers to the space between what scientists discover and what is translated to practitioners, or users, of those findings. Too often, research results are solely, or at least primarily, reported in very long, very detailed documents such that only those intimately knowledgeable about the subject can read, digest, and apply the information.

> **We are now trying to bridge the researcher-practitioner gap because a 200-page document is difficult to navigate even if that's your universe.**
>
> *- Kelly Terpak, Director of the Education Innovation Programs*

Yet, the entire purpose of the research, at least theoretically, is to answer a question identified by those working in the field. **Without connections between those who investigate and those who apply, there is a gap in the communication and therefore a cost in the ability to make use of the scientific advances.** For example, in education, teachers are the primary practitioners but are not always included in the research design or technology development process led by researchers. Thus, delivering research findings to teachers in actionable ways is hindered by a) not considering the differences between working in the field (classroom) versus a laboratory setting and b) not packaging the information in an accessible and usable fashion.

Innovative Solutions:

The Education Innovation Programs office does not just fund research to find more answers, they also ask researchers to re-think the way they get information into the hands of teachers. Activities for supporting information dissemination beyond research reports include creating videos that condense large amounts of information into more accessible and smaller chunks of recommendations. There is also a liaison role that helps directly reduce this gap. **Systems methods that encourage scientists and practitioners to co-create the future will maximize the skills and knowledge of all parts of the system and ultimately create the most effective outcomes.**

Even people experienced in education research need help. We have an evaluation technical assistance provider to help with evaluations and how to address particular problems like attrition that was expected and helping them navigate those evaluations, talk to the implementers, explaining why they need a control group, and how to communicate these issues with the schools and teachers in which they're working.

- Kelly Terpak, Director of the Education Innovation Programs

Innovative Methodology: Multi-community co-creation

A key impediment to co-creating in the military is the sizeable number of goals, rules, and communities that are necessarily involved in achieving effective national defense. No specific group can simply architect the entire system or even influence it past one degree of connection. However, the stability gained by distributed decision making can negatively impact speed, innovation, and the benefits of collaborative work to abate the research-practice gap. Yet the imperative for an agile defense force is encouraging the consideration of improved business practices and a broader range of defense strategies and implications (National Defense Strategy, 2018).

One such consideration is implementing strategies to prepare Americans to enter the military ready for defense education as well as transition to civilian jobs following their time in uniform (Drummond, 2018). These considerations necessitate involvement of communities beyond the immediate defense sphere. Accordingly, the Advanced Distributed Learning Initiative embarked on a design thinking large-scale study that bridges the research-practice gap across multiple public and private sector communities to recognize learning as a life-long endeavor that necessarily includes teachers of all ages, research scientists, technologists, policy writers, defense experts, and employers. The goal was to determine if rapid consensus could be attained across communities and at multiple levels that would result in a nationwide multi-layered, multi-community advancement of the U.S. education system. For the military, the goal is to improve incoming and outgoing service members' capabilities because it improves our ability to attract the best talent and support their continued service to the nation for life. The benefit to the nation is a co-created education system that provides an implementable plan rather than a set of research documents, a technological tool, or a defense-only solution. The benefit to the government is a replicable methodology.

Innovative Solution: The Future Learning Ecosystem

The Future Learning Ecosystem is a system-of-systems concept that supports formal, informal, and nonformal learning using data to inform education decisions. Built on the recognition that **technology is not a teacher but a tool**, this system supports data capture but does not promote technology use over teachers, life experiences, or personal growth. Rather, by allowing any device to connect, or interoperate with other devices across time and space, it promotes a life-long learning model that supports social, emotional, physical, and cognitive

growth using specifications and standards to tag learning experiences that help create personalized pathways.

This "internet for learning" will not only allow us to learn anywhere, anytime, it will create the structure needed to optimize talent development, management, and the combined human-computer system.

Significant technological development has occurred within the Department of Defense, across government, and in industry over the last 20 years. These advancements have created the synergy needed to develop optimized learning solutions that maximize efficiency with heightened effectiveness. This ecosystem brings to bear the work of a significant number of teachers, researchers, technologists, and engineers both within and outside the defense space and requires coordination across both public and private sectors nationally and internationally. A major finding of this work is that so many communities are ready to participate in a wide-scale change and that the benefits of learning science should be used as a guiding force for decision making to promote personalized learning experiences (Walcutt and Schatz, 2019).

HEALTHCARE

Innovative Solutions: Modeling and Simulation

Healthcare cost and delivery are some of the key topics facing the United States today. These same issues are exacerbated within the Veterans Health Administration as they already operate under a universal healthcare model for veterans and their families, which services the largest integrated healthcare system in the world (simlearn.va.gov). Accordingly, they face the same issues that are being discussed regarding a national healthcare system, including cost modeling, treatment advancements, and delivery choices. The system has been focused on advancing the science of medicine and in that area, the U.S. has achieved significant success, but equity of access is now a driving concern and much can be learned from the work being spearheaded by key programs within VHA. Distributed care, including virtual training and virtual treatment, is being tested and implemented within the VHA system with significant success. Located in the world's leading city for modeling and simulation, the VHA has built a state-of-the-art hospital and training center that contains simulators for promoting rapid learning and retention. The Simulation Learning, Education and Research Network

(SimLEARN) National Simulation program can also provide access for continuing education anywhere, anytime through virtual connectivity (simlearn.va.gov). Making access ubiquitous increases opportunities for successful treatment even in remote areas and at a low cost since only one-time development is required but endless repetitions are possible.

Innovative Methodology: Opioid Practitioner Grants

Primary research and practitioner support are some of the main methods for increasing innovation across the nation. To accomplish these goals, federal funds are dispersed to labs, schools, or even law enforcement agencies to empower them to investigate new methods for tackling some of the nation's toughest issues. One example of this is being carried out by the Substance Abuse and Mental Health Services Administration (SAMHSA) under the Department of Health and Human Services (HHS). They are providing state level support through their "State Targeted Response to the Opioid Crisis Grants (Opioid-STR). The Opioid-STR grant program helps states, territories and jurisdictions expand prevention, treatment and recovery support services for individuals with an opioid use disorder" (samsha.gov).

"You can't arrest your way out of this. This is not a situation where we make bad people good; it's a situation where we make sick people well." – Sheriff Dennis M. Lemma, Seminole County, Florida

The state of Florida is one such state taking advantage of this opportunity as it is the most effected state by opioid abuse in the nation (SAMSHA, n.d.). In fact, in 2010, 98% of physicians that dispensed high quantities oxycodone prescriptions came from Florida (Philip, 2017). The severity of impact has been high and has required medical and law enforcement to work together to combat this epidemic. Grants that provide cross-community support can increase the sustainability of solutions.

Innovative Solutions: Telehealth

As we look to the future for healthcare solutions, the legislative branch will discuss and decide on the laws that will govern delivery but within the executive branch, the goal is to find new solutions to a healthcare system that is struggling to meet the needs of the nation at a cost-point commensurate with quality. Accordingly, new methodologies are being employed to create new solutions. *VA Telehealth Services uses health informatics, disease management and telehealth technologies to target care and case management to improve access to care, improving the health of veterans. Telehealth changes the location where health care services are routinely provided. - telehealth.va.gov*

Telehealth allows patients and providers to maximize access to the most talented healthcare staff while saving resources including time, expense, and travel. But it can do more than that. It can help reduce the barrier or fear of testing. It can allow for improved data capture intermittently or continuously without having to be in a hospital and without continuous interruptions to sleep and daily life. It can reduce exposure to unrelated diseases from other patients.

Telehealth is not the answer to improving all healthcare issues but it is a significant tool in a suite of advancements for improving delivery, access, and care quality.

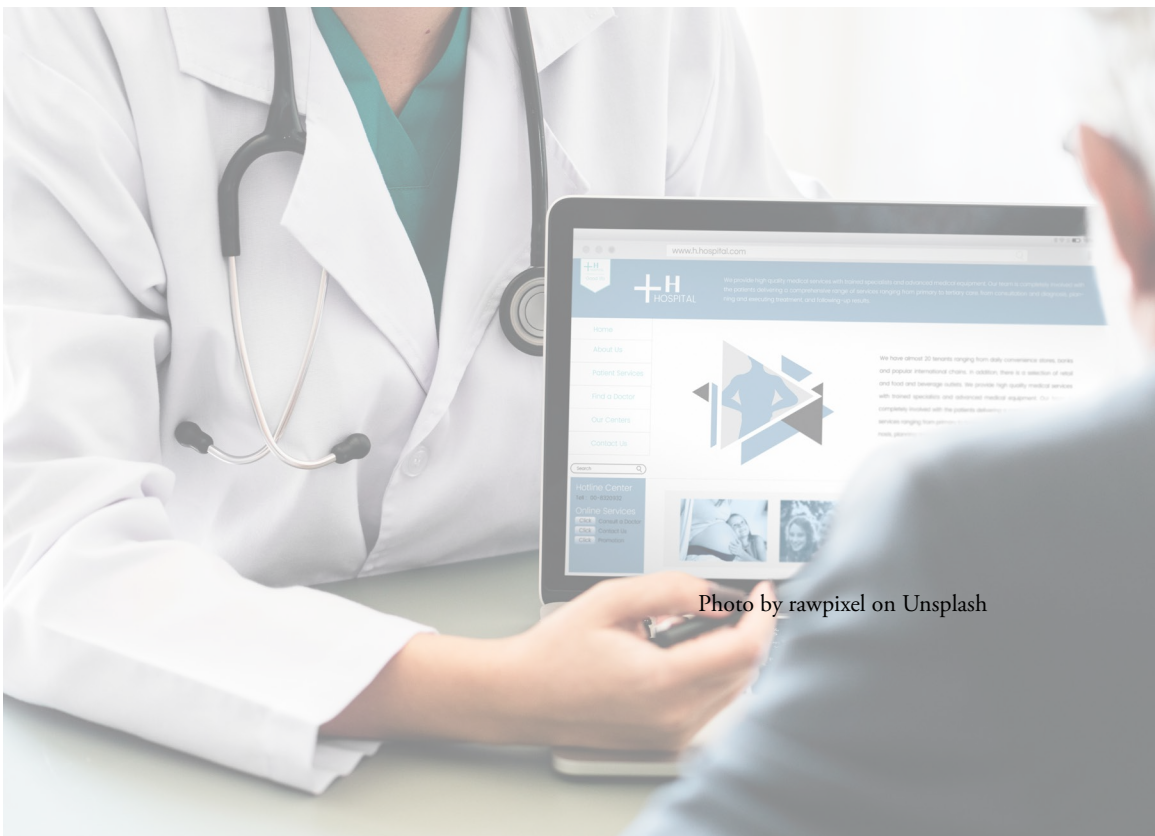


Photo by rawpixel on Unsplash

MILITARY

Innovative solutions: Community challenges and cooperation

MD5 is a defense innovation accelerator that uses hackathons to reach out to the public and bring together thought leaders, fresh perspectives, and different age groups to create new solutions that not only maximize the current outcome but also optimize the system. They capitalize on their connections to universities and other regions across the nation to create a web of experts in this area who can work on not only specific problems but also methods for improving the pipeline. MD5 acts as both an enabler as well as a solution-focused group. More importantly, it acts as a thought leader in the design of future innovation methods (Harrison & Horn, 2015).

The **Defense Innovation Board (DIB)** is one of several independent federal advisory committees advising the Secretary of Defense. The DIB provides sets of recommendations covering three key areas of focus: people and culture; technology and capabilities; and practices and operations. Recommendations are provided by a team of elite subject matter experts across the nation and are intended to provide clear, actionable, high-impact solutions that maximize DoD capabilities and resources. The DIB coordinates with the Defense Innovation Unit (DIU), the Defense Digital Service (DDS), and with individuals (both active duty and civilians) who have innovative ideas and entrepreneurial mindsets. Some key topics include artificial intelligence and machine learning, software workforce capacity building, and acquisition reform (innovation.defense.gov).

The **Navy Enterprise Research and Data Science (NERDS)** team is housed at the Naval Air Warfare Training Systems Division (NAWCTSD) research lab in Orlando, Florida. It employs data scientists with expertise in big data, enterprise data, machine learning, natural language processing, and data visualization. The goal of the NERDS team is to better leverage large data sets to lead to a better understanding of highly-intricate systems. They receive data from an assortment of Navy activities around the world, including aircraft memory units, maintenance records, and pilot self-reporting. Using statistical and analytical tools like Pandas, Tensorflow and SPARK, they extract meaningful information that provides the opportunity to take full advantage of their supercomputer's computational bandwidth. Ultimately, they demonstrate how a bidirectional flow of information between research labs and stakeholders can work together to both identify problems and evaluate solution strategies that optimize all parties' capabilities (Lerma, 2019).

COMMERCE AND JOBS

Innovative Methodology: Connecting solutions across the lifespan

One way to increase employment is to simply create more jobs but as we look to the future, the speed of change will necessitate not only new jobs to be created but new types of workers who can not only operate in the expected chaos of the future but thrive in it. Harvard University has suggested that in the future, we will be expected to have 3-6 careers across our lifetime, not just multiple jobs (Etherington, 2018). Citizens will need to be continuously learning, have new ways to demonstrate their capabilities, and new ways to accumulate competencies. As such, the U.S. Government has taken a more holistic view of developing the future American workforce. Rather than focusing solely on current job creation, additionally addressing the expected problem space using multiple research and prototyping programs and connecting those solutions to create a greater impact now and in the future.

Innovative Solutions: Life-long Learning

At the foundational level, there are several programs investigating life-long learning. National Academy of Sciences recently published How People Learn II (National Academies of Sciences, Engineering, and Medicine (NASEM), 2018) which brings to-date consensus across American learning scientists about human cognitive development but also highlights that the next set of research needs to address life-long learning models. Initial descriptions and research in this area are being published in response. *Modernizing Learning* (Walcutt & Schatz, 2019) is a book being published by the U.S. Government that elucidates not only how the U.S. education system needs to develop young people cognitively in school but also emotionally, physically, and socially as the future workforce will need skills in all these areas to become learners able to acquire new skills continuously.

At the organizational level, several research projects within and outside government are developing competency frameworks that will help clarify what skills future workers will need but also create a new set of communication tools for sharing with employers what capabilities possible employees possess. These capabilities will include information beyond formal education and work experiences to include personality traits, teamwork skills, life experiences, and informal learning. The goal is to better understand people as whole humans in order to better select talent and create teams of talent to solve problems of the

MD5:

There are a lot of different organizations running around the Department right now engaged in innovation activities; so much so that the term "innovation" is becoming a bit of a trope. Although the Department hasn't chosen to organize like this, per se, I think there a few different types of innovation going on. The first is what I'll call **strategic innovation**: the work of making the Department fundamentally better at what it does through improving its processes and people. This includes business reform, one of former Secretary of Defense Jim Mattis' three focus areas during his tenure. Importantly, we don't really mean making it easier to move paper but rather moving at the speed of relevance to deliver solutions to warfighters when they need them. The second type of innovation might rightly be called **technological innovation**: the research and engineering-based work that is seeking out fifth generation, "golden key" technologies that will unlock a competitive advantage for the United States during future conflicts and possess the ability to alter the very nature of war itself. The pursuit of the current Defense Modernization Priorities in technology areas like quantum computing, hypersonics, and ballistic missile defense are all good examples. Both of these kinds of innovation are necessary, but I'd posit that they are also insufficient.

The Venn Diagram of overlapping interests, in terms of technology, ideas, and talent, between the public and private sectors is bigger than it's even been in our nation's history. When you consider it from that perspective, and that fact that most of those talented people don't live within the National Capital Region, there are an awful lot of people, ideas, and talent that the Department of Defense will never be able to fully leverage unless it pursues a third of kind of innovation. It's what I would characterize as **network-driven innovation**: the notion that to get better at problem-solving within the complex world in which we live, we need to introduce new problem-solvers into the Department's thinking and processes. This kind of innovation deliberately seeks to link talented people, organizations, academic institutions, and businesses into a "whole of nation" approach to national security problem-solving that involves as many people from Omaha, Nebraska as it does from McLean, Virginia. This third kind of innovation is, at some level, the hardest to achieve. The Department makes it really difficult for individuals that don't want to sign up for a 20-year career to help solve national security problems. DoD needs to recognize the generational, cultural, and attitudinal gaps that exist between the talent that's out there and the way we currently attract and retain that talent if we're going to maintain a competitive, warfighting advantage. Right now, MD5 is working to trail-blaze this third kind of innovation through discreet problem-solving events like Hacking for Defense (H4D) in college campuses across the country, and will soon engage in the long-term work of building a "bench" of non-traditional innovators that can help the Department solve its problems in new and unique ways across time and space."

– Morgan Plummer, Director MD5

future. **Department of Labor's O*Net** (https://www.onetonline.org/) is a program aimed at defining these competency frameworks to share with the Department of Education to drive educational decisions, Department of Defense to drive talent management decisions, and across the government to improve training programs as well as employment structures to attract and retain the best workers for America. Another program, the **Center for Leadership Development** under OPM adds to these capabilities by focusing on developing these new structures for the federal government and ensuring we maintain an optimized future workforce through improved continuing education opportunities (leadership.opm.gov).

At the strategic level, connectivity outside of government to include both national and international partners is needed. Simply regenerating money within a nation only means we have finite fiscal capabilities but ensuring that our people are competitive internationally creates an infinite employment resource space. As such, the U.S. Government connects with the **U.S. Chamber of Commerce Foundation's T3 Innovation program** helping businesses transition to competency-based hiring and sharing those frameworks across the nation, the military, and with higher education so the system can more seamlessly transition workers through these communities (U.S. Chamber of Commerce Foundation, 2018). Internationally, the **Office of Commercial and Business Affairs (CBA)** in the State Department is helping create workers who can not only be effective in our own country but also compete around the globe to generate increased revenue for the nation.

ENVIRONMENT

Innovative Solution: Basic Research

Innovation at the **Environmental Protection Agency (EPA)** is focused on funding deep, forward-thinking basic and applied research for air, land, and water protection and improvement. Areas of recent focus include immobilization technology for lead and arsenic co-contaminated soils, bioremediation in Zebrafish, flooding impacts on superfund sites, developmental neurotoxicity, and identification and removal of toxics from water (epa.gov/innovation). Additionally, the **Department of the Interior** is more broadly focused on applied solutions. Methodologically, a tiered approach to ensuring innovation for the environment has been developed. Data is being collected and displayed through the Environmental Justice Screening and Mapping Tool aimed at providing the public and legislators information about the quality of the air, land, and water across the nation (epa.gov/ejscreen). Coordination across internal groups

working in this area is accomplished through the Federal Interagency Working Group on Environmental Justice. Grassroots efforts are being supported through the myScience program that collects information about citizen-driven science projects (txpub.usgs.gov/myscience).

BENEFITS TO PUBLIC SECTOR

The building blocks of innovation have been created across the federal government. There is extensive work happening at every level to include content-specific basic and applied research but also enabling programs for supporting a **culture of innovation** and connecting programs to citizen-led research projects, national experts in every focus area, and international programs to ensure Americans benefit from the entire global market. However, these programs most typically work independently making the next step for the executive branch to involve strategic planning for an optimized network for innovation.

Freedom and diversity of thought and focus combined with community collaboration offer the best opportunity for optimizing national solutions. Thus, a U.S. network of innovation would create a seamless transition of information, aiding the future workforce, optimizing healthcare capabilities, and supporting an agile military. Combined, these advancements create ...

a ready nation.

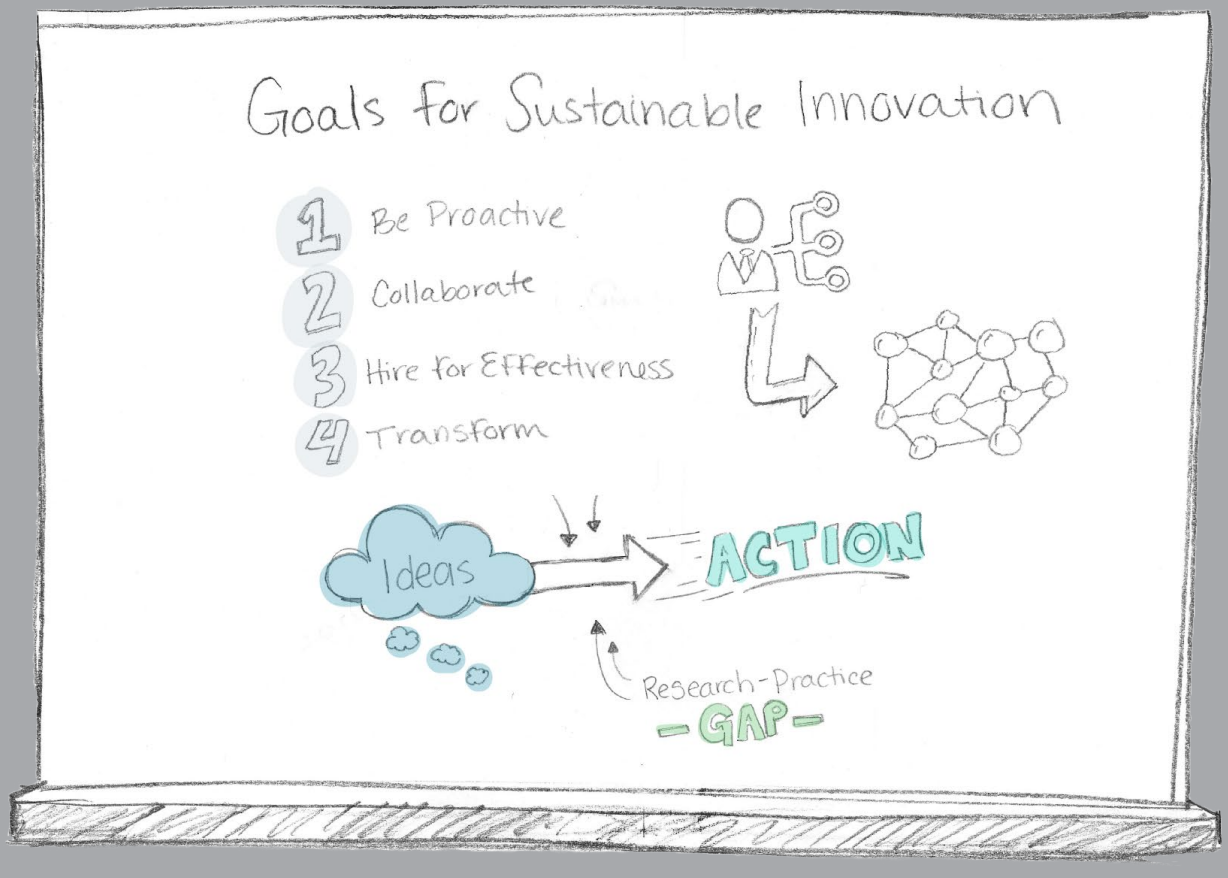
PUBLIC SECTOR INNOVATION

Enrique Martinez
Dr. J.J. Walcutt

SUMMARY

To optimize the network of these individual innovation initiatives, we must first understand the unique challenges faced by public sector programs because these differences lead to important questions. How can we create a culture of innovation rather than focusing on innovation as a task? How can public sector employees work together while still respecting their required departmental boundaries? How can they feel both empowered and fulfilled by their jobs while still respecting the rigid hierarchy of decision making in the government? How do we find clarity within such ambiguity? This chapter responds to these questions by providing a foundational platform on which to build a new set of ideas for connecting innovation programs across the federal government. It further defines initial tools that can be used to create the pathway to sustained innovation needed to meet the growing requirements to respect fiscal constraints while simultaneously producing effective solutions for the nation.

With the capability to connect across time and space comes the ability to coordinate, collaborate, and co-create



BACKGROUND

Innovation Today

While the earlier review of the country's history and current efforts quickly highlights a number of impressive milestones, from putting a man on the moon to the Hoover Dam to almost all the components that make up smartphones, the development of these types of advances is not the daily experience for most federal employees. Instead, the majority spend their days expending their imaginative facets on creatively navigating red tape on tasks that appear more mundane. But these actions do the important work of maintaining progress in order to deliver products and services to the people that their programs and agencies serve. This is vital and surprisingly imaginative work, but it is not the flashy genius that most conceive creativity to be. Unfortunately, only 31% of the 485,000 federal employees who responded to the 2017 Federal Employee Viewpoint Survey (FEVS) believe that "creativity and innovation are rewarded" in the federal workforce. Nonetheless, 91% of respondents also indicated that they are constantly looking for ways to do their job better. Looking forward, figuring out how government employees at all levels can better access the lessons learned and best practices of the innovation methodologies driving the country's achievements is necessary to making the entire government more responsive to the external factors affecting society.

Secretary of Defense Ash Carter speaks with members of the Defense Innovation Board during the board's first public meeting Oct. 5, 2016, at the Pentagon in Washington, D.C. (DoD photo by U.S. Air Force Tech. Sgt. Brigitte N. Brantley) No changes were made.

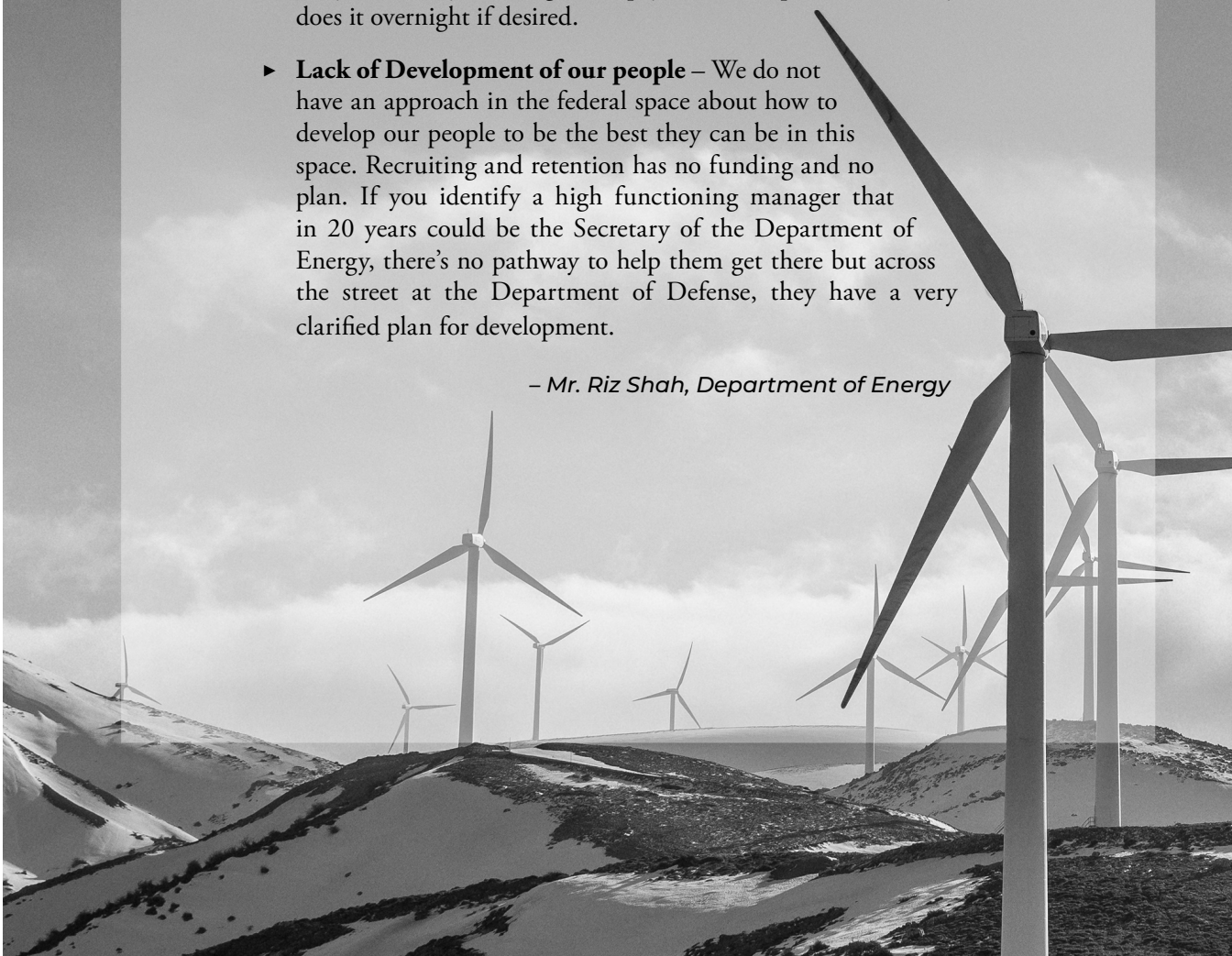
What Hinders Innovation? An Employee's Perspective

- **Policy** – We're not driven by increasing the bottom line. We're talking about revolution, not evolution. We're talking about innovation yet we operate based on compliance so policy is our biggest process. In a corporation, they make an idea, vote by the board and they are off and running. But in Government, our strategic documents, how long will it be before they trickle down to the lowest levels? And then the folks in charge, will say they are already developing the people so we have to look at the framework and think about how we develop those policies.

- **Bureaucracy** – The federal government is a bureaucracy so we have a different business model and it allows you to operate better if you have that situational awareness. For example, changes aren't going to happen overnight so if you think people should be paid better, it's a 2-5 year activity to change their pay bands compared to industry who does it overnight if desired.

- **Lack of Development of our people** – We do not have an approach in the federal space about how to develop our people to be the best they can be in this space. Recruiting and retention has no funding and no plan. If you identify a high functioning manager that in 20 years could be the Secretary of the Department of Energy, there's no pathway to help them get there but across the street at the Department of Defense, they have a very clarified plan for development.

– Mr. Riz Shah, Department of Energy



There are three key differences between public and private sector innovation: goals, focus, and control. In a private business, the goal is to generate revenue, and to do that, the company has to sell something – a widget, a process, or a capability. To meet that goal, they must hire individuals with the skills, interest, and drive to provide the best ideas and solutions to the company. In the public sector, however, the goal is to support the nation at the highest strategic level of planning. Particularly, the goal is to focus forward and prepare for the future. But since the government is accountable to the voting public, it must be requirements-driven and risk-averse. It must also control how information flows and who is empowered to share it. These constraints inadvertently create challenges for achieving innovation across the departments. To break this cycle, we must first understand the system architecture, challenges, and initial attempts to create change. **It is ironic how a system intended to protect a standard for society, can also inadvertently slow innovation. Finding the balance is necessary to ensure progress with wisdom.**

Strategic goals vs. fiscal goals

The first difference is that public sector goals are strategic and serve the nation's interests whereas private sector goals focus on profit and market share. In the private sector, since the goal of a company is to make money, the goal of innovation necessarily is to create products, ideas, or interventions that will convince consumers to pay for what they are selling. However, in the public sector, the goal is to create opportunities to support Americans across the nation. At this level, there are a significant number of considerations that must be observed to include the current needs of the nation, Congress's requirements and mandates, and the President's platform and strategic vision. Additionally, equality, equity, and fairness must be observed to ensure advantages are not inadvertently given to certain groups, companies, or industries (acquisition.gov). With a population of nearly 326 million, where everyone is a paying "customer," providing what everyone believes should be provided is extremely difficult. Therefore, the public sector is accountable to a wider constituency (its citizens, interest groups, and other organizations for example) than private sector organizations that answer

The government's job is to provide governance through policy and opportunities for Americans through collaboration and partnerships. Ultimately, the goal is to define the national vision of the future and architect the pathway to get there.

primarily to their investors and board of directors. One direct consequence of this difference is that public sector organizations tolerate higher thresholds of inefficiency in their systems.

Requirements-driven vs. Market-driven

The second difference is seen in how decision making for resource allocation and activity planning occurs. In the public sector, the President and his or her cabinet create the strategic vision for the nation every four years. This vision is used to clarify and justify the writing of the U.S. budget which the Congress can approve as-is or modify. Based on this approval process, requirements are then provided to each department and trickle down to each office and eventually to each executive branch worker. Through this process, tasking is assigned and accordingly, employees are required to fulfill the assigned tasks. The system appears efficient at the surface but **when individual task outcomes aren't coordinated, it is expected that many solutions will work only for one program or department.** Generalizability of solutions is hindered. Further, if a solution already exists, the person receiving the mandate to complete the requirement is unlikely to know of this solution created by a different office or department and therefore is, by design, left to develop yet another solution to a related problem already solved. With 2.4 million executive branch workers, **knowledge sharing is a challenge in a perfectly aligned system but grossly problematic and costly in an inefficient stove-piped structure.** Conversely, private sector companies are able to create, and more importantly change, reporting and planning structures as the market demands. Their continued existence is predicated on the need to constantly evolve at the pace of change and thus, private sector businesses either adjust or fall out of the market. The act of competition inherently drives efficiency and excellence that cannot be easily replicated in the public sector.

Freedom to hire, recommend solutions, and collaborate

Finally, hiring practices, multi-directional flow of information, and collaboration are areas that deserve considerable attention when trying to create a culture of innovation across government. Specifically, the inability to hire based on need and in a timely manner can result in significant losses of possibly impactful personnel. The lack of ability to share information up the chain, across the departments and to Congress means that employees are always being tasked but rarely effectively able to send information the other direction. Accordingly, the ability to optimize solutions is hindered. Collaboration is necessary but with so many rules in place to be requirements-focused, sharing of information is a challenge.

Hiring Freedom

In the public sector, there are limitations in place where organizations cannot hire anyone on an as-needed basis and the hiring process is very long (it takes an average of 106 days to complete; Ogrysko, 2018). Then once hired, an individual cannot be removed easily or quickly, resulting in a constrained workforce (Aitoro, 2015). While this may be a hindrance on the one hand, it exists because there is a lot of institutional knowledge across time and depth of expertise required to maintain stability within the government. Still, it makes it difficult to gain the same level of capabilities in newer or emerging fields. A person cannot be hired simply for their expertise; rather, they must be hired for a particular task or position. To address this issue, contractors are often used but this method comes with its own challenges. The contracted workers are several-steps removed from the government because they work for other companies and those companies may work for yet other companies. As contractors, there is no guarantee of continued work and as such, there is a cost in buy-in, loyalty, and high-level mission focus. Again, **there is a significant separation from personal needs and mission goals and with that, comes the cost of true investment.** In the private sector, if there is a need for a particular skill or capability, once a job description is developed, a person can be hired. Private sector companies can also hire someone they deem particularly skilled and then develop a position simply because they value the thought process or leadership of that person. This concept is not exercised throughout every layer in government, though it is allowed at the highest levels and is being tested in other expert areas and labs. Yet with this option comes the ability to differentially hire and thus begins the fairness questioning cycle. Constraints exist for a reason but can also hinder speed and progress.

Recommending Solutions

Another freedom in the private sector is the ability to recommend solutions. This allows for both a top-down and a bottom-up approach to be used simultaneously. Ultimately, this communication structure is expected to result in better outcomes because **when both strategic and tactical personnel work together, there is a blend of needs and capabilities.** In government, mandates come from Congress. The positive side of this is that since federal workers are supposed to be experts, the actual tactical activities of the legislation, how they will be carried out, are conducted by experts in the domain, which is the theory behind the bureaucracy. They will interpret the legislation and design programs with their knowledge of best practices from the field. However, there is minimal to no sharing of

information between executive branch workers and Congress, leaving both parties guessing what the other needs or wants. It also means Congress isn't aware of what the workers are capable of, inevitably leading to the stove-piping of outcomes. Since Congress does not clarify the overall vision for any requirement to the individuals working on the task, executive branch workers' ability to determine holistic solutions are hampered and they are forced to provide piecemeal answers. **It is the structure, not the people, that creates issues.**

Collaboration

Finally, as executive branch workers are hired to conduct specific tasks rather than to achieve an overarching goal, there are few resources set aside for the transition activities to ensure the goals are met, let alone allowing time for collaborative space. How do employees justify attending a meeting that does not exactly pertain to their current project? How do they justify travel to a conference that influences their thinking but does not answer a specific task in their program or project? How do they justify travel for meetings, discussions, and face-to-face activities unless they can point to an outcome that will directly make a decision or provide a widget for their project? The answer is, they do not. Silos of expertise leads to a cautionary tale related to collaboration. In today's world, when problems are increasingly complex, no one office or area of expertise can solve it all. The different parts of the federal government need each other, and they need to see each other as partners and collaborators in this work. Too often, the way that legislation is written, it keeps people to their silos and doesn't encourage them to work across communities' areas of expertise.

The Federal Government's challenges have not arisen in isolation, and it cannot solve them through isolated efforts. To really get traction on these complex and interconnected challenges, broader, system-level thinking is needed to tackle interconnected barriers to change.

– President's Management Agenda, 2018, p.23

GOAL

The goal of public sector work is to ensure the best possible ideas for the nation are benefitting the country at the strategic level. To achieve that, **we must create sustainable innovation because it allows solutions to continuously evolve according to national needs**. In the executive

branch, we are challenging the historical system, questioning how we have always worked, and reviewing the stated and unstated rules to identify ways to "extend the lines outside the box." Innovation-focused workers are not hired to be the same, they are hired to challenge the system. But they need to know and have a critical respect for the system and the bureaucracy to understand the levers that are available for change. The system will not be overthrown, but how can we reinterpret and embody its purpose for the current and future needs of the country? America is demanding the best outcomes for tax payer dollars and that requires the federal government to constantly bring new ideas, new pathways, and innovative thinking. So how do we get started? What methods should we employ?

What are the rules within which we must operate and yet what are the places where employees can be empowered to think differently? We can't approach the problem space the same way others have. We can't ask the same questions; we have to remember to stand out, to question, to think, to act.

It is a daunting concept to re-imagine the executive branch of the government, an ambiguous environment to be sure, so the question becomes, "How do we tackle such a large problem space?" The first task is to define the goal. The second task is to reconsider the problem space, approaching it from different angles. More specifically, it means developing innovation groups within each department that are tasked to highlight, investigate, and test new processes and ideas. Third, there needs to be a clear and regular communication pathway between these groups to ensure complementary sharing to reduce overlapped efforts. To support these goals, hiring practices, employment options, and sharing information and recommendations with the legislative branch must be re-considered. But to maximize impact, innovation cannot stop at the task-based tactical level of operations. Rather, it must be applied to all strata of the executive branch, from the position of the President to The Cabinet to the Senior Executive Service to the O6 and GS15 levels and must necessarily include outreach to the American public as well as our international partners.

Think outside the box:

The expression think outside the box comes from the nine dots puzzle, a lateral thinking exercise from the 1970s. This puzzle challenges the player to connect nine dots with four straight lines without lifting the pen from the paper. Because any straight line can only connect a maximum of three dots, there is always one dot left unconnected after the fourth line is drawn, no matter where the player starts or which order she follows in tracing the lines. The solution to the puzzle is to extend three of the four lines outside of the boundaries of the nine-dot area. You have to think outside the nine-dot area, and this is where the expression think outside the box comes from.

Here's what's important about this: the possibility of extending the lines outside of the nine-dot area is neither allowed nor denied explicitly when the problem is presented to the player: nobody tells the player that she can or can not extend the lines outside of the nine-dot area. To succeed in solving the puzzle, the player has to question the problem definition as it is presented and assume that it is ambiguous and open to interpretation. This is what I call positive ambiguity: the player engaged in solving the nine dots puzzle must realize that not knowing if something is allowed does not imply it is not.

– Mr. Enrique Martínez, Federal Executive Institute, Center for Leadership Development; Office of Personnel Management

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VISION: SUSTAINABLE INNOVATION

Task 1: Define the goal

The goal is to stimulate an innovative environment. Thus, the first step in creating sustainable innovation in government is to unlearn what we know and question the legacy system. It is often claimed that something cannot be done because it has not ever happened in the past. However, if we look at something from a fresh perspective, or if we have new capabilities like those gained through technology and human interoperability, we can unlearn the past and press forward with new ideas and new solutions. The second step is to build trust among stakeholders -not just a few friendly stakeholders, but a broad range- to build a foundation for influencing the skeptics. The third step is to develop a shared vision, one in which everyone buys into. While it is possible to accomplish some short-term wins without this, if we want to create a sustainable culture of innovation, we need a shared vision. Finally, this vision needs to clarify that innovation will only succeed if it is a long-term, flexible proposition. Long-term because it is a complex process that doesn't happen quickly; flexible, because if it is meant to be a fundamental part of government, it needs to be self-sustaining.

Task 2: Reconsider the Problem Space

To unlearn the past, build trust, and develop a shared vision, we must first identify key constraints, rules, tendencies, and systemic practices that may support or hinder innovation. By better understanding the system, we improve our ability to understand where there are key advantages and where changes may be warranted. Also, by conducting a full review of the system, we increase the likelihood that the changes will be influential at the strategic rather than local level.

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Current System

1. **Power Structure:** One of the biggest differences in the executive branch from businesses is the definition of power. Even though it often seems this way on the inside, power does not derive from how much money one controls or even by the position one holds. Power is instilled in all civil servants by the American people. This is a recognition that warrants consideration because if not, when issues arise, we run the risk of individuals shedding responsibility of outcomes. Yet at the same time, with only a small amount of information provided, many employees are not able to fully understand the greater strategic goals. The question becomes: How do we provide the larger picture to our workers and empower them to view themselves as a piece of the total puzzle? They may not have the power to control everything, but they can better influence the greater picture if provided a full view.

2. **Bureaucracy:** While there is a good reason for it: bureaucracy ensures no single person can make major changes without agreement from many others, when it goes wrong, it also means no one is responsible for large outcomes. So how do we support the positive goals while avoiding the responsibility trap? How do we increase efficiency across the federal government? The answer is to connect our efforts. Government workers are all individuals but operate within a collective. They are an interdependent web of workers, and their actions affect others. It is necessary to recognize not only what each department or office can do but also how the connection to the office next to them and their connection to the office next to them creates a chain of synergy. Centralizing power leaves one person or a small group responsible for all decisions. It creates a bottle-neck for throughput that, by design, limits outcomes. By creating connected chains of distributed decision making power and throughput, we would be able to capitalize on the extensive web of expertise, experience, and capabilities throughout the executive branch.

3. **Efficiency:** It is frequently depicted in pop-culture, the lowly government worker building an expensive hammer and moving too slowly to be useful. Yet, in actuality, **the government attracts very dedicated and talented experts across the nation.** Thus, it is not the workers that are the issue, but rather the system. The bureaucracy can be stifling to even the best and the brightest making inefficiency a common complaint and concern within the American public (U.S. Government Accountability Office, 2018). Given the required bureaucracy in the private sector and the requirement to work within a significantly intellectually and physically-constrained environment, retaining these highly skilled employees can be challenging. So, the question becomes, how do we retain brilliance and encourage creativity in the public sector? How do we improve talent management? It is necessary to help workers clarify their individual strengths because if we do not then a) there are reduced feelings of value at work and b) solution-building suffers. There is a set of requirements that defines every job in the government, but beyond that, there are unique aspects of each employee so we need to

encourage them to use their brilliance and empower them to share it because whatever that nugget of greatness is, it means they can do their job just that much better because they are the one doing it. Encouraging ownership at work can have a positive impact on job performance (Brown, Crossley, & Robinson, 2014).

4. **Accessibility of learning opportunities:** How do executive branch workers respect the government rules and still expand their minds and work experiences? One way to achieve this goal is to become an active learner. The problem for government is a) how do we justify to the tax payer the need to support personal learning experiences and b) if we do not, how do we attract and maintain the highest capability workforce? As the world of work is evolving, it is becoming part of Americans' personal identities and life experiences rather than a means to an end. As such, if employment is not personally meaningful or nationally relevant – if they do not feel like they are making a difference but instead just acting as a cog in a wheel - **then attrition is predictable and especially from the most innovative thinkers.** We need to consider making it part of our mission to help executive branch employees gather as much information as they can through their careers and create personal webs of knowledge because when their mental models are rich in structure and complex in nature, they will be able to make the very best decisions, know who to connect to, and what information they need to press forward. We need them to be ready to learn every day.

5. **Problem solving:** Stove-piped problem solving is a common issue within top-down, hierarchical structures. But how do we get away from one-off solutions? How do we reframe our minds to be focused on holistic solutions that affect root causes? Perhaps we need to focus forward and solve not only for today but also solve for tomorrow. As a nation, we have traditionally focused on reacting to problems in our societies. We need to make policy and take actions that not only help individuals and groups that are struggling today but we should also diagnose what led us to this point in the first place. Then we need to use that diagnosis to clarify what policy or actions need to be taken to ensure that it doesn't continue to repeat. We need to transform from being reactive to being proactive.

Diversity is a force multiplier.

- Lt. Gen. Silveria, Superintendent, U.S. Air Force Academy

6. **Decision making:** Groups often fail to make good decisions because members silence themselves to 'follow the leader' or bow to social pressure (Sunstein & Hastie, 2015). This is perpetuated within extensive bureaucracies. So how do we create improved decision-making across the federal government? **Valuing diversity and creativity creates the best opportunity for success**. Diversity refers to differences in thought, experience, background, interest, personal attributes, and skills. Creativity refers to the ways in which we approach problem solving. It is factually the case that when

> everyone in the room believes the same and thinks the same, a singular, predictable outcome will result. And on the average, that singular point of view will produce a solution inferior to what a diverse creative team can create. In the exercise of disagreement, the best answer will rise to the top and not only that, but it will be enhanced by the gestalt of the system. No country anywhere has the level of diversity and focus on creativity that ours does.

Task 3: Share Innovation Resources and Knowledge

While it is always wise to learn from one's mistakes, it is even better when we can learn from others.

Two benefits are achieved when resources are shared. The first is obvious and easily measurable because when we expand existing programs or repeat with small adjustments methods or projects, cost-savings is clear. When we reuse technology or other apparatus, the same savings is evident. Additionally, however, knowledge sharing can be extremely beneficial at both achieving fiscal savings but also improved effectiveness in spite of the difficulty in calculating return on investment. Sharing intellectual resources can help programs avoid pitfalls, identify better outcomes for their own project, and increase the capability of forming connected, mutually supporting deliverables. The long-term implication of such connections may not be immediately measurable but as technology and other solutions improve, making single adjustments that update an entire system is significantly more efficient.

IMPLEMENTATION PLAN

Now that we understand, theoretically, the goals, how do we implement change? It is not enough to generate ideas, we must also take action.

1. Strategic Focus

To create wide-scale change, we would need to ensure that innovation is a key part of the nation's overall strategy and vision. There are several strategic documents developed by each administration at the presidential and cabinet levels. However, in this case, we are referring to the over-arching goal of the executive branch. During elections, it is often the focus of the public to assess potential candidates based on their tie to a particular platform. **However, the role of the executive branch is to provide support to the American people in the form of opportunities, access, and the benefits of national connectivity.** The legislative branch is the law-making arm of the government and as such, is

focused on the issues of today. The executive branch provides strategic vision and architects the systems – to include human, technical, and defense assets, that will lead our nation into the future and prepare us for not-yet-seen obstacles. Thus, **the first step to creating a nation that capitalizes on innovation is to ensure that the country and the government workers are clearly aligned with a national vision that ensures our nation is ready for the future.** This will help to understand the goals of each department, each innovation sector, and ultimately, how the executive branch interacts with the American people as well as internationally. To prioritize innovation:

- Establish clear innovation objectives, goals, milestones, and metrics to include short, midterm and long-term objectives
- Align acquisition processes to allocate necessary innovation resources to key areas (human resources, capital, technology)

2. Foster a culture of collaboration

Government does not have the resources or capabilities to create and deliver everything the nation needs. Rather, the executive branch's job is to be the coordinating unit that identifies best practices, methods, and ideas that can help support the strategic goal of national capabilities and readiness. Thus, the second step in this transformational process is to promote collaboration. This comes in several different forms. First is the transition to placing explicit value on collaboration. At present, we value fulfilling requirements in a singular fashion. Rather, we would need to consider focusing on the overarching goals and then find ways to combine resources across departments to answer those strategic goals together. This would naturally require designated spaces to collaborate. Best practices to encourage collaboration could include:

- Encourage the wider workforce to initiate and implement innovative ideas without fear of failure (For example, by creating innovation lab spaces for testing ideas to increase psychological safety for experimentation)
- Empower workforce members who originate and promote innovation by delegating decision making to these thought leaders
- Promote a culture of learning and training
- Define and measure input/output metrics to provide incentives for developing innovative ideas

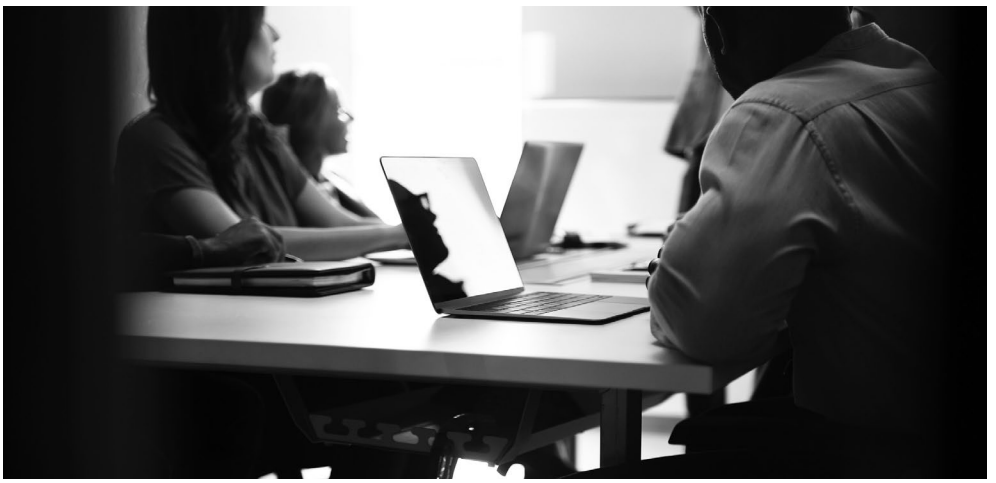
We could encourage collaboration by enabling our workforce to engage with one another via all available means, digital, virtual, and when needed, face-to-face. This would necessarily require both refining approval processes and authorities in order to encourage these meetings and allow for streamlining and rapid response to collaborative requests across the whole of government. Finally, we would need to capitalize on partnerships –individually, academically, across industry, and internationally.

Collaboration and Innovation:

Two key observations across government with regard to collaboration and innovation:

1. The use of cloud technology has really helped. We're starting to see an impact because it's really pushed everyone's minds outside their own silos. From the physical point of view it's pushed them to share
2. The data act also helped push everyone to act very quickly and ultimately everyone complied to bring about transparency in reporting and advances in how we report visually. You can now go to the website and as a citizen you can query and find information about government spending

– *Mr. Marshall Henry, Program Manager of the Office of Financial Innovation and Transformation (FIT), Department of Treasury*



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3. Hire for effectiveness

Talent management is tricky business in a system as large and focused as the U.S. Government. We have competitive service employees, who are considered full-time federal employees, and temporary employees that come to government on rotation, for instance, for a period of 6 months to 1 year. We have Presidential Management Fellows, Human Innovation Fellows, Interns, and Adjunct Faculty members, etc. But public sector hiring is not an action/reaction situation such as: let's hire 4 more people this month. It is a way that has been shaped by an intent to maintain a stable workforce. In the past, when Americans desired long-term positions, this made sense. However, workers of the future will demand flexibility, purpose, and personalized experiences. Attracting and retaining an effective workforce will require the government to adjust these employment practices.

4. Transform initial actions into sustained change

Government innovation is a bit like infrastructure: it is a long-term proposition that is necessary for things to be better, but not necessarily visible or present. We take infrastructure for granted: when we drive on the highway, for instance, we never think about the highway system, or the highway itself, a costly but necessary infrastructure that enables us to travel. Thus, we need to continuously question and challenge the system. **The greatness of our nation should be displayed in every department we have.** Recommendations include:

- Foster the ability to share innovation practices between government departments and agencies. For example, many government agencies are saddled with stove-piped technology systems that exacerbate problems of communication between cross-functional operations and processes. Bridging technology gaps between organizations could enable collaboration.

- Incorporate learning into the agency's long-term innovation strategy. Instill a culture of learning to give individuals confidence in their abilities and incubate innovative ideas. Extend and share programs being developed to make learning accessible and shareable.

CONCLUSIONS

The executive branch is a meta-system of hierarchical sub-systems, developed initially to streamline communication and ensure efficiency across an enormous workforce. However, with the maturity of technological capabilities, not only is data interoperability possible but so too is enhanced human interoperability. With these advances, a full review, from the human and organizational perspective, is warranted to better clarify what is working, what can be imagined, and paint a picture of a possible pathway to get there. Additionally, as fiscal constraints become more pronounced and Americans' expectations continue to grow, it becomes necessary to use innovative methods, practices, and tools to address both current and future needs of the nation. With access to data comes the ability to make more informed decisions. With the capability to connect across time and space, comes the ability to coordinate, collaborate, and co-create. The future of the executive branch structure is at a pivotal juncture and warrants review.

The first step in a redesign project is to understand the process needed to ensure we tackle the right issues with the right solutions. What methods, existing programs, and personnel can help?

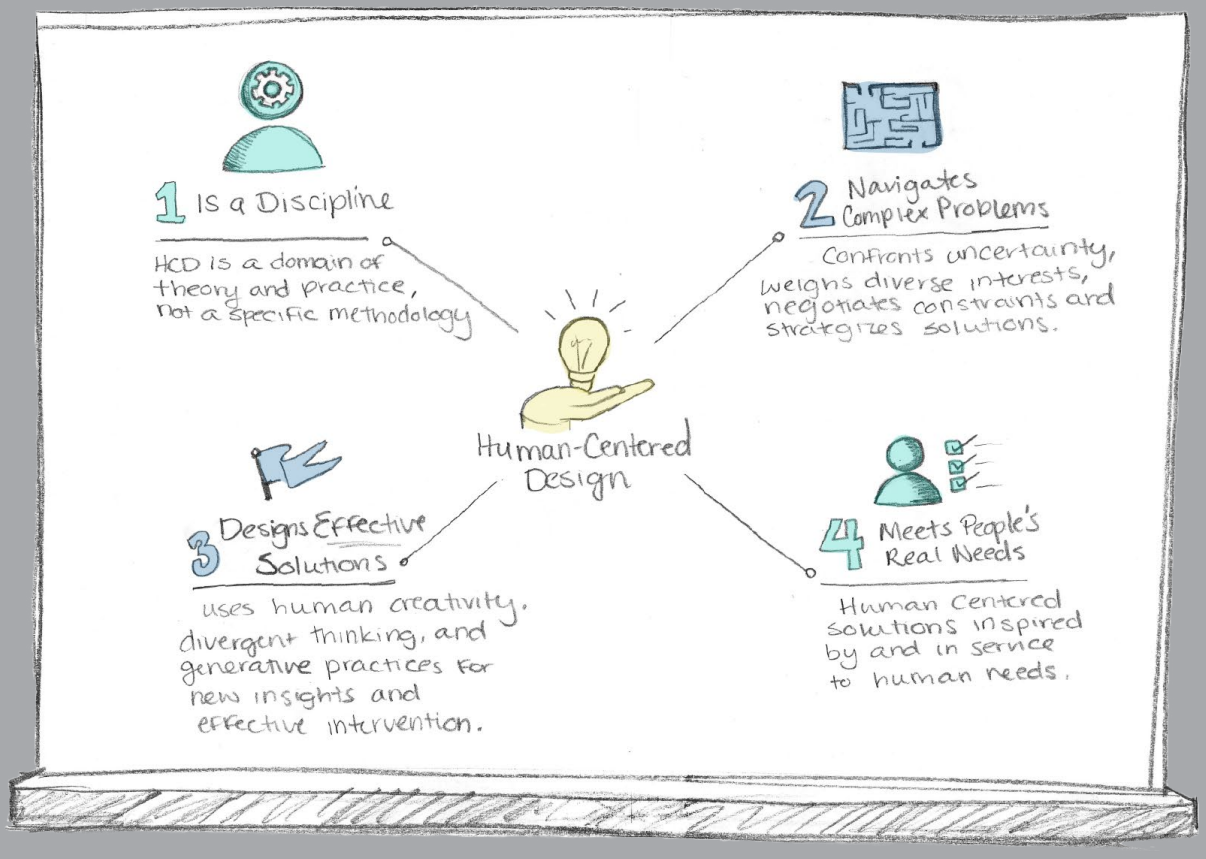
4

HUMAN CENTERED DESIGN

SUMMARY

In order to begin this process of transformation, there first has to be a guiding force that enables change. Humans are inherently aversive to changing behaviors and when we are trying to create a full-scale culture change across an organization as large and diverse as the executive branch of the U.S. Government, the task can be daunting. Thus, the first step in this process is to consider the space from the human, or user, perspective. As we better understand the process of using human centered design, we can apply these processes across the governmental systems to co-create the pathways for sustained change.

Navigating complex problems and creatively designing effective solutions to meet people's real needs



You don't choose which challenges come to your desk. You do decide how to respond

-George W. Bush

INTRODUCTION

The world is becoming increasingly complex and fast moving. As it changes, the government often struggles to keep up. Yet, that was by design. The founders of the United States deliberately devised this system of government to ensure that its political institutions would limit size and reach and make it difficult to mobilize. They believed this would protect American citizens from the abuses of power that they and others found back in their home countries. However, it also created an entrenched bureaucracy which makes it difficult for public servants to create and implement much needed changes.

The administrative agencies that make up the executive branch are often perceived as impersonal and formalistic, mindless groups responding to the tasks at-hand as dictated by rules and red tape. Yet, in reality, bureaucracies, and the people who work within them, have some leeway in figuring out how to administer, implement, or regulate the policies placed on their desks by Congress. As a result, a bureaucracy's real challenge is how best to do its job. For years now, in trying to figure that out, government has been borrowing successful practices from the private sector. One of those practices is human-centered design. Human-centered design is hard to explain and best learned by doing. This is because it is an emerging field for which no singular definition or unified theory currently exists. There are many design researchers, theorists, and practitioners who have sometimes similar, but often differing views of the field. Still, it has begun to develop a shared language and continues to have a growing presence across sectors around the world. With that shared language in mind, human-centered design is considered by many to be **a creative and strategic approach to solving challenging problems**. It blends together design, strategy, qualitative research, and

entrepreneurial thinking. The method puts people at the center of the process, taking into account their complex behaviors, mental models, and needs.

By using this approach to problem solving, root causes of problems are identified and addressed, rather than the symptoms.

The discipline of human-centered design quickly generates ideas and tests new prototypes that meet the true needs of the people with or for whom solutions are being designed. As a result, impactful and sustainable solutions are created and implemented. As the popularity of human-centered design has grown, so too have the questions related to its value. The earliest report done on the subject was by the Design Council, an industry advocate and advisor to the United Kingdom government, in 2005. It conducted a longitudinal study from 1994 to 2004 called the Design Index. It found that those **companies that invested in design performed up to 200% better** than all of the largest Fortune 100 companies found on the London Stock Exchange. It also found that those same companies were more stable over time, as the market dipped and peaked over the decade of investigation (O'Grady & O'Grady, 2009). In the United States, a similar study was conducted, called the The dmi:Design Value Index. The Design Management Institute and Motiv Strategies performed this research with their first edition published in 2013 (DMI, 2015a). Their index looks specifically at a number of organizations that they consider to be design-centric, meaning that they meet a set of six criteria, and how they fare against the S&P 500 over the course of ten years. In its most recent report, which looks at 2005 to 2015, it revealed that the set of 16 design-centric organizations "had a return of over 211% over the S&P 500" (DMI, 2015b).

Since then, McKinsey has created and put out their own version. In their iteration, called the McKinsey Design Index, they too found that those using design continue to have business success at rates higher than their non-design-centric competitors. Still, more interesting and probably more important for this book, is the fact that success of design-centric organizations cut across the three sectors in which McKinsey investigated. As a result, McKinsey contends that "good design matters whether your company focuses on physical goods, digital products, services, or some combination of those" (Sheppard, et al., 2018). Interestingly, the government's vast mission touches each of those areas as well. So, in turn, this chapter endeavors to share what human-centered design is and what its practices could mean for the U.S. Government.

BACKGROUND

Humans are natural designers. We have been crafting and improving things for as long as our big brains and opposable thumbs have allowed for it. At first, our designs helped us to survive. As time wore on, it permitted us to thrive. Our creativity and ability to design and create leant itself to great achievement in the fine arts, but also to commercial craft and technological development. While creativity is innately human, it has long been a mystery. There are some specific methods for making certain things, but these are normally gleaned from experience. While there have been many years of research on key enablers and environmental considerations, there is no universal or scientific method to turn to for any project. Creativity and making have been largely seen as artsy and ad hoc.

Thus, industry and commerce created the imperative to define more reliable and repeatable processes for developing novel, desirable goods for mass production. This accelerated the standardization of design methods into specialized vocations and drove the search for generalizable principles of design. Human-centered design is a continuation of this early work to master and manage human creativity to meet ever-changing needs. It has become decoupled from specialization and inclusive of all those who are looking to create lasting value or meaningful **change in our increasingly complex, dynamic, and interconnected world.**

HCD in the Public Sector

While human-centered design has been practiced in the private sector for quite some time, it has only recently been employed in the federal government. Yet, it is not new to the public sector context. In fact, governments in Europe have been using HCD to improve government programs and practices for years. MindLab, founded in 2002 in Denmark, was one of the earliest public-sector innovation labs that focused on using human-centered design to improve the way the government delivered its work (Hermosilla, 2016). It was a governmental office that was funded by the three different Danish agencies: Ministry of Industry, Business, and Financial Affairs, Ministry of Employment, and Ministry of Education. The use of HCD remains widespread today in the public and non-profit sectors across Europe and around the globe. Examples of its continued use and value to international governments can be seen through its large community of practice called the International Design in Government community, which held its first International Design in Government Conference in 2018. It attracted 220 people from 26 countries, including individuals from the United States, and

was hosted by the UK's Government Digital Service in London (Kane & Jordan, 2018).

> **The problems of Government are complex, and their solutions depend upon diverse resources. As a way of applying interdisciplinary insights to the lives and work of human beings, design is necessary to government. The effective design of public service is indeed an essential public service in itself.**
>
> *-Excerpt from The Design Necessity, prepared as part of the first Federal Design Assembly, 1973*

Today, HCD is increasingly being used across the government to help inform policy, design services, and create products that make sense for the people who will be affected by or using them. It is seen as a way to remain better connected to the needs of citizens and to ensure that tax payers dollars are being used for methods, products, or services that have been tested at various scales for viability, feasibility and desirability. It is being used more and more by public servants, government contractors, and design experts alike.

An Integrative Discipline

HCD offers a relatively new orientation towards design characterized less by its products than its processes. It is not about predefined material outcomes; it is about solving problems, creating opportunities, and meeting needs. So, then, what is human-centered design really? **It is the discipline of navigating complex problems and creatively designing effective solutions to meet people's real needs.**

As a domain of theory and practice, people often find that it feels accessible and familiar. This is because HCD draws on common design disciplines, like graphic design, industrial design, product design and others. It also incorporates other methodologies, like anthropology and sociology, human factors and behavioral economics. The key element of human-centered design that sets it apart from other disciplines is the fact that it prioritizes human needs, often including collective, social, and ecological needs, over other considerations. To further explain, we break down the parts of this discipline into three key phases.

Human-Centered Design Phases

Just as an internet search would result in a massive number of results for the definition of HCD, so too would a search for the phases of human-centered design. Some organizations believe there are three, others consider it five, while others use seven. Whatever the preferred number, there are a set of common practices that designers will iteratively complete while using HCD. These phases are not necessarily conducted in a linear fashion. In fact, more often, the process individuals use when employing HCD will be very non-linear. Within the U.S. Government, we employ design research, problem framing, and iterative prototyping as core elements of the discipline. Those who practice HCD employ these three approaches as ways to continuously increase understanding and align their ultimate solution with the needs and aspirations of the people for whom and with whom they are designing.

1. Design Research

As with other parts of human-centered design, research-driven design is not new. It has been used by design practitioners throughout time. For example, in *Designing for People*, a book by Henry Dreyfuss published in 1955, he shared how his studio used anatomical drawings of the average man and woman to consider the human factors that needed to be considered when designing things like bicycles and airplanes (O'Grady & O'Grady, 2009). Similarly, anthropologist Margaret Mead famously said, "What people say and what people do and what they say they do are entirely different things." Research, then, enables us to broaden our perspective and deepen our understanding of people and contexts, instead of relying on our assumptions. Well-known design educators and practitioners, like Jennifer Visocky O'Grady and Ken O'Grady, argue that "design creates value by making meaningful connections with individuals, and research is the tool we use to foster that connection" (2009). This connection through research generates empathy for people's needs, aspirations and experiences. It also helps to reveal hidden patterns, tacit knowledge, and transformational insights. Finally, it contextualizes and prioritizes stakeholder interests and design requirements.

Thus, design researchers today borrow heavily from anthropology and the other social sciences, conducting applied ethnography. Ethnographic research is the study of people in their own element. It is a core part of HCD because it encourages practitioners to leave their desks and go out into the world in which their design solution will ultimately live. Its variety of techniques act as primary

resources to understanding the behaviors, needs, and desires of the individuals for whom interventions are being designed. Research may happen multiple times over the course of the project, and its purpose is to continuously keep the people, or humans, at the center of the design process. **Building empathy for the people for whom and with whom you are designing is a result of good design research, and it is key to designing effective solutions.**

While ethnographic methods are qualitative in nature, good design research includes a mix of qualitative and quantitative data. This is because both have important strengths. Quantitative research is great for providing data that is descriptive. For example, it can determine the differences, similarities, or preferences of particular groups. However, it struggles to help interpret why those groups have the differences, similarities, or preferences that they do. Qualitative research can fill in those gaps by providing depth to the data in the form of qualities and characteristics. **Qualitative research provides the 'why' behind the groups' difference, similarities, or preferences by capturing human needs, behaviors, and desires.** The variety of methods embedded in HCD provide a structure that enables organizations to not only collect data, but also use it in ways to discover new patterns and preferences from the data that can become the foundation for any design ultimately made. Access to data, especially access to both qualitative and quantitative means, is a powerful resource that can help organizations determine whether or not to move forward and how. It adds richness and depth to organizations' understanding of an issue and gives a better sense of why something is happening, not just what is happening. Better decisions can be made when research reflects a person-first mentality. It ensures that designs will meet the needs of the people who will use it.

2. Problem Framing

Breakthrough innovation is often the result of simply seeing old problems in new ways and as opportunities.

Humans are hard wired to solve problems but we often we jump directly from the articulation of a problem to its solution. However, if we do not take the time and space to make sure that the problem being solved is the right one, not only will the solutions not make a difference, the effort will be a waste of time. As Charles Kettering famously said, "A problem well-stated is a problem half-solved." Since how we define a problem largely defines its solution, typically, design problems and solutions co-evolve. In HCD, iterative framing, or 'reframing' of problems, is as much a design opportunity as finding solutions.

Effective and iterative problem framing is important because it avoids wasting resources on solving the wrong problems and expands the range of possible solutions to any given problem. It also maximizes the creative leverage and innovative potential of HCD. In fact, some would say that problem framing is one of the highest expressions of design thinking and practices.

But continuously revisiting a problem frame is important to combating the various cognitive biases that we each hold as these are common hang-ups when trying to effectively articulate a problem statement. Additionally, as problems do not exist in a vacuum, it is necessary to determine and account for the people, places, systems, forces, and constraints that must be included in their framing. Before trying to solve a problem, designers observe, ask important questions, and try to understand who and with what they are really dealing. Following that research phase then, problem framing is used to make meaning from the data. Our perception of meaning, purpose, and possibility is largely defined by our frame of reference. Thus, creating new ideas, understandings, and value, is often a function of framing AND reframing our perception.

3. Iterative Prototyping

A prototype is a first simple model, release, or version of a design or an idea that is built in order to test the concept in the real world. Prototyping is valuable because it makes theoretical concepts tangible and available in ways that words cannot. In many work environments, ideas are discussed and debated verbally. Since words have many meanings, it is difficult to truly know what someone may be describing or proposing. However, when an idea is made visual, it makes it tangible and brings it to life. The prototype then becomes a platform for real discussion and feedback. Thus, this engagement with the prototype to refine and update it with people is key to making the final version of the concept reflective of the people who will be using it or affected by it. Prototyping is integral to human-centered design because crafting, testing, and refining rough models and rapid simulations of new ideas often reveals design considerations that abstract thinking does not. This process of "learning by making" increases a design's chances of success by exposing it to repeated failure. Building new policies, products, and services is an inherently uncertain proposition, and there is only so much research, analysis, and strategy can tell us about the value or viability of new designs.

Resourcefully prototyping early and often with people allows organizations to identify and address unforeseen user needs, design flaws, and contextual constraints. It also manages risk and reduces waste by optimizing designs before investing in implementation.

Problem Framing in Practice

After the swine flu scare of 2009, regulators detected some issues with the systems in place to produce respiratory protective devices (RPDs). Since the mass production of these might be necessary for future health pandemics, the FDA wanted to respond to manufacturers concerns about the confusing approval requirements. The confusion stemmed from the fact that there are three different regulatory authorities who oversee the production of RPDs dependent on their use. Respiratory protective devices are regulated as medical devices (by the FDA), as disease prevention equipment (by CDC's National Institute for Occupational Safety and Health), and as personal protective equipment (by the Occupational Safety and Health Administration).

The Emergency Preparedness/Operations and Medical Countermeasures (EMCM) within the FDA was tasked with working within the institution and across the other regulatory authorities to figure out how to ease requirements to reduce the burden on manufacturers. They believed that this would also reduce confusion by hospitals and other medical institutions about the right RPDs to buy. EMCM decided to host a workshop that would convene many of the stakeholders involved in the production and regulation of RRDs. They hosted two days of conversation, utilizing human-centered design activities during breakouts. The FDA walked into these meetings expecting the conversation to largely be focused on the standards for manufacturers, but these activities revealed something different, and it changed the conversation, and the definition of the problem, significantly.

Photo by OPM

As the regulators listened to the practitioners and other stakeholders' experiences and concerns, they learned that the standards were only part of the problem. Another major issue was knowing when and which device to use and making sure it fit users correctly. EMCM walked away from the meeting with a broadened problem statement that went beyond just the scientific question related to standards, but included the realities of training for usage in the field. EMCM learned that the production standards did not really matter if practitioners in the field did not know when and how to use the RPDs (Liedkta, et al., 2017).

It is easy at the FDA to see standards as being what matters, but in the meetings, it became clear that the standards didn't incorporate real-life experiences. We began to see a new reality: this particular standard is useful, but it's not comprehensive enough to really guide us, or it doesn't provide the solution that we need to overcome this challenge. *– FDA Workshop participant*

Prototypes begin very low in cost and fidelity. This means that an idea may take the form of a brief storyboard, a quick skit, or a rough drawing to provide greater meaning. As the prototype is introduced to various people who will be using it, feedback is provided that helps to determine whether it moves forward and how. With a prototype, there is no expectation to get it all right from the beginning. In fact, prototyping is one way to collaborate and co-create with the people who will ultimately be using or affected by the product or service. Often these rounds of testing uncover new iterations or specifications. As the concepts resonate, the level of fidelity increases. This is purposeful. Increases in the level of fidelity also correlate with time and money. In human-centered design, prototyping is used as a means of repeated checks on the idea's feasibility, viability and desirability, so that when an organization decides it is ready to bring the concept to full fruition, it knows that it is built in a way that makes sense for the people who will be using it. These rounds of tests have assured them of adoption and uptake because they have done their designing from a person-first perspective.

Thus, design research, problem framing, and iterative design come together to create a framework for addressing complex problems within the public sector. But simply knowing the steps is not enough, federal employees need to know how to use them. **Further, for systemic change to occur, they need to learn how incorporate design thinking as a holistic practice rather than a method used for specific projects.** However, individuals are hired across the executive branch for a variety of positions, most of which are not directly assumed to require design skills. Thus, to create a culture of innovation across the branch, all workers could benefit from the skills of designers, their differences in vision, and the methods they employ to solve problems efficiently and with the human recipient of the outcomes in mind. As a way to support this goal, enabling programs and positions have been created to teach and expand these skills across government.

CONCLUSION

Ultimately, the goal across the public sector is to transform thinking from a task-focused proposition to one that considers holistic solutions, focuses first on the recipient of the information, product, or service, and that efficiently meets the needs of internal staff and Americans. In short, the goal is to create a culture of innovation that seamlessly weaves different perspectives together to best support the nation. To do that, these enabling methodologies, labs, and fellows start the process of this transition.

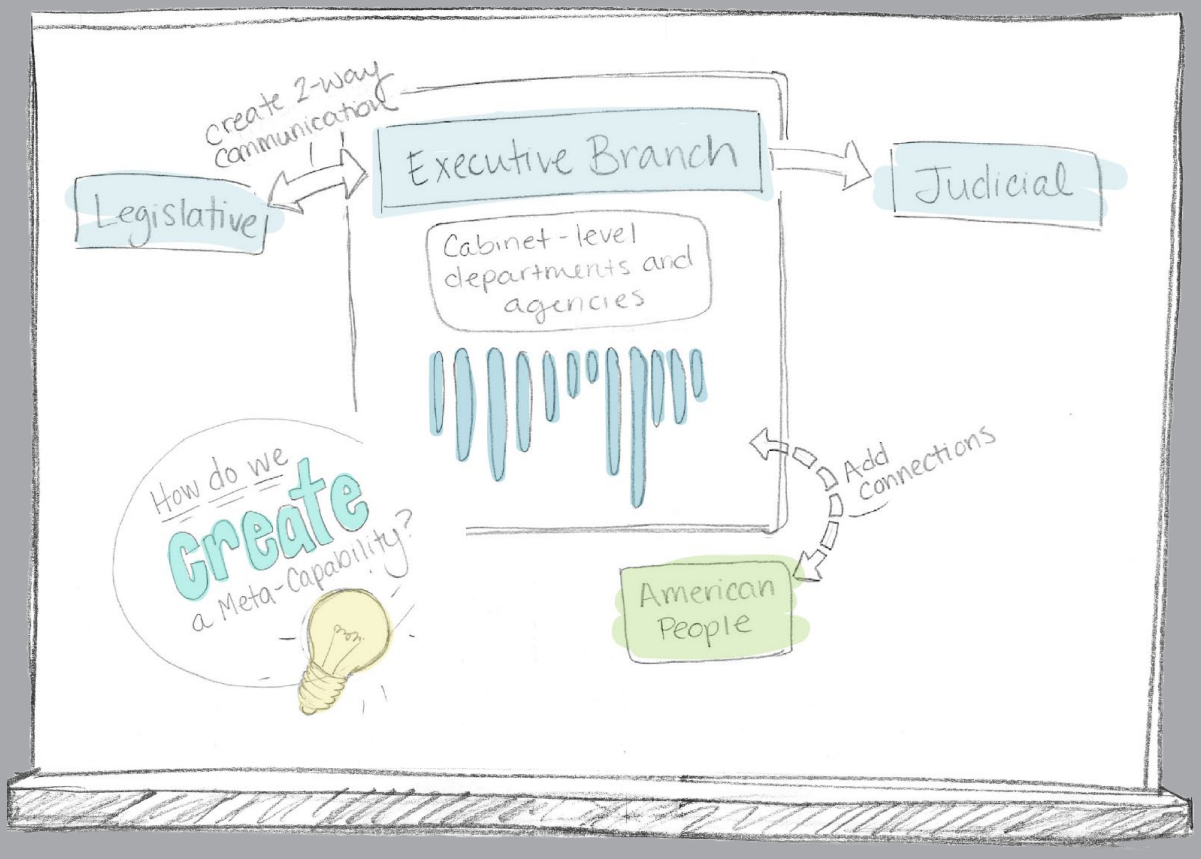
The next question is: How do we expand these concepts to all facets of the executive branch?

COMMUNICATION PIPELINE

SUMMARY

It is difficult to comprehend the massive size of the executive branch. At more than 2 million employees, it is by far the largest employer in the United States. Maintaining an active and effective communication pipeline becomes increasingly complicated in a structure this large. However, as improvements in technology continue to transform connectivity and communication, the federal government is continuously striving to keep up with these trends. Nevertheless, there is a deeper, less obvious, communication challenge that is often missed: human interoperability – specifically, the pathways within and between like-minded and similarly-tasked programs across the departments. The very nature of the existing organizational system limits federal workers' possibilities to connect and communicate. In response, this chapter provides a vision and pathway for considering how we can improve connectivity and communication across programs, especially for innovation programs, leading the way toward efficient repurposing of existing solutions. It proposes an implementation plan for an interconnected pipeline that emphasizes the importance of shared work space, connected solution curation, and the benefits that can emerge from intellectual freedom.

We need to balance the need for thought distribution with the threat of disjoint mission definitions



CURRENT STRUCTURE

Innovation in government is currently tied to single mission goals, requirements, and mandates from Congress. Each program's team focuses on their key tasking and executes to the best of their abilities. Information flows from Congress to the executive branch, entering at the Presidential level, continuing downward to the cabinet level, and then is dispersed through the Senior Executive Service (SES) and political appointee level to career employees. Depending on how legislation has been written, programs may work to implement their task as best as possible or tasking is delegated to innovation spaces.

On the surface, communication appears efficient, clear, and easy to measure. Each department and program can seemingly achieve success independently. It also ensures the control of decisions remains with the elected officials and the political appointees. This may ultimately be the preference of the American people, but this strictly hierarchical decision-making tree comes with hidden costs. **A stove-piped hierarchical system inherently hinders the ability to share problem spaces, lessons learned, resource costs, ideas, and solutions.**

Innovation barriers: Why do we have them and how do we break them?

…for a variety of reasons, like force security reasons, classification reasons, or we're just scared to do things differently reasons. Those are cultural issues and MD5 works at least in part. One of our three verticals is an education portfolio that is specifically designed to take innovation skills sets from a commercial sector, from the academic sector and bring them into the department so that we can break down some of those lexicon barriers, break down some of those cultural barriers…MD5 existing as an organization is this notion of creating collision events, because that's where really interesting innovation happens. When we've got folks from really different backgrounds, deep intellectual diversity, all working on the same type of problem set, that tends to change the dynamic of the conversation and you get beyond stereotypes and actually towards solutions.

– Morgan Plummer, Director, MD5, Department of Defense – iFest, 2018, Perceptions of No Panel

Arguably, these barriers lead to a less effective and efficient system. Additionally, the ability to share information up the chain in an effective manner is reduced because when those working at the tactical level are not aware of the strategic planning goals, their ability to share relevant information is hindered. But it also hampers those at the strategic level from being able to suggest to the legislative branch composite solutions that might be more viable or impactful if multiple groups worked cohesively. Finally, rules that protect the government prohibit workers from sharing information directly to the American people. The information distribution procedures and bureaucracy often make it difficult for those in positions of knowledge to share information with taxpayers, or even stakeholders. The number of levels an artifact must proceed through before being deemed cleared to share with the very people that paid for the work in the first place can be high and difficult to navigate. **It means that Americans are often unaware of how their tax dollars are specifically spent**, making it difficult to garner help from outside entities. While more information may be getting out than before due to the world's digital transformation, government websites alone do not provide enough information in a timely manner to the various stakeholders interested in the work that agencies are doing. Without direct connections to the private sector, academia, and non-profits already working in common areas, the government can miss the benefits it could reap from their talents, ideas, or solutions.

Thus, the federal government often works from a risk-avoidant perspective rather than from an outcome-optimization goal. Since the individual opinions of workers do not necessarily reflect the stance of "the government", they are reviewed by Public Affairs Offices and Security Offices to ensure no protected information is accidentally released. However, while the President and his or her cabinet are technically the spokespeople for all governmental work., with over 2 million workers (OPM, 2017), it is unlikely, if not impossible, for 17 people to summarize and share all the facets of programs that are developing solutions for the country. Additionally, just like tactical-level workers, the 17 at the highest strategic level also have their own tasks to perform: creating the vision and architecting the future. For those at the strategic level to be burdened with the day-to-day tactical and operational level decisions is a misuse of their purpose, talent and skillsets. Thus, the Freedom of Information Act (FOIA) was created to allow citizens to obtain whatever information they wish, including the emails behind the work. While it is a burdensome process for both agencies and citizens, it exists because the government's work is too vast to be contained in one place or ever described completely by strategic leaders alone. Nonetheless, while all

information is technically publicly available it is not necessarily reasonably digestible due to volume. **Information sharing at all levels has the potential to create more synergy up the chain, down the chain, across the departments, and with the public but only if it is meaningfully structured.**

VISION

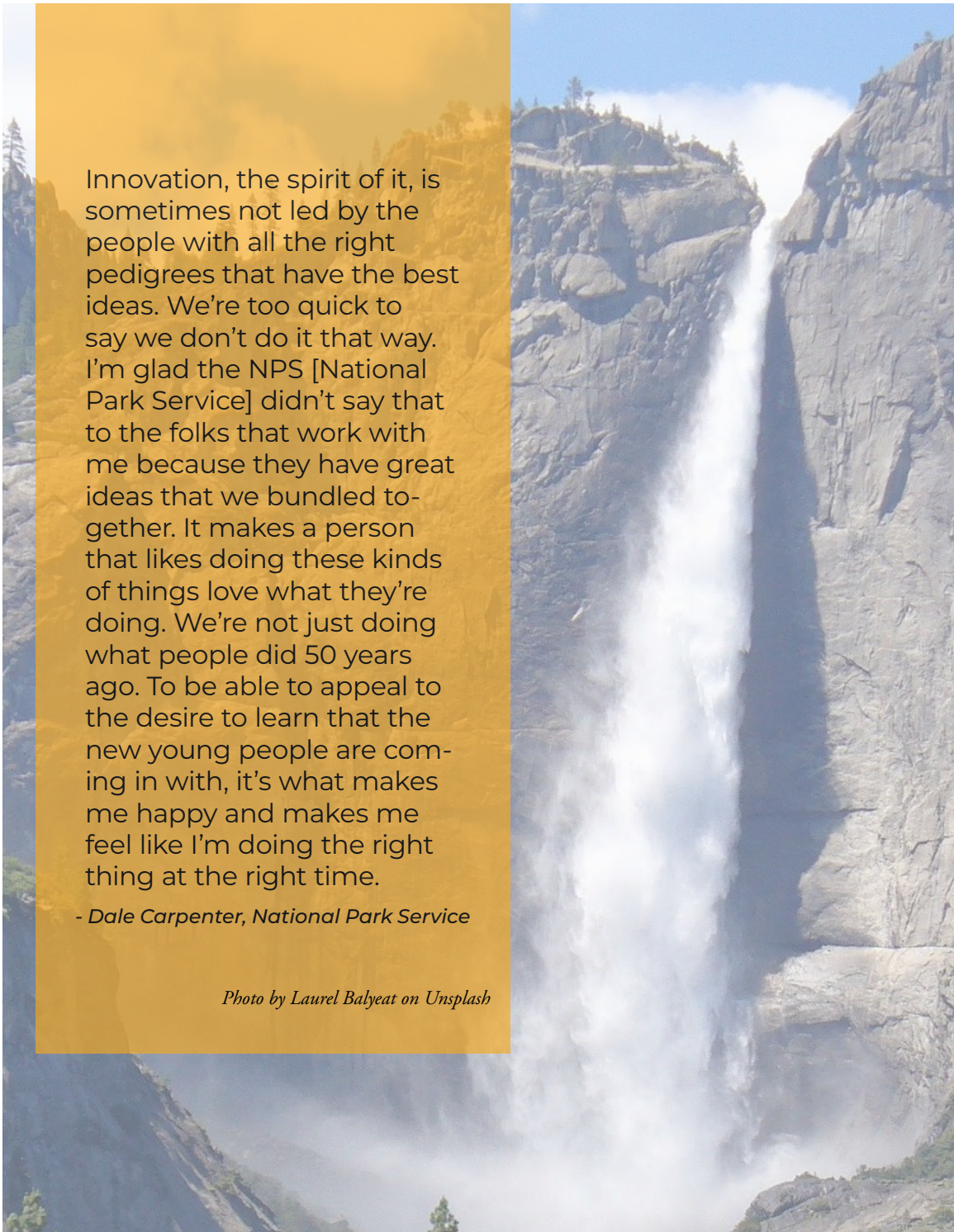
The goal is to develop an effective living Innovation Ecosystem that spans across all government departments, but that also connects to academia and the private and non-profit sectors nationally and internationally. To accomplish this, it requires a multi-directional communication pipeline, clarity for measuring return on investment, and enabling resources that promote a constantly evolving organizational structure.

An optimized communication system promotes distributed decision making, capitalizing on both the expertise of the individual but also their experience within the sector. As an example, Department of Veterans Affairs has a significant focus on this type of information diffusion, capturing inputs from internal staff but also externally from experts. This dual channel approach helps to identify promising solutions but also best practices and aims to replicate them.

Thus, the first goal for a distributed communication system is to create a multi-directional communication pipeline that provides information from employees deep in the system to those above, across, inside, and outside and vice versa. The second goal is to update our measurement and analysis metrics to support data-driven solutions based on the true goals rather than those that are easily measured. We should define success with a wider scope. Finally, we need to allocate enabling resources to ensure good ideas spread throughout the branch rather than merely produce a singular impact. It takes time to share information across the current system. This is because employees are, by requirement, fully burdened by direct requirements-driven tasks. To deviate from this task-based system, explicit permission would be required. Also, time is money. Thus, fiscal resources would need to be allocated within and between departments to ensure that employees' time is adequately and appropriately supported. Departments could find ways to share supporting resources - training, technology and methodology tools - to

Building on existing, already tested available options is one of the most efficient methods for optimizing solutions and cutting costs.

ensure that employees are set up for success rather than having to rely solely on internally accessible resources. **Sharing should be a cultural norm rather than an exception needing approval.**



Innovation, the spirit of it, is sometimes not led by the people with all the right pedigrees that have the best ideas. We're too quick to say we don't do it that way. I'm glad the NPS [National Park Service] didn't say that to the folks that work with me because they have great ideas that we bundled together. It makes a person that likes doing these kinds of things love what they're doing. We're not just doing what people did 50 years ago. To be able to appeal to the desire to learn that the new young people are coming in with, it's what makes me happy and makes me feel like I'm doing the right thing at the right time.

- Dale Carpenter, National Park Service

Photo by Laurel Balyeat on Unsplash

IMPLEMENTATION PLAN

One of our biggest hurdles is getting approval to be connected. In government, we have a hierarchy that really hinders us from collaborating.

– Mr. Marshall Henry, Program Manager of the Office of Financial Innovation and Transformation (FIT), Department of Treasury

1. Multi-directional communication pathways

Multi-directional communication pathways can be encouraged and supported in many ways. Formally, top-down approvals would need to be explicitly defined. This can be accomplished through strategic documents, initiatives, or memoranda that define with whom, how, about what, and for how long groups or individuals can share information. The President's Management Agenda (PMA) could provide the anchor for justifying these approvals.

Yet, while approval is necessary, alone it is insufficient for creating communication improvement. It is also necessary to have shared goals and understanding, but these goals need to be defined both from the top and from those working across the executive branch not merely provided from Congress to workers. Also, requirements coming from the strategic leadership of the executive branch would need to be assigned across departments, to encourage co-ownership of the solution to increase efficiency by reducing overlap and sharing development activities.

Finally, there would need to be a mechanism by which seemingly-unrelated groups can learn about each other because both methodologies and tools that work in one department can oftentimes be repurposed for other departments. One example of a repurposeable solution is the Total Learning Architecture (TLA). It is the technological backbone of the Future Learning Ecosystem being spearheaded by the Department of Defense (DoD). This architecture is based on a set of specifications and standards that define how learning data can be moved between devices, locations, and repositories like data streams and lakes. Although this effort originated in DoD and focuses on learning, data is data. The architecture is immediately transferrable to other uses such as coordinating health or financial data. Yet, how would Health and Human Services or Treasury know this is being developed? By what mechanism would these groups connect? How would they

justify meeting? How would they find time and resources to do so? And how would they provide information up their chains of command to even seek approval for these actions?

Despite good intentions, the Federal Government has become overly bureaucratic and complex in ways that have prevented agencies from seamlessly transitioning services to meet the needs of the 21st Century. Many of these challenges and shortcomings arise from statutory, administrative, management and regulatory practices designed in the past that no longer align to the realities of today. Major root cause challenges facing the Federal Government include: accumulated regulatory burden, structural issues, decision-making and processes, leadership and culture, capabilities and competencies.

(PMA, 2018, p.4)

Photo by Laurel Balyeat on Unsplash

In short, we have inadvertently created barriers to sharing. Conferences that bring together similarly skilled individuals and groups across departments can create the opportunities needed to learn about other work. However, the government is restrictive in nature to those that it allows to host conferences as well as participate in them. Attendance and travel costs have to be approved to participate in conferences outside internal thought or physical workspaces. Additionally, time spent at conferences is often only reviewed from the overt

When federal employees aren't empowered to make decisions at every level but instead must spend inordinate amounts of time and energy seeking that approval, their motivation to reach out wanes.

workshops, talks, or courses being shared, and less evaluated by the connections, collaboration, and cross-pollination of ideas that occurs in the in-between moments of these conferences, symposia, and meetings. In other words, government workers are generally not approved to attend these more casual connection events in their official capacities and because they are not allowed to volunteer their time (or donate hours), they cannot even offer to attend and discuss their work if they are willing to do so.

Given that these individual programs and pathways are mature on their own, our next step is to coordinate and centralize them. One of the recurring challenges learned through interviews of employees is the difficulty connecting across departments. There are a few ways to address this concern. The easiest and fastest method is to connect individual groups at large meetings or conferences. This creates opportunity for increased awareness and shared information but would not be requirements-driven on its own. The second option is to connect innovation groups for specific projects. This option improves sharing of information and increases joint outcomes, allowing the government to increase efficiency by solving multiple problems at once. Effectiveness would also be expected to be improved because of the thought and experience diversity that would inherently be present.

A large-scale option with the greatest potential impact would be to develop a Department of Innovation with the primary goal of centralizing innovation efforts to reduce overlap and increase complementary work. This would act as a conduit for change but would not likely be a sustained solution. The goal is to reduce the footprint not increase it but sometimes, for culture change to happen, space for growth must be temporarily available. It would serve as a space for uncovering, documenting, and sharing the efforts occurring across the government. The department could be used as the hub or anchor to the living innovation ecosystem across the government. Making a department would enable government employees to know who to go to find out what is happening across government and how to get or receive support on cross-cutting issues. Additional benefits would be seen in coordination efficiency, process efficiency and effectiveness, and ultimately, cost-savings. **When innovation becomes a clear, stated, and resource-supported focus, the impact across all parts of the government as well as the nations would be affected.**

2. Improve "Success" Metrics

Return on investment (ROI) is an important metric used for justifying resource decisions across all departments. However, current ROI methods miss or do not accurately reflect important elements for determining success. Conceptually, collaboration does not create direct cost savings, but does reduce redundant spending. Capitalizing on personal and team strengths can improve outcomes, but quantifying "better" is challenging. Further, collaborative activities are not typically recorded in a way that makes them measurable and sharable for purposes of ROI calculations, making after-the-fact assessments challenging. This is partly due to the informality of these activities. For example, awareness of other programs in other departments is generally not measured. But when these informal interactions are repeated across the entire government, they can collectively create significant impact. However, measuring that impact and reporting it across departments, outward to the other branches, to American citizens, and internationally can be difficult. Accordingly, we need to create an improved methodology that better accounts for types of impact, more accurately mines and assesses available data, and provides clearer justification for resourcing future activities.

How do we better measure to better inform?

> We're moving from a risk management system because it's time intensive and expensive to get things approved, to a risk-informed plan. If the risk is low, we shouldn't waste time. For us the biggest challenge is changing the mindset. We were going to redo our qualifications programs but there was not enough cost savings shown, so we got shot down. Perhaps we can try again in the future if we can show the data, but we'd have to be able to collect the data, so right now it's just what we believe.
>
> *– Mr. Doug Tharp, Nuclear Regulatory Commission*

Ultimately, the goal is to clarify the entire impact of programs and projects, not just the most easily measurable parts. Thus, data will need to be captured in multiple forms to include resource allocation (time, team, or monetary), scientific outcomes, methodological replication, community impact, and long-term ripple effects. Specifically, direct and indirect impacts further split into measurable and influential. **Direct measurable impacts** are easily measurable and address strategic goals. These include transitioned tools, methods, or programs. **Indirect measurable impacts** include money saved, improved effectiveness, and reduced redundancies achieved through collaborative activities. **Direct influential community impacts** include jobs created, education and training programs established, and money brought to locations across the nation started from government seedlings whether they be time, money, or information. Finally, **indirect influential impacts** are defined as intangibles such as community lifecycle opportunities from K-12 to post-retirement, positive work environment, personal work-life journey experiences, contributions to the science and greater body of knowledge of American or government knowledge, and repurposing of methods or outcomes to industries outside of the initial program. All of this information would then need to be shared across the system, but to do that, resources must be allocated (for more information, see Vogel-Walcutt, et al., 2018).

If the federal government does not maintain its role as a preeminent supplier and sophisticated user of data it will no longer be able to fulfill the trust placed in it by the American people. – *PMA, 2018, p.15*

3. Provide Enabling Resources

To coordinate, collaborate, and co-create the future, there must be connectivity across the federal government but also with the nation and internationally. Information would need to be shared multi-directionally to highlight requirements and promising solutions for improved efficiency and heightened effectiveness. Foundationally, this requires a system of trust across all levels. Trust is needed at the executive level to provide vision and architect a system that has a clear pathway to success. **The American people need to trust that tax payer dollars are being wisely spent.** Trust is needed from the legislative branch that the budgets are addressing the requirements in the most impactful manner. Trust is needed from

the tactical leadership to approve travel requests so that those at the working level can collaborate. Trust is needed up the chain that information provided from the grassroots level will be heard and valued. And trust is needed between departments to ensure that we complement work rather than overlap. Finally, trust and coordination with private industry and academia is needed to capitalize on all U.S. assets and to optimize the entire system.

Three key types of enabling tools are needed. First, a team of interdisciplinary professionals who represent the breadth and depth of expertise inside the government would be needed to support the development of a new system of thinking across the federal government. They would be charged with using their knowledge of the bureaucratic nature of government along with their collective expertise in a participatory way to design this new system, while also creating an implementation plan that iteratively tests the methodology at different scales. The Lab at OPM described earlier is an exemplar program for enabling creative thought across the federal government. They are a fee-for-service program that can be "hired" to support a project or program through this transformation process. As noted, they also host design workshops of a variety of lengths around the nation acting as an enabler of innovation by providing specific educational activities aimed at providing both tools as well as encouraging new perspectives, connections, and collaboration grounded in design methods and practice across departments to improve outcomes of programs and projects.

The second need is a tangible set of tools that allow improved access to data, visualizations, and other researchers, thought leaders, and program experts. This can be accomplished through the communication pipeline and repository activities such as DoD's Innovation Marketplace (https://defenseinnovationmarketplace.dtic.mil/) where data and outcomes from unclassified projects all over the department covering every topic can be accessed. In this marketplace, communities of interest and other coordination efforts can also be created providing the tools needed to be successful.

Finally, enablement would need to include continuous access to training and education because as we progress forward, to be competitive internationally, we will need to ensure we are constantly improving our workforce agility. However, if conferences cannot be led internally, non-government entities would need to be contracted to do these activities. Examples include GovLoop, which provides trainings to federal workers through conferences like NextGen, which showcases the various innovative activities happening across government and enables connections for the next generation of government employees. These are some

ways for executive branch personnel to connect to others and learn to think with innovation in mind. This and other government support programs can provide both new ways to share information but also provide group support and energy for pathways forward.

BENEFITS TO PUBLIC SECTOR

We are a powerful network of innovators across government.
– Bridget Roddy and Caitlin Bergin, Department of State

What impact does a coordinated effort achieve? As we contemplate how we can best leverage these innovation assets for the future and how we can unleash the power of innovation to all facets of the government, we consider three key points: **Centralize** communication but distribute decision making, **Enable** innovation through improved metrics and resource allocation, and **Collaborate** for issues, vision, and solutions to create a sustained culture of innovation. Without a formalized set of enabling tools, innovation will remain a buzz word that is used to describe thought leaders but not the system. It will be something a person does rather than a transformed method and culture for doing business for America.

Developing a synergistic, multi-directional communication structure that promotes the exchange of thoughts and ideas will ensure that individual programs maximize impact reach, spend tax dollars more wisely, and become self-sustaining. The vision for how original ideas can be leveraged beyond the initial requirements to address collective goals important enough to be needed by many external stakeholders, civic institutions, and related industries, requires building a system that promotes innovation to generate a fluid evolution in society. Ultimately, formally coordinating this effort through either an overseeing office or a transition department would translate vision into proactive planning for the nation and reduce spending, improve outcomes, provide clarity to the nation and Congress about how taxpayer dollars are spent, and clearly show the results of those expenditures.

In short, centralized communication with distributed decision making creates a meta-capability across the system where individuals can realize their potential value while maximizing the collective impact.

SECTION 2

RE-DESIGNING GOVERNMENT

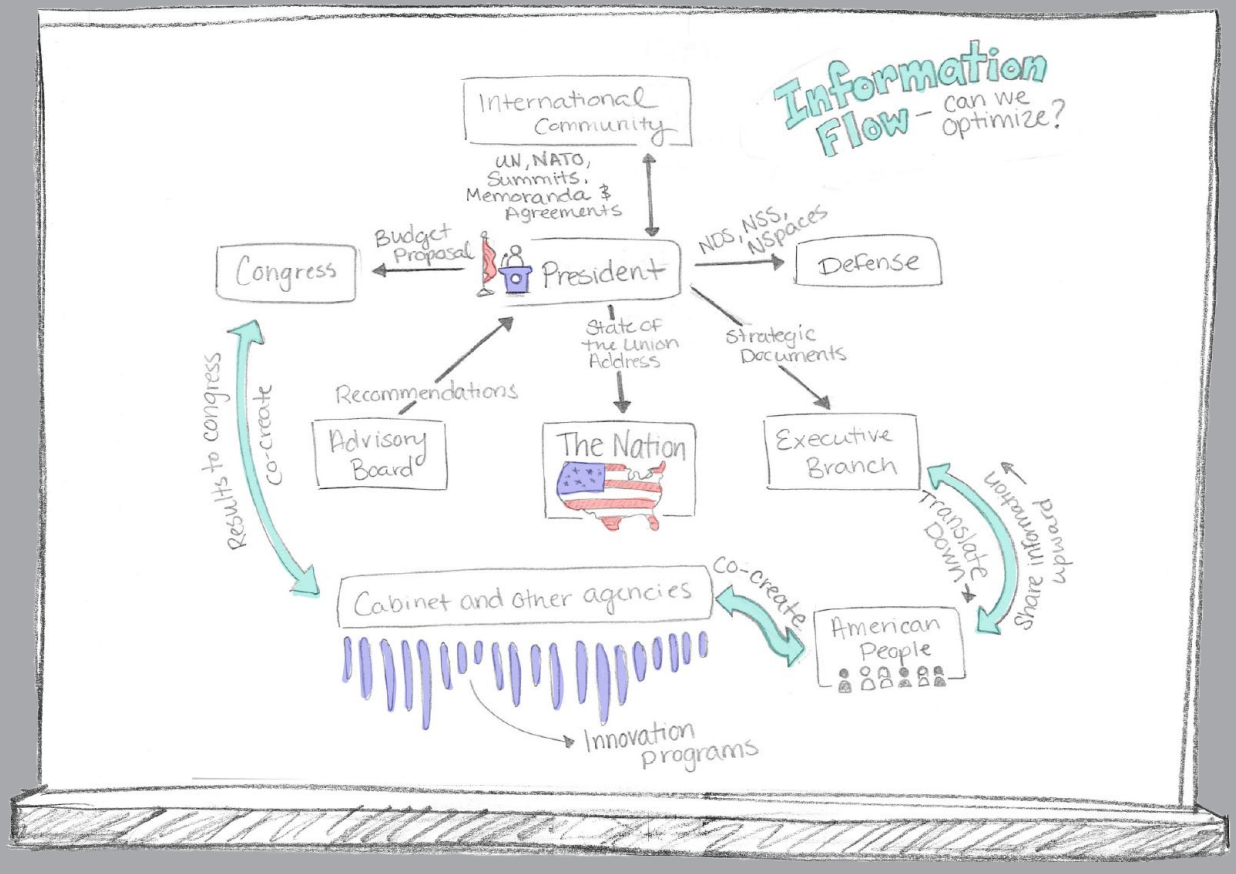

Innovation isn't about reinventing the wheel...it's about connecting the dots.
Find brilliance. Repeat.

EXECUTIVE OPTIMIZATION

SUMMARY

At the strategic level of the executive branch, many people think of only the President and Vice President. Some additionally consider the 15 cabinet members but both assumptions are incorrect. The Executive Office of the President employees over 1800 people and has duties ranging from purely logistical planning to strategic communications around the world. Given the size, ensuring that the strategic vision of the President is being carried out can be significantly challenging. How have presidents historically packaged this guidance? How could a single human, or even a small group of them, maintain oversight over such a large group? How does America ensure that we balance the necessity of a distributed executive team while maintaining a central vision? In response, the focus of this chapter is to review more deeply the communication structures, pathways, and content delivery methods from a human-centered design perspective and how all of this can be enhanced to drive innovative solutions to the complex problems being addressed by the public sector.

Government must be citizen-centered and results driven



CURRENT SYSTEM

Decision Making Structure

The President oversees the executive branch as both the head of state and the Commander-in-Chief of the military. The Vice President supports the President and must be ready to assume office at any time should something happen to the President. With these authorities, the President implements and enforces the laws defined by the legislative branch and appoints the heads of the executive departments (known as the President's Cabinet), other executive agencies not in the Cabinet (such as the CIA), independent federal commissions, and other federal offices overseeing specific areas of national interest. The President and Vice-President are responsible for providing information about the state of the nation to the **legislative branch** and the American People. Information provided to Congress comes in many forms but the four primary methods include verbal briefs, written briefs, a budget recommendation, and veto power. Formally, the President addresses a joint session of Congress annually through the **State of the Union Address** to fulfill rules in Article II, Section 3 of the U.S. Constitution. This address clarifies the strategic goals of the nation, the progress to-date to reach them, and plans for the future. **Briefs** can be provided at any time and can focus on any particular area of the President's goals. The goal of these briefs is to inform Congress about how he or she plans to spend money or for requests to spend money for unforeseen expenses like natural disasters. The **President's budget request** is presented to Congress on the first Monday of February and is the primary method for clarifying the goal list and associated costs of each strategic plan (Haughey, 2018). Finally, **veto power** provides the President with the ability to share, indirectly, his or her thoughts about a bill Congress proposes. Part of the checks-and-balances system in our government, the President can express disagreement through refusal to sign a bill into law, although Congress can override this veto with a two-thirds vote of both houses.

The President also converses with the American people and with **international partners** in a variety of ways. The White House Press Secretary acts as a spokesperson for the executive branch, especially for the President and other senior executives, to communicate information and policies directly to the people. Since the advent of television and other communication channels, the American public can also listen in on Presidential addresses such as the State of the Union Address and, more infrequently, an Oval Office address. Abroad, the President acts as the spokesperson for government and decision maker on behalf

of the American people at **summits and meetings** and can negotiate and sign **treaties,** though these must be ratified by Congress. Informally, the President can provide information to either of these parties at any rate or in any manner that achieves his or her mission goals. He or she can also create **advisory councils** made up of American citizens who work together to provide guidance to the President in key areas. These are not required teams but can be created, expanded, or disbanded as desired. Examples include the Defense Innovation Board (DIB) and the Strategic and Policy Forum. Though not a communication tool, but also a power retained by the president, is the ability to pardon or provide clemency for federal crimes.

Finally, the President communicates within the **executive branch** through the chain-of-command. Formally, this means the President writes the strategic goals of the government during his or her tenure and shares them with the Cabinet members, who break down those goals into a set of sub-tasks and either assign existing groups of people to address them or create new programs as needed. Some of the key current **strategic documents** include the National Defense Strategy, the National Security Strategy, the National Intelligence Strategy, and the President's Management Agenda. Documents in progress include the National Spectrum Strategy and National Space Strategy.

Communication Structure

The President and Vice President can communicate with Congress either **directly or indirectly**. They can directly provide information to anyone at any time, through any media. However, formal information is most typically provided through the **budget request** and accompanying explanation which outlines the preferences of the President on how to expend taxpayer dollars or through **strategic documents** that are shared both internally and externally. Portions of documents that are classified remain internal and are shared only with individuals who hold proper levels of clearance.

Government should be: — Citizen-centered, not bureaucracy-centered; — Results-oriented; — Market-based, actively promoting rather than stifling innovation...

-President's Management Agenda, 2002, p. 4

The second source of information comes indirectly from the **Executive Office of the President** (EOP; www.whitehouse.gov). This is an extensive network (currently over 1800) of individuals who are appointed by the President to carry out duties in support of everything from logistics to safety to security planning and communication. This chapter focuses on the communication pipeline to and from this office. Communication from this office is directed by or on behalf of the President and approved individuals can **share information publicly nationally or internationally**. Some of this information is simply informative, clarifying the President's plan of the day or clarifying his or her intent with certain documents or direct communications. This information typically comes from the White House Communications Office or the Press Secretary's Office. However, additional information is shared either unilaterally or bi-directionally across departments and agencies, within private partnerships at meetings or through councils, and internationally as needed. Ultimately, the goal of these communications is to share the President's message. These personnel essentially act as strategic multipliers and are direct extensions of the President.

Communication Content

Communication content can be used to inform three key areas: decisions, strategic goals, and resource requests or allowances. Decisions made by the President can be based on any number of data points, beliefs, or strategic goals. It is beyond the scope of this chapter to review the differences in decision making steps taken by Presidents. Presidents are individuals, and each one's personal pathway for decision making necessarily reflects their personal tendencies. However, what is important is to understand how information is made available to the EOP, president, and vice president because while executive branch workers do not make the final decisions,

Just as the research-practice gap can render good scientific data unreachable or unusable by those who need it most, so too can the strategic-tactical divide result in enormous amounts of data being provided but in such a way that no human could make sense of the meta-messages across findings, solutions, tools developed, or outcomes.

it is their job to ensure that available information is accurate, accessible, and digestible.

Currently, the president receives information through four key areas. Congress shares information informally in meetings, speeches, or documents and formally through laws and budget approvals. Within the government, the cabinet and heads of agencies provide information through meetings, briefs, or documents to the EOP. Information from the American people can come through a variety of inlets to include social media, personal meetings, or citizen projects. International information comes through meetings, agreements, and the media.

The president shares information through a variety of pathways and delivery methods, but currently, the primary recipients are the same as those who provide information to the president. As such, Congress receives information from the president typically through meetings, publicly shared information through speeches or social media, budget proposals, and explanations. The American people and the international communities receive information through the same pathways they use to provide it.

The Cabinet is the gateway point of entry to the rest of the federal employees

Information is shared from the president to the Cabinet informally through meetings or through external commentary (e.g., speeches, interviews, or social media) but formally, strategic goals are created and written by the president and his or her staff. Input can be provided from a variety of sources but is not required. These goals are then provided in strategic documents that are shared internally with the Cabinet and externally either in whole or in part with the American public.

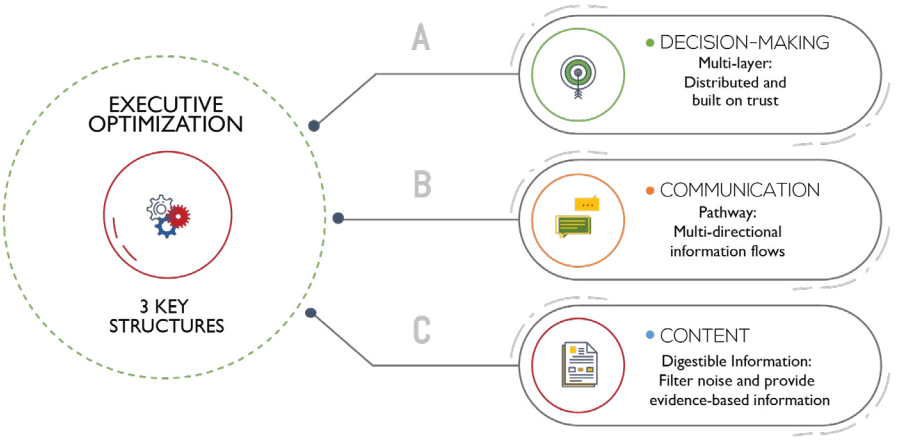
CHALLENGES

Until very recently, the metaphorical communication highway was necessarily laborious, tedious, and slow because information had to be essentially hand-delivered to ensure accuracy. Today, however, information moves instantaneously and is accessible easily by anyone, anywhere. While the goals of the communication pipeline are to ensure accurate information in a timely fashion haven't changed, the entire network of pathways has, and with it comes opportunity or chaos depending on how the public sector evolves to make use of these possibilities.

When we apply old methods to new capabilities, we fail to capitalize on the possible. The easy answer is to focus on using the pathways as simply new modes of transmission for the same information and to spend time fortifying the connectivity and safety of information passing through the conduits.

It is often said in innovation meetings, "If Henry Ford had asked everyone what they wanted him to build, they would have asked for a faster horse." Connecting back to the discussion about return on investment, the definition is often stated as faster, better, cheaper and the Ford reference elucidates this point exactly. **If the best outcome we can achieve in government is based on what we can measure, then faster and cheaper will be the focus, and nothing new will be developed; the art of the possible will be missed.** Alternatively, the government invests substantially in individuals all over the nation to be the questioners, the innovators, the ones who look at the same data mixed with new tools and suggests not just faster and cheaper, but instead to create new capabilities previously not possible. The question isn't "How do we make the communication pipeline faster or safer?" The right question is "How do we optimize the system possibilities to provide opportunities previously unimaginable?"

VISION



Decision Making

The first question to tackle is: What is the structure of decision making at the executive level of the government? To date, and by necessity, the President and his or her team have exclusively outlined the strategic vision and accompanying tactical goals. It was necessary to do this because the time it would take to bring information in from all over the government or all over the United States was simply untenable. However, crowdsourcing information is a viable option today making this issue of extensive and timely input from others no longer impossible. In fact, it is even quite easy to accomplish and already in use in some of the innovation groups across the public sector (Examples of Citizen Science and Crowdsourcing, https://www.citizenscience.gov/toolkit/resource-library/#).

Co-creating national strategic goals is now a possibility but is it a wise one? We should always strive for what is possible but determine the wisdom of exercising that option. One of the biggest challenges to a President is acquiring the right information that is accurate and digestible by a single human. Every individual contributing to a crowdsourced decision-making project faces the same challenge. As such, this capability makes co-creation possible, but also generates the need to manage public input given the reality that no person will ever acquire all the information needed to make strategic-level decisions. Although many public-sector crowdsourcing projects can lend themselves to openness and transparency of information, others require information to be kept secret and protected, especially when national interests may be compromised. So, what is the solution?

If we provide people with a solution they become our critics but if we include them in developing it, they become our champions.

One of the cornerstones of a sustainable innovation system is trust. Trust is not built by telling people to trust you, trust is built by bringing them into the system and making them part of the team. The opportunity of distributed decision making could be enhanced by utilizing distributed communication pathways. No single person can ever be an expert in all areas. Otherwise, we would simply use a dictator structure and rely on a single human to make all decisions. The United States was founded on the premise and structured in such a way that recognized the fallibility of a dictatorship. **Disagreement breeds improved answers but only if everyone shares the same goal.**

Fundamentally, the ultimate strategic vision decisions must remain with the President and his or her team because they alone are charged with the responsibility and authority to access all necessary information. However, the building blocks guiding those decisions could be substantially enhanced by distributing authority across the system to include Americans within and outside the governmental structure.

The role of government could be less about decision making authority and more about organizing opportunities.

By law, government workers are required to be fair and honest brokers deriving no financial benefit from supporting national strategy. Therefore, based on new communication options, they have the opportunity to be the organizers of Americans' ideas, capabilities, tools, and visions. The government can find the best of the best and elevate awareness of the findings to benefit the entire nation. They can connect communities unaware of each other and strategically support partnerships. The ability to share information at the speed of relevance doesn't just allow Government to move faster, it creates the opportunity to **build a system of communities that together could co-create an optimized national strategic pathway to capabilities yet unseen.**

Communication Structure

Recognizing that reaching mission goals supersedes rank is a concept becoming more and more prevalent in military innovation because ultimately it is more important to get the right answer than it is to always maintain a rigid hierarchy.**When we limit the number of people who are allowed to express ideas, we limit the possibility of finding the best result.**

Ideas have no rank

– CAPT (Ret.) Scott Erb, Former Commanding Officer of Security Forces and the Velocity Innovation Lab, U.S. Navy

Multi-directional information flow blurs the lines of formality but increases and equalizes access to information by all parties. As such, it also creates the conduit through which all ideas can be shared. It allows those working at every level to provide input and clarity about what is working, what is not, and ideas for improvement. A system like this has numerous benefits. First, it reduces the strategic-tactical divide by ensuring that strategies are written knowing they can be implemented.

This means that those closest to the information and the most knowledgeable about it are providing the most up-to-date and accurate data to those making the decisions. For example, the President and his or her office can work with the best information from not just across government but also from across the country. Also, Congress can be given timely information that clarifies how the budget has been spent in ways not yet seen. **Trust must be bi-directionally supported – trust Government to listen but also trust Americans to understand.**

The system also creates the opportunity to build trust with the American people by not only sharing a clearer picture of how tax payer dollars are spent and what outcomes are created but also allowing them to be part of the system by giving them opportunities to provide their input, expertise, and personal experience. Making all citizens part of the solution team not only helps Americans know and understand governmental activities but the nation also benefits from the entirety of information available rather than restricting decisions only to those in the government. More information creates a larger pool of options and the opportunity to be more selective in defining solutions.

Ultimately, an open model of innovation allows our nation to benefit from the best ideas rather than just the accessible ones.

Communication Content

Two major issues are created when enormous amounts of information are made available: accuracy and volume. When everyone can add to an open communication pipeline, it is predictable that there will be what data scientists call noise. In short, it is information that is not useful or is inaccurate. To deal with this issue, humans naturally create blinders for themselves that essentially cut out information once the mind becomes overloaded (Bannert, 2002).

Out of necessity, the mind will focus on information that is most familiar, easiest to digest, and that whichis most comfortable. So how do we balance the benefit of having access to all the data while filtering out the noise? This is where the learning sciences can help. Significant research has been conducted that clarifies how a) data can be gathered, analyzed, and searched, and b) those findings can be presented in a digestible format (Walcutt & Schatz, 2019). Human-computer interaction optimization allows computers to do the computational actions that would be impossible for a human to do in a reasonable time and empowers the

human to make sense of that data to determine how it can be best applied. The learning sciences help clarify how that data can be packaged in such a way that optimizes human decision making (e.g., providing information in similar delivery packaging that starts with high-level information, followed by increasingly deeper details; using highlighting techniques to aid pattern recognition; and creating data-driven models to better imagine outcomes).

PLAIN Language

The Plain Language Action and Information Network (PLAIN) is an all-volunteer group of federal employees from different agencies and specialties who support the use of clear communication in government writing. Originally called the Plain English Network, PLAIN has been meeting informally since the mid-1990s. Our goal is to promote the use of plain language for all government communications. We believe that using plain language will save federal agencies time and money and provide better service to the American public. To promote plain language, we:

- develop and maintain the content on plainlanguage.gov
- offer free, half-day training sessions to federal agencies
- meet monthly to share best practices in clear communications
- manage the plain language community of practice
- host occasional seminars about plain language

Plainlanguage.gov

What inspires me about PLAIN is that people volunteer in addition to performing their regular job. Some even take personal leave to teach classes. Many of our volunteers hold roles outside of communications. They do it because they believe in making government communications better for everyone.

– Kathryn Catania, Co-Chair PLAIN

CONCLUSIONS

Implementation of an open model for innovation in government at the strategic level would involve three key goals. First, it would involve establishing a multi-directional communication highway within the federal government both across the 15 departments but also with Congress. Second, permissions would need to be formally clarified for federal employees regarding the content that can be shared and the resources that can be expended to do so. In other words, innovation and collaboration would need to be named as formal internal goals so they can be infused into planning activities. Finally, formal structures would need to be put into place that allow the American people writ large to receive and provide information from and to the Government. Technically, access to information is already in place under on the Freedom of Information Act (foia.gov). However, equity and heightened effectiveness cannot be achieved so long as information remains technically accessible but not realistically consumable.

It is not enough to provide access without context or the ability to submit ideas or recommended changes. Further, one-way access does not, on its own, create a collaborative space. Rather, it meets a requirement at the technically acceptable level. Within an open innovation model, however, collaboration, more than access, is the intent. Creating multi-directional sharing with the government would create a larger pool of ideas and data, Congress would benefit from the clarity of expenditures, and America would benefit from improved efficiency and effectiveness of outcomes.

How could we implement such a wide-scale re-design? What's the pathway?

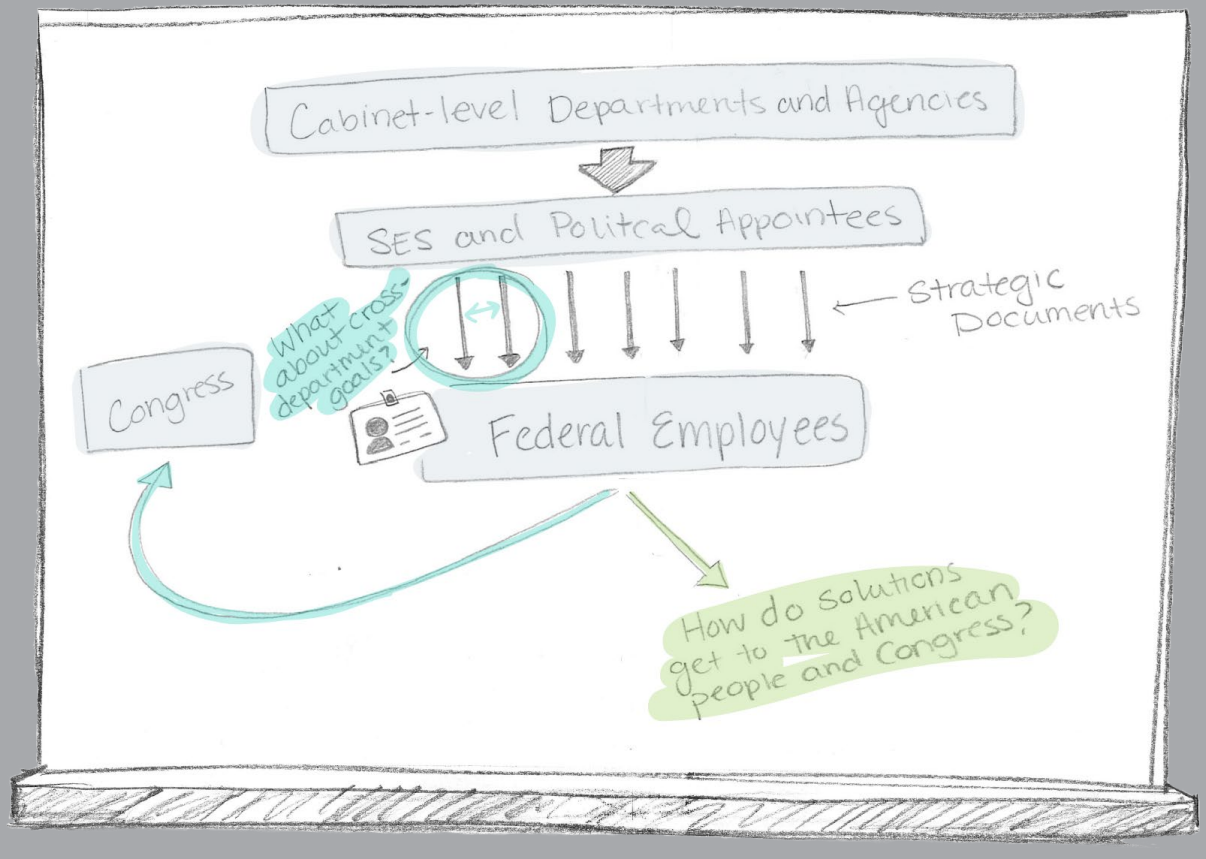
7

DEPARTMENTAL STRATEGIC DESIGN

SUMMARY

The magnitude of the size of the U.S. Government necessitates a distributed decision-making structure that balances the need to ensure all levels are empowered to progress, make decisions, and affect outcomes with the need to understand the gestalt of the system. Accordingly, this chapter focuses on clarifying how strategic documents are currently written and how human-centered design techniques could help developers consider the writing of these plans from the perspective of the users. By flipping the communication intention from one of sharing of information to one focused on the receiving of information, it is possible to identify innovative presentation modes that can provide both a holistic picture and clarification about how each individual or group fits into the system. Primary recommendations include updating return on investment (ROI) measurements to support decision making and maximizing the impact innovation programs can have on strategic planning for the Departments.

When everyone is involved in creating the solutions, they become your champions



CURRENT STRUCTURE

Existing Departments

There are 15 departments across the executive branch which include the Departments of Agriculture, Defense, Labor, Education, Interior, Homeland Security, Justice, Commerce, Housing and Urban Development, Health and Human Services, Energy, State, Treasury, and Transportation (For a list of their mission statements, see Table 2, and for their goals, see Appendix II). Each department is required to write a strategic document that outlines the goals of the department every four years, but the structure is variable (Pub. L. 111–352). Some provide mission and vision statements with a set of core values. Others provide a set of objectives and a strategic approach to achieve them. Still others provide a strategic goal framework.

Over time, numerous programs with overlapping missions and competing agendas grow up alongside one another—wasting money and baffling citizens. Though reform is badly needed, the obstacles are daunting—as previous generations of would be reformers have repeatedly discovered.

-PMA 2001, p. 3-4

Ultimately, the intent of these documents is to clarify the strategic vision of the President, stratified across the departments' focus areas. However, the question is, is this the best method of communication? For so long, it has been the only option but as technology has matured, with it comes options for improved methodologies and a wide variety of tools. Inherent in these developments is the need to determine if these tactics remain the optimal pathway for communicating that vision.

Thus, while the requirement is to define strategic goals and metrics, the intent of such policy is to use that information to drive decision making down the chain. However, several goals would need to be accomplished for that to occur. First, the strategic plans would need to be accessible, understandable and digestible by

all workers affected. Hierarchical systems are built on the assumption that only those at the top of the chain are affected whereas an open system model would provide clarity about who is impacted and how. Second, the goals would need to be broken down into digestible sub-goals, personalized for each of the groups or individuals involved. Currently, this only considers one department at a time but an open system would equally consider overlapping goals and goals that include groups outside the current chains of commands (e.g., other departments or programs external to government). Third, success would need to be measurable and extend beyond the current metrics of faster and cheaper. How can we define Return on Investment (ROI) better and how can the system support that goal? Finally, either the goals of each department would need to be mutually exclusive or they would need to combine goals across departments in order to optimize the system.

> **Perhaps most importantly, the Government needs to become more agile in its organization and operations. An operational inertia often takes hold, with too little attention paid to incorporating operational efficiencies or responding to technological advances and innovations. In some cases, statutory barriers prevent such adaptation. But, there are countless opportunities to evolve.**
>
> *-PMA 2018, p.20*

Current Communication

While the mission statements defined by each department generally highlight their focus areas, it is less clear how these missions roll up to an overarching national goal. Additionally, the length, structure, and depth of each mission statement varies by department. Standardizing the structure of mission statements could make sharing and identifying overlap easier. Technically, these documents must be updated for every administration to reflect the goals of each new leadership team. However, at this level, it is difficult to vary them much per administration. In some ways, this is by design to help maintain a sense of long-term rather than immediate focus.

Table 2: Department Mission Statements

Department (website)	Mission
Agriculture (www.usda.gov)	Provide leadership on agriculture, food, natural resources, rural infrastructure, nutrition, and related issues through fact-based, data-driven, and customer-focused decisions.
Commerce (www.commerce.gov, http://www.decsocal.org/NewsEvents/us_department_of_commerce_2018-2022_strategic_plan.pdf)	Creates the conditions for economic growth and opportunity
Defense (dod.defense.gov)	To provide the military forces needed to deter war and to protect the security of our country.
Energy (www.energy.gov)	To strengthen the integrity, economy and efficiency of the Department's programs and operations including deterring and detecting fraud, waste, abuse, and mismanagement.
Education (www2.ed.gov)	To promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.
Health and Human Services (www.hhs.gov)	To enhance the health and well-being of all Americans, by providing for effective health and human services and by fostering sound, sustained advances in the sciences underlying medicine, public health, and social services.
Homeland Security (www.dhs.gov)	To secure the nation from the many threats we face. With honor and integrity, we will safeguard the American people, our homeland, and our values.
Housing and Urban Development (www.hud.gov)	Create strong, sustainable, inclusive communities and quality affordable homes for all.
Interior (www.doi.gov)	Conserves and manages…natural resources and cultural heritage…provides scientific and other information about natural resources and…hazards…and honors the Nation's trust responsibilities…to American Indians, Alaska Natives, and affiliated island communities…
Justice (www.justice.gov)	To enforce the law and defend the interests of the U.S….ensure public safety against threats… provide federal leadership in preventing and controlling crime…seek just punishment for those guilty of unlawful behavior…ensure fair and impartial administration of justice

Department (website)	Mission
Labor (www.dol.gov)	To foster, promote, and develop the welfare of the wage earners, job seekers, and retirees of the United States; improve working conditions; advance opportunities for profitable employment; and assure work-related benefits and rights.
State (www.state.gov)	State leads America's foreign policy through diplomacy, advocacy, and assistance…Agency for International Development leads the U.S. Government's international development and disaster assistance…
Treasury (www.treasury.gov)	To maintain a strong economy and create economic and job opportunities by promoting the conditions…strengthen national security… and manage the U.S. Government's finances and resources…
Transportation (www.transportation.gov)	To ensure our Nation has the safest, most efficient and modern transportation system in the world, which improves the quality of life for all American people and communities, from rural to urban, and increases the productivity and competitiveness of American workers and businesses.
Veterans Affairs (www.va.gov)	To fulfill President Lincoln's promise to care for those "who shall have borne the battle" and for their families, caregivers, and survivors.

For the complete list of departments and their strategic goals, see Appendix I

However, when goals are written in high level terms, such as the Department of Agriculture's first goal to "deliver programs efficiently, effectively, and with integrity," workers can find it difficult to understand how that translates to their personal work activities. It can be equally difficult for the American public to understand how taxpayer dollars are being spent. Is this goal meant to remind personnel to do their best work quickly and honestly? Then perhaps this is an overarching goal, rather than a specific goal of a specific department. However, due to current mission statement writing requirements, each department must reiterate the same point.

This repetitive statement concept is also seen in the management goals. Many of the departments have one goal dedicated to management reform (e.g., Department of Defense: Reform the department for greater performance and affordability) though each one writes it slightly differently (e.g., Department of Education: Reform effectiveness, efficiency and accountability of the Department). Wouldn't it make greater sense to have a standard overarching goal of management improvement or does the mandate to repeat it in each department obligate them to conduct reform methods independently? Certainly, it is recognized by the administrations that this is a cross-department activity, as evidenced by the President's Management Agendas. However, the analog, hierarchical system structure does not easily support cross-department strategic design.

Stated another way, even with great ideas, execution of them within this system would be challenging at best and impossible at worst.

User Challenges

In addition to structural issues, success metrics and analyses procedures do not lend themselves to adequately measuring outcomes that make findings meaningful and useable by recipients of the data. Specifically, current ROI and strategic planning measurement methods only focus on products or services delivered that assessed by time and money spent. However, considering these findings from an end-user perspective, we need to instead measure *quality* in order to know who can share networks, products, or information to improve effectiveness and efficiency across the system. But without ensuring the data is useful, these connections cannot easily be made and overlapping work as well as reduced impact is expected. Further, to determine how end users would need this information packaged in order to act on it, we first have to identify the users, or stakeholders. There are currently four groups that digest information from these documents: Congress, the President, the American people, and those that work in the departments. What if that aperture were widened to include other departments' Secretaries? Other departments' employees? Two common human-centered design activities used to address these questions are stakeholder mapping and problem framing. Both are applicable here as we envision a structural redraw and content review.

Stakeholder Mapping

Stakeholder mapping is a process that begins by determining who is influencing the system and who is influenced by it. This step defines the full landscape of individuals in a system and informs the research that needs to be conducted to understand what data is needed. Ultimately, the goal is to determine what format will be most effective for sharing with each group of stakeholders. Too often, we are inward-focused, meaning we only think about what we would like to share rather than what would be the most effective method or information to share. Further, as discussed in a previous chapter, there can be challenges in determining what we should be measuring. **If ROI is defined using limited standards for measuring "better", then we are working with flawed data,** hindering our ability to share accurate information, and ultimately reducing decision-making capabilities. Thus, it is imperative to think about the audiences and influencers of the information. In this case, since the digital communication pipeline makes it possible to share information to everyone anytime, anywhere, and immediately, it changes who is in that stakeholder group. Also, as we formalize specifications and standards for interoperability across the system, data production is improved and improved capabilities for sharing and accuracy are being developed.

Within any structure, defining who the stakeholders are for an individual or for a group is typically focused on those that a) we interact with the most and b) make decisions about our employment activities or c) have a vested interest in the activities of the individual or group. Currently, the President acts as the primary stakeholder overseeing the executive branch. However, if the workers in the branch are carrying out the mission, they also become stakeholders. Further, since Congress is the group that appropriates funds for these goals, they are stakeholders too. The media interprets and disseminates the information to the nation and to the world. Are they stakeholders too? Add the ability of Americans to access information from anywhere, any time and now the public becomes a key stakeholder as well, with the opportunity to read, assess, and provide much more input than was possible in the past. **When we widen the aperture for who needs these documents to drive their decisions and actions, we can reconsider how they are written** and ask the critical questions, "Do these documents meet the needs of all those that are expected to understand and use them?" The technical requirement is to write them to satisfy Congress but does that satisfy the intent of these documents? When there are multiple stakeholders in a system, satisfying all their needs becomes increasingly challenging but equally important.

PROBLEM FRAMING

> **Almost every President from Herbert Hoover to Ronald Reagan had this authority to redesign the federal government, the executive branch, to deliver services better.**
>
> – Barack Obama, presenting the President's Management Agenda (PMA) July 8, 2013

The second step is problem framing. This step involves thinking about the problem from a holistic perspective and constantly working to evolve it to find the root issue. By way of analogy, imagine being in a forest where you are constantly chasing fires. The initial goal is to improve the way one puts out the fire and then increase the speed of moving from one to the next. The goal of faster and better is achieved… and yet, the fires continue and sometimes even multiply. Eventually, the person or team are overrun; there are too many fires and not enough people to fight them. This is when we realize we cannot just improve at the tactical level, we must step back and look at the larger system. We begin to ask, "Why and how are the fires starting in the first place?" This line of questioning may lead to the realization that people are accidentally setting them. Soon, it becomes clear that educating the public on how not to start forest fires is a necessary step in the system. A marketing team is hired, a bear named Smokey is created, and now, there are fewer fires to fight, making the system manageable. **Oftentimes, it is insufficient to address only the immediate issues...rather, it is necessary to review the entire system to create the desired effect.**

It is no different within the executive branch. But the issue here is that due to rules and requirements, justifying the time and resources required to step back and gain a more holistic view can be challenging. The employees of the government take an oath to serve the American people. Yet how best to do that is fraught with personal opinion, preference, experience, and knowledge. It is further tangled in politics at the highest levels of government and in extensive multi-administration experience at the lower levels. Whether one focuses on the military, government, or Congress, changes in leadership are the norm, not the exception, adding to the messiness of properly framing, and addressing, the underlying problems. It also explains why the hierarchical structure remains unchanged. It fulfills the need for a stable, top-down, leadership-driven structure that can handle the constant change in administrations. But now that the technological communication opportunities have advanced, does it still serve the American people best to maintain this structure?

VISION

This idea of sharing ownership of solutions drives the goal of creating a multi-directional pipeline of input, not only because it creates the highest possibility of finding the best solutions but because it also creates the best chance of those solutions being carried out. Thus, working from an end-user perspective, strategic information would need to be consolidated at the highest level but curated from all stakeholder groups to create these outcomes.

When individuals are involved in creating the solutions, they become your champions. When they are the recipient of a plan, they become your critics.

Accordingly, modernizing the communication pipeline, data collection, analysis procedures, and data consolidation, as well as designing a pathway to success, become important elements for the future. Specifically, multi-directional communication would allow information to be shared but also received between the highest and lowest levels of government and the American public. Data collection that is secure, organized, and searchable makes it usable and consumable. Analysis procedures that incorporate big data techniques can better filter noise from important points to organize them in a digestible manner. These tasks allow strategists to meaningfully consolidate the findings. Ultimately, consolidation makes translating the information for empowering each stakeholder community to maximize their skills and achieve their particular goals possible.

An open innovation structure can support this **multi-directional data communication system** by connecting outcome information to create a forward plan and pathway to success. This is possible because **the open innovation model differs from a hierarchical system in the way value of information and input are re-defined**. In a hierarchy, the person at the top is assumed to have the greatest capability to decide everything based on the belief that he or she has a) the most experience, b) the most information, and c) the greatest number of connections. However, in a world where it is possible to exchange information instantaneously, the value proposition necessarily and naturally changes.

First, there is an important flaw in the assumption that experience is the singular indicator of capability. Certainly, experience is important, but there are many other determining factors that have rarely been considered but which advancements in technology can support. Technological maturity allows for

capabilities to be recognized, defined, and measured, which, in turn, allow for improved team structures and ultimately, improved outcomes. Stated another way, experience used to be the primary method for gaining knowledge but technology makes it possible to curate it from a social network faster and better.

Thus, it is not technically experience that matters for decision making, rather it is the ability to curate and synthesize information and translate it to a plan that is important. In fact, it is expected that decisions based on a set of experiences and collective knowledge across an extensive number of people would greatly outweigh the quality of decisions a single person could ever develop independently.

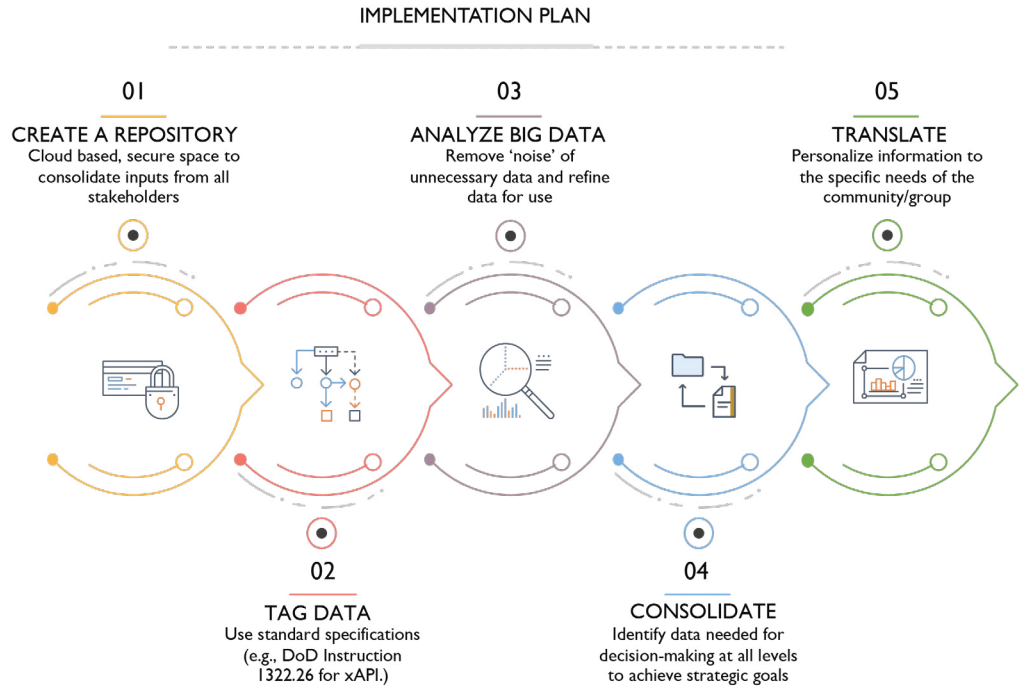
When we value input from the stakeholders in a system, to include those at the strategic, tactical, and recipient communities, we create the opportunity to maximize the quality of decisions and completion of associated solution plans.

IMPLEMENTATION PLAN

How can we increase impact at the strategic level for the nation? How do we curate and synthesize data to drive decisions and plans? It is easy to recommend listening to all groups affected by the decisions government makes in order to determine what Americans most want and need. It is a much harder reality to carry out. To date, the way this is handled is to create a plan for a government program, post it in a publicly accessible location, and give the American public a period of time to post comments (Office of the Federal Register, n.d.). How these responses are gathered and used is variable across groups and departments. The number of people who respond is calculated but how their data is used is not always clear. Further, this method assumes that everyone is aware of the information that has been posted and knows how to interact with the opportunity. It also assumes that the way in which the information is gathered will be useful for the decision maker. Rather, this creates limited access, laborious review, and therefore, also reduced effectiveness. **Accordingly, an improved method for data capture that includes improved equity of access and opportunity knowledge plus improved analysis and translation procedures is needed.**

In response, we present five key enabling tasks that could help create an open innovation model structure that could better inform decision makers at the strategic level. The first is to create a repository for the data gathered from

stakeholders. The second is to develop a tagging system that would help define each of the input parameters to support data organization. Third, big data analysis techniques would need to be implemented to adequately handle large data sets. Fourth, stakeholder representatives from across the communities would need to test ideas with other members of the stakeholder groups then consolidate the information into a plan. Finally, these same leaders would need help translating the message across their respective groups.



1. **Repository:** A cloud-based repository of information would need to be created to house all the inputs provided. This space would need to be secure, possibly anonymized, and able to consolidate inputs from all stakeholders. The Office of Personnel Management's USA Learning office is already building these structures for groups across the public sector. A fee-for-service enabling program, USA Learning has the capability to orchestrate the building of a data lake but requires funding to execute. This approach can be coordinated, but only with approval at the highest level of decision making. Without clear lines of budgetary support, individual organizations cannot act on this goal.

2. **Tagging:** Information would need to be tagged to facilitate meaningful analysis. The Advanced Distributed Learning (ADL) Initiative supports Department of Defense (DoD) Instruction 1322.26, which outlines the recommendation to use xAPI (Experience Application Programming Interface), a set of specifications that are becoming standards through the Institute of Electrical and Electronics Engineers (IEEE, P92741.1 xAPI Work Group, n.d.). In non-technical terms, this is the language that technologists can use to describe behaviors and information stored in a database. It allows for standard descriptions to be used and makes analysis clearer.

3. **Big data analysis:** Technically, big data analysis simply means one is analyzing a large database of information. But the reason there are new techniques being developed is because once significant amounts of data are available, two issues arise. First, it takes too much time to analyze large amounts of data with older methods, even using computers. Second, there is a lot of what data scientists call "noise" present in these large repositories. In other words, there is information included that is not relevant or useful, creating noise in the system and confusing the analysis. Thus, big data techniques need to be applied and refined for public sector needs in order to improve analysis to drive decision making.

4. **Consolidation:** Personnel at all levels, representing all departments affected by the strategic plans, would benefit from participating in defining the tactical plans borne out of the strategic goals. A primary benefit of this activity is that metaphorical potholes can be identified to help develop proactive contingency plans and make future success more likely. In other words, those working most closely in carrying out plans are also the best equipped to anticipate problems and plan forward. With their help, efficiencies can be realized.

5. **Translation:** All communities differ in the way they operate and communicate. Accordingly, information is best provided in a manner that can be understood by all and that resonates within each group. Personalizing messaging increases the likelihood that goals will be accomplished because each community best understands their individual roles and tasking.

CONCLUSIONS

Transforming from a top-down, singular message to a distributed decision-making system creates the opportunity for not only the best solutions to be recognized across communities, regardless of rank, but also the greatest chance for them to be carried out. By widening the definition of stakeholders who receive and need to use the strategic documents written by the cabinet members, it creates the ability to consider new ways to communicate goals that are digestible at every level and by every community. By creating open pathways for these stakeholders to provide information up and across the network, the Secretaries would be empowered by extensive data to inform their decisions.

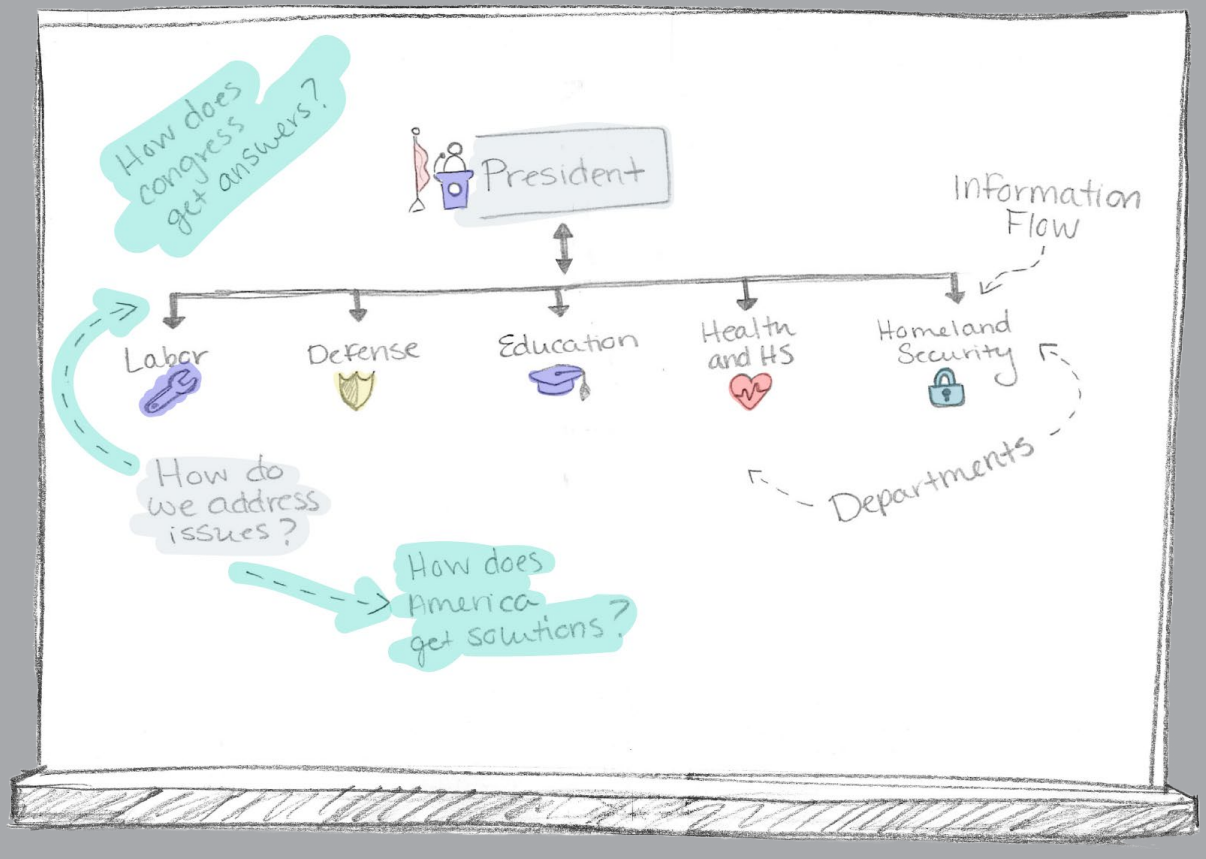
How can we accomplish and support this cross-department structuring?

CROSS-DEPARTMENT STRATEGIC DESIGN

SUMMARY

Inherent in the current structure, is the requirement for The Cabinet level political appointees to be responsible for the outcomes and solutions produced by their departments. By mandate, each is required to write the previously discussed strategic plans and to align them to the President's Budget proposal and requirements set by the legislative branch. But looking at this structure from a different perspective, we see that while they are responsible for the work from their own departments, none are responsible for the work of other departments or the holistic outcomes that the executive level strategic plans identify. Because everyone is required to be focused on only one department, there is no formal pathway for developing joint solutions. Thus, this chapter explores the possibility of combining goals, and how connecting communication, planning, and co-creating could increase return on investments.

Connecting ideas for a flexible innovation ecosystem



CURRENT DESIGN

The previous chapter described how the current hierarchical communication structure of the executive branch is designed to move information from the top to the bottom, down the chain- of-command. Outcome data is provided up the chain through answers, solutions, or widgets to help the Secretaries address their strategic goals, and ultimately, the President to achieve his or her strategic vision. However, trying to achieve goals that require input from multiple sources such as expertise or financial support, and different tools or methodologies can incur many costs in hierarchies. Namely, when we need to borrow from our neighbor in the government, how do we do it?

In the private sector, this can be as easy as borrowing sugar from a neighbor. A person can generally walk over to a colleague and ask for help. We assume there is a culture of supporting other workers, groups, or departments because after all, they are all working for the same company, which is presumably trying to make money to pay both of their salaries. It is mutually beneficial to share ideas. Ownership is less important because they are both going to win or lose if the company is successful in generating revenue or if it is not. However, in the government, due to the way resources – including time and money – are allocated, each person, group, and department is not responsible for, nor directly affected by the system's failure or success. Each of these layers is typically focused on meeting requirements set forth in their strategic documents toward a mission or goal, or on line items in a given budget. Inherent in this system design is a disconnected set of mission goals where each layer is responsible for and assessed based on the sub-goals rather than the over-arching strategic missions. **The unintended secondary effect of layered goals is a reduced incentive to be jointly successful.**

Though unintended, there is an incentive to outperform and fight to gain the resources of one's neighbor. If one is allocated more resources, one controls more people, time, and money, and has more power in this system. Further, the way money is allocated leaves little wiggle room for work across departments. There is an area, however, where cross-work is not only allowed but encouraged. **Innovation and research programs are allowed more leeway in how they coordinate and make connections across departments and labs.** There are three types of innovation programs within the public sector: basic and applied research, enabling programs, and connecting programs. This system of innovation could be used as a methodological starting point for cross-departmental impact.

It's not just about the outcome of the research, it's also about the method for building innovative solutions for the nation.

Creating a culture of innovation as opposed to observing innovation as a task completed by individuals or teams within the research space would change not only the structure of how departments, officials, and groups interact, but it would also change the way communication flows and the way solutions are developed. **A culture of innovation would look like a team of teams that coordinate in a variety of ever-changing structures.**

> **The Federal Government's challenges have not arisen in isolation, and it cannot solve them through isolated efforts. To really get traction on these complex and interconnected challenges, broader, system-level thinking is needed to tackle interconnected barriers to change.**
>
> *-PMA p.23, 2017, p. 23*

Open Innovation Structure

What options are there for this type of structure and what could the impact be? Generally, there are three options. First, individual departments could request, through the President's budget, to either set up their own innovation offices or obtain funds to expend on fee-for-service programs. Second, they could create a centralizing initiative, program, or office by executive order. This is how many programs are developed, such as the Office of American Innovation (2017). The third option is to create a Department of Innovation. But what are the benefits and costs of each option? And, more importantly, which one best achieves the goal of creating sustained innovation?

Although a new agenda is developed every four years and invariably includes a push to reform, increase efficiency, and improve effectiveness, clarity on the benchmarks for achieving those goals is much less clear. Further, true reform, rather than incremental adjustments, is difficult, if not impossible to achieve because of the rules of government and the way in which money is moved through the system. If we assume that all recent presidents have tried to reform the government, and agree that the mark has been missed, perhaps it becomes necessary to apply the same principles of innovation to the structure itself by re-

> The work of reform is continually overwhelmed by the constant multiplication of hopeful new government programs, each of whose authors is certain that this particular idea will avoid the managerial problems to which all previous government programs have succumbed. Congress, the Executive Branch, and the media have all shown far greater interest in the launch of new initiatives than in following up to see if anything useful ever occurred.
>
> *-PMA 2001*

imagining how connectivity is defined, architected, and impacts the system. Thus, rather than making incremental changes or adding new offices, programs, or initiatives, we could consider implementing a large-scale reorganization, re-structuring, and integration plan that includes all stakeholders in the system and is no longer built around the existing, outdated governmental framework. **The greatest assets of the United States of America are diversity and creativity yet the governmental structure, by design, can reduce these benefits through controlled bureaucracy, rules, and communication limitations.**

All Americans would need to be involved for this plan to succeed because innovation is not invention and does not involve only government, academia, and industry. To confront the strategic-tactical divide, we would need to create an interdependent system that recognizes the benefits of multiple skill types and experiences.

Developing a coordinated space would allow for the temporary shift in the system needed to develop a culture that values input from every department and cultivates the expertise and experience of the American people. It could give individuals time to be part of the solution without having to relocate or obtain a full-time job within the government. It could provide an intentionally collaborative space where cross-department teams of experts would be the norm rather than the exception. It could connect individuals with long-term public sector experience with the next generation government workers or innovators from across the nation to collaborate for proactive planning. Finally, it could be a connecting, enabling, intentional unit explicitly tasked to assure the best and brightest solutions are being shared across groups, communities, departments,

Congress, and the American people. What it could not be is permeant. Consider the need to reorganize a closet. We declutter, package, repackage, build shelves, fix a section, etc., but it never seems finished. Why? Because to truly re-organize to create an improved system requires more than just cleaning a section at a time; it requires one to first empty the closet and then repack it. In order to do that, one first needs to create a temporary space to move everything until it can be relocated. Though the move would be temporary, it is also necessary. Thus, an open innovation system could provide the metaphorical space needed to support a re-organization.

Small businesses prove that large businesses don't innovate as effectively - likewise-small countries can innovate more than large countries - likewise the National Park Service as a small department can innovate in ways the larger departments can't. I know beyond a doubt that we couldn't have done this in a larger department. We have the best medicine, but we are so contrained.

- Dale Carpenter, National Park Service

Innovation Mindset

Innovation is about creating the mindset to think and know where to find the other problem solvers. This idea is similar to the Department of Defense's Innovation Marketplace (https://defenseinnovationmarketplace.dtic.mil/). If one has an idea, they can go there and see if someone else has or knows something that might help them. Essentially, it acts as a centralizing space that is known to others for coordination and collaboration. Similarly, with regard to a department of innovation, instead of prescribing a path of how to innovate or prescribe innovation-on-demand (e.g., "when you get to step three in the acquisition process you must collaborate with another member outside your dept…"), the goal is to focus on enhancing the tools that people are using to innovate and to designate a space in which to create together.

Some key groups are already tackling these considerations and attempting to develop new supporting tools. The Office of Personnel Management is

investigating different methods for managing talent across the federal workforce (Office of Public Management, 2018). The Center for Leadership Development (CLD) is considering new ways to structure education and talent development to promote a world class workforce (CLD, n.d.). The Federal Interagency Team on Volunteerism (FITV) has created a volunteer talent and experience management system to help provide opportunities to federal workers to expand their experiences by sharing their expertise across programs or projects benefitting the nation's resources (Youth.gov, n.d.). The Virtual Student Federal Service (VSFS) program creates a conduit for individuals across the nation to support international efforts from their own home and at their own pace and gives students opportunities to intern for projects from more than 40 federal agencies from anywhere in the world with a broadband or internet connection (VSFS, n.d.). MD5's hacking for defense program creates a pipeline of challenge-focused activities that allow experts and students to tackle difficult problems to support a wide-variety of wicked problems in the defense department (Hacking for Defense, n.d.) and citizen science projects create opportunities for grassroots initiatives to solve problems across the nations with support of the federal government (see CitizenScience.gov, n.d.).

However, in spite of individual advances being made in each of these highlighted programs, their awareness of each other is limited or non-existent (PMA, 2018). With appropriate and determined efforts and focus, the goal of each group, and each department is focused on the requirements from Congress. But these programs have surfaced to focus on the in-between, or the glue that connects programs. They exemplify key methodological examples that could be replicated across the system but would require organization. The goal is not to force individuals to work together in a task-based culture system but rather to create a fluid space and system that supports a culture of innovation and leads to optimized solutions.When you connect work across the federal government, you can find representative structures and methodologies that, if combined, would yield a flexible ecosystem of innovation.

The Presidents' Management Agendas (PMAs):

Attempts to improve the system

The Presidents' Management Agendas are cyclically updated and reflect the issues being faced at the time of their writing. When looking across the agendas though, patterns can be seen that affect not only internal actions and goals but also affect how the public views the government's actions during those timeframes. For example, the goal of the 2001 PMA was to **define** several key issues regarding bureaucracy and the challenge in affecting it.

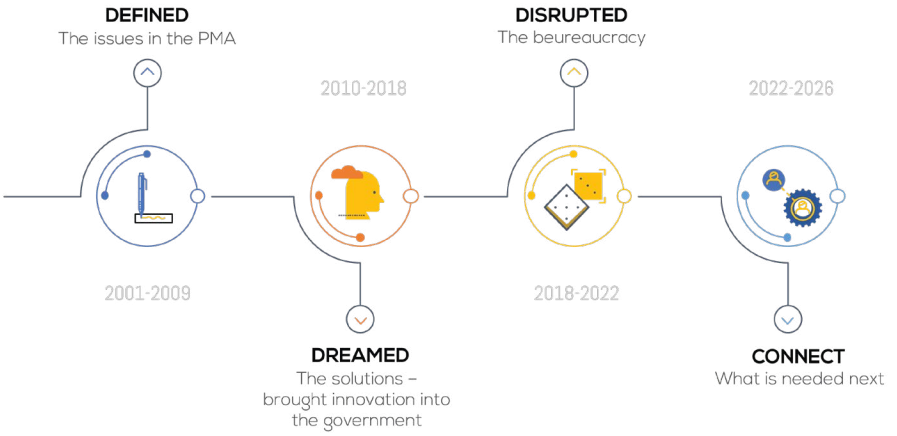
> To reform government, we must rethink government. The need for reform is urgent. The General Accounting Office (GAO) "high-risk" list identifies areas throughout the federal government that are most vulnerable to fraud, waste, and abuse. Ten years ago, the GAO found eight such areas. Today it lists 22. - *PMA 2001, p. 3-4*

In the next stage, the focus was to bring in extensive idea generators to **dream** the future and begin proactive planning. Based on the belief that global competition necessitated an elevated 'way of doing business' because the digital highway changed the way information moves and consequently, the way the world operates. These global market changes favor smaller, more agile nations because they can reform their practices and focus areas much more easily. The same is true within our government. It is easier for the smaller departments to create changes than it is for the Department of Defense, the largest of the 15.

> It makes sense for us to be able to redesign government so that it can deliver on the functions that the American people are looking for. We should all want a government that's smarter, quicker, and more responsive to the needs of the American people...the good news is America is full of talented, dedicated public servants who are working really hard every day to uphold the public trust...We've got to have the brightest minds to help solve our biggest challenges. – *Barack Obama, presenting the PMA July 8, 2013*

However, as more people entered government, and more solutions were brought to the table, the system became overburdened and locked, especially because it was an analog system. A single human could never digest all the incoming data adequately to make sense of the information and use it optimally. Thus came the need to **disrupt** the system.

> Government must recognize that it can no longer meet modern needs with the same approaches, technology, and skillsets from centuries past...In some cases, real change will demand different agency structures. In other cases, we may need to update rigid requirements from the past that hold back Government...The President's Management Agenda identifies Cross Agency Priority (CAP) Goals to target those areas where multiple agencies must collaborate to effect change and report progress in a manner the public can easily track. -*(PMA 2018, p.8-9)*



VISION

> What you need is a scholar-practitioner because if you only have a scholar then they can only tell you the background research but they can't tie it to anything in the real world. But if you have only a practitioner, then they are wrapped up in their own experience but can't connect it to anyone else's findings.
>
> *– Mr. Riz Shah, Department of Energy*

Once a system is disconnected, the next question that inevitably follows is, how do we re-connect the system using all the knowledge of the past combined with the goals of the future? In the case of the U.S. Government, the goal is to balance the need to maintain a stable structure, meet the needs of the country, and do so at the lowest cost but the highest impact. If an enabling space for innovation was developed to coordinate across the departments of specific expertise, three key steps would need to transpire.

1. **Define goals, mission, reason for existence**: To consider the development of an innovation space, goals would need to be clearly defined, and sufficient reasons given to justify the need to establish this workspace. In this case, there are three key reasons to consider a new initiative, program, or department. First, substantial numbers of innovation sectors already exist across the government. They span every department, suggesting that innovation is a **key enabler** of all focus areas. Second, although there is substantial agreement regarding the use of innovation methodology and viewpoints, cross-departmental **connectivity** is lacking. Ironically, stove-piped solutions, are a major driver for innovation and yet, innovation in pockets without collaborative exchanges can easily reduce rather than promote a culture change. These two points could be addressed by the use of an office rather than a department. The final, primary reason for considering the development of a new department, is the need to approach governmental activities holistically, to include its role with Americans as well as its development and execution of solutions. Without Cabinet-level empowerment, a lower-level organization will lack time, money, oversight, and most importantly, the authority to be regarded as a key strategic enabler across all decisions.

In short, a department would enable the government to transform from using innovation as a task or tool to making it a national cultural-mindset.

2. **Define tasking:** The next aspect to consider is departmental tasking, which could fall into four categories: **Enablement, Coordination, Collaboration, and Co-creation.** The enabling arm could house a network of innovation educators who could provide the tools and training across the departments that empower transformative thought and improved solution-development. The coordination arm could focus on ensuring that the right arm is talking to the left- ensuring that awareness of work across the government is accessible, digestible, and usable. The third arm of the innovation space could focus on collaboration activities. Awareness is the beginning but collaboration requires designated time and space. This solution-focused group could design space, time, structures, and funding to accommodate collaboration activities. Finally, co-creation could involve not just the internal government employees but also Americans across the nation and international connectivity with allied nations. **The ultimate goal would be to define solutions with all the stakeholders, to encompass broadening the range of topics to include areas such as improving international economic competitiveness, national branding, and unifying a stance and plan for the environment.** To date, no single department has been tasked with the goal of promoting innovation across the federal government or to change the way in which human infrastructure is managed to promote a culture of innovation. Rather, each department is trying to infuse these concepts into their departments and throughout their programs. However, if we consider innovation to be something beyond simply creating new ideas, and instead aim to develop sustained innovation, then we have to consider new pathways, methodologies, and system-wide evolution because anything in government that becomes instantiated is often then hindered by bureaucracy.

   Think tanks aim to answer the goals but several issues exist in their structure. First, there is no direct communication pathway to either define requirements for these groups nor to move their solutions back to government efficiently. Second, there is an over-abundance of information available but making information technically accessible may not make it necessarily realistically digestible or applicable. Finally, they operate outside the governmental structure and as such, are not easily accessible by the federal employees. Thus, we need to meaningfully incorporate them into the innovation ecosystem along with other supporting groups to optimize national solution development. However, it is not enough to envision flexible structures - decision making rules would also need to be re-defined. Thus, the need for formality within the system, such as a developing a new department, doesn't come until there is an actual road block to achieving the goal. However, by mandating and creating either a department or a framework, the formal entity, in and of itself, becomes a burden. Infrastructure that supports the sharing of information would need to be developed and tested, and supportive tools as well as enabling programs would need to be expanded to create a functional, fluid system.

3. **Define steps to coordinate at the strategic level:** If an innovation space was created, it would act as the connective tissue across government, requiring substantial interaction at the highest decision-making level. Specifically, while it is important to support stakeholders at tactical levels to promote better solutions by providing improved tools and training, cross-coordination at the highest level is also a vital ingredient. First, **an innovation-focused department would provide forward-thinking leadership across government and the nation by providing a strategic-level innovation vision of the future, looking not only at immediate success but also long-term goals.** Second, a dedicated department or initiative for innovation would, over time, build an innovation culture by engaging in human-centered design principles discussed in earlier chapters: embracing a multi-faceted approach to creative problem solving, empowering workers to elicit innovative practices, carefully devising innovation metrics for maximum benefit, and always learning from what went before and looking to the future. Third, at the strategic level, the department would have knowledge of and access to resources and workers to build effective and collaborative teams with a broader outlook than organizations at tactical levels. Yet, additionally, as noted earlier, when this culture develops and the improved communication architecture is in place, an exist strategy that de-formalizes the department or program would need to be employed. The goal is to be fluid rather than create permanent fixtures that increase government bureaucracy.

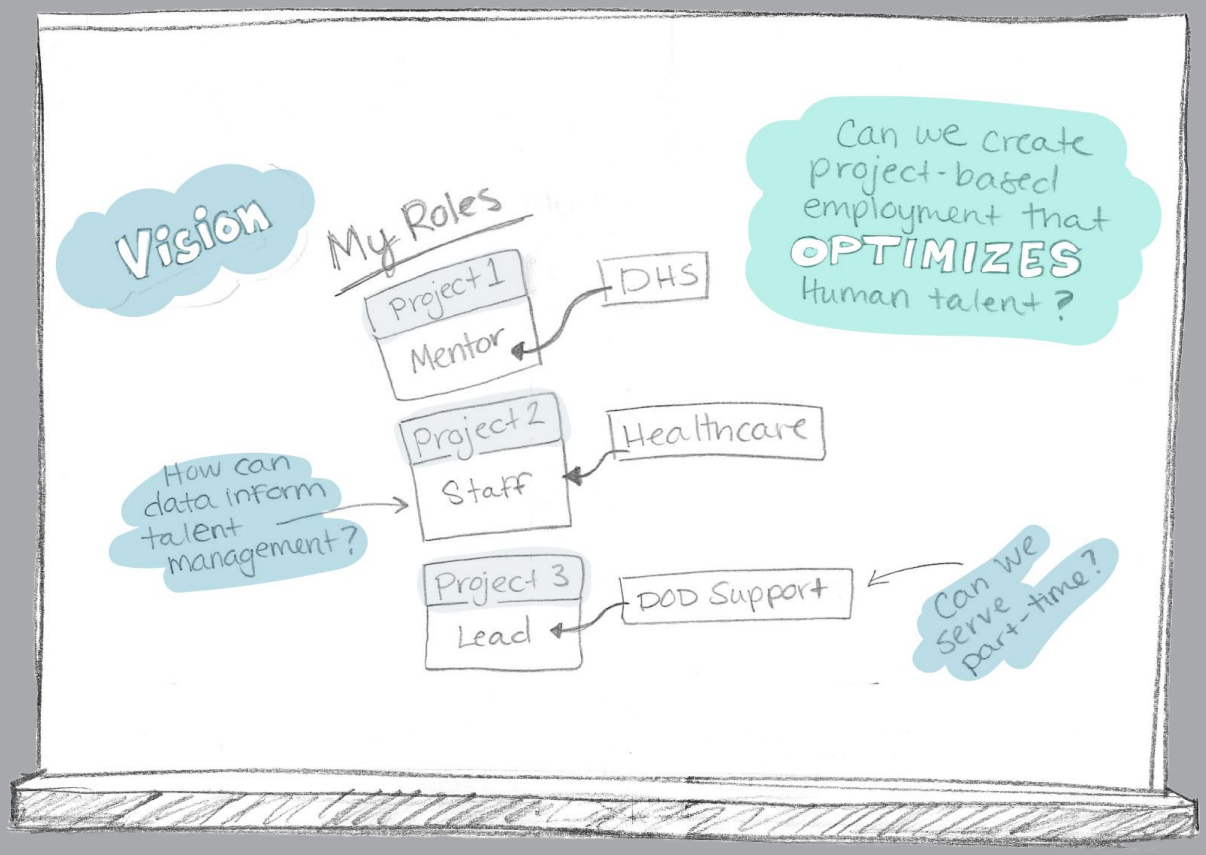
If we apply these same principles at the tactical level to support talent management, what would we do dirrently and what would we gain?

HUMAN OPTIMIZATION

SUMMARY

Now that we've covered the strategic level coordination, we have to consider the employees that would carry out these changes. The federal workforce is therefore the focus at the tactical level. Hiring and retaining effective talent are primary concerns for the longevity of the executive branch (EconSys, 2018). Specifically, the model of long-term 30-year service is no longer the primary goal of the federal worker. New hiring and retention practices must be developed to attract and retain the next generation of employees. As society changes, the government also must evolve to keep up. But evolve to what? And in what way? If we are committed to looking at the entire system, we must consider the tactical-level workers in two ways. First, we must provide supportive communication pathways to help them develop the solutions to problems identified at the strategic level. Second, we must consider how to enable programs to attract, hire, retain, and create an effective workspace for our federal employees. As such, this chapter focuses on identifying those enabling structures that could help improve the quality of the federal workforce but also the foundational structures that could help make their work maximally effective within a culture of innovation.

Creating a fluid, flexible federal workforce ecosystem to optimize American talent



CURRENT STRUCTURE

> **The personnel system supporting Federal employees is a relic of an earlier era that has failed to keep pace with changing workforce needs. Both employees and managers agree that the performance management system fails to reward the best and address the worst employees.**
>
> ***– PMA, 2018, p.18***

Hiring Practices and Challenges

A director of human resources faces several challenges when hiring workers for the federal government. The average time to hire federal employees was 106 days in 2017 (Ogrysko, 2018). Considering the average hire time across U.S. industries was 29 days, federal agencies face increasing competition for qualified workers (DHI Group, 2017). Additionally, due to hiring quotas for specific positions, programs requiring additional personnel must find another program willing to donate a billet, or a position, to be moved to their team.

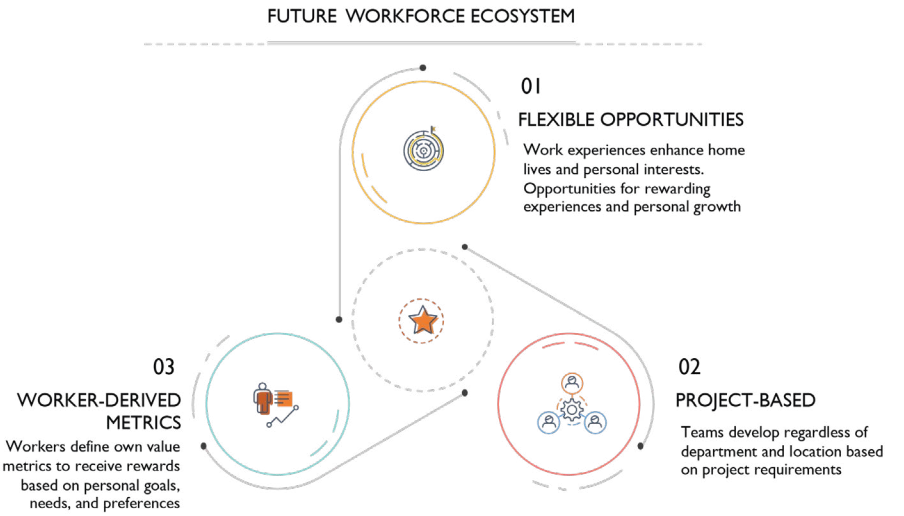
Alternatively, awarding external contracts is a much faster process. However, the government must follow many rules defined by the Federal Acquisition Regulations (FAR) to contract external services (FAR, 2019). For example, because Congress designates specific pots of money, departments must justify expenditures. Also, a government contracting officer and - because these documents are long and complex – a government lawyer must review all necessary documents prior to awarding a contract. Next, there must be a competition for award, including contracts set aside for a variety of small and/or disadvantaged businesses (USA.gov, 2017). Money, time, and human resources is expended at each layer to write, organize, plan, and execute. But none of this considers the human impact of what happens when contractors are hired. Because they are not part of the federal government, they must follow their own company's rules. They provide deliverables to meet the terms of the contract, rather than cohesive solutions. And when people are not truly part of the system, it is much more

difficult to establish team cohesion and buy-in. Hiring internal employees can be impossible. Hiring contractors can be costly, time-consuming, and comes with psychological challenges to system effectiveness. **How do we consider alternative solutions that promote a culture of innovation while honoring equity, opportunity, and expertise needs?**

VISION

Optimizing America's Human Talent

Over time, the American Dream has evolved from a singular ideal of upward mobility into the American Experience, where home and work life are intertwined and viewed as a personalized journey rather than a destination. The public sector will need to adapt to these expectations by workers in order to continue to attract and retain top talent. Future personnel will need the opportunity to enter at a variety of levels, for multiple reasons, and stay for different lengths of time. They will also expect an experience that adds to their personal growth. Accordingly, workforce development in the future will not only focus on technical job skills and requirements but also on a variety of personal interests, life experiences, social interactions, and soft skills development. In the future, jobs will be viewed as part of a person's life journey rather than a means to an end. Employers that offer the most personalized, engaging, and meaningful opportunities will attract the best talent.



Flexibility, interest, and meaning will drive engagement and productivity in the future workforce. Individuals will increasingly work when they want, where they want, and how they want. Work goals across the nation are expected to be more commonly project-based rather than time-based, allowing individuals to achieve success through many pathways. Collaborating effectively to finish the task on time is expected to be the key factor for success rather than being concerned about who finished the task or how it was completed. Thus, complementary people and systems will naturally develop themselves into teams to improve project time management. It is also expected that workers will collaborate more effectively when completion is the goal and they are given the freedom and trust to solve problems. Workers are driven to create optimized, holistic solutions when they find their work meaningful and interesting, and feel valued not only in the workplace but also in life.

Meaningful and interesting projects will attract the most driven talent. Allowing flexibility of thought, time, and structure will result in the most optimized solutions.

Role Flexibility

Rather than remaining siloed within departments, large-scale projects focused on solving today's issues and anticipated issues of tomorrow could be the organizing units. Accordingly, for each issue, different departments would take the lead or co-lead. At the individual level, a subject matter expert could be the leader for one project but, at other times, a management expert could take the reigns. These decisions would be made based on the timeline of the project and the goals. If the goal is to create new solutions, the thought leader is the one in charge but if the goal is to carry out the plan, the manager might be instead. **The key is not to decide a fixed structure but instead to create a fluidity in structure that defines people or teams by roles that are different per goal.** The adaptability that is required is to enable the fluidity and transfer of this leadership. Identifying specific roles for personnel often leads to creating more isolationism in problem solving instead of innovation. Alternatively creating an ebb and flow of leadership could enhance collaboration based upon each individual's strengths, rather than time in service.

For example, consider a nurse who demonstrates exceptional abilities working with patients, families, and doctors. As a reward the individual is offered a position as a manager. It is considered the next level in the chain and comes with a higher salary and more responsibility. Ironically, however, it does not capitalize on the skills the nurse demonstrated that make him eligible for the position. Now consider a person with extensive management experience in a business field that decided to get a nursing degree. But this person found she was not very good working with the patients. She did not like some of the hands-on work that was required. The question is not, which one is a more valuable employee? The right question is, which employee matches which job best? The same concept is relevant to decision making and input across the federal workforce.

Pathway: Tactical Planning for Optimized Development

Significant technological development has occurred in our nation over the last 20 years creating the opportunity for talent identification, education, and management. Individualized development and management based on extensive data analysis of information beyond a traditional testing environment to include learner traits, tendencies, competencies, and experiences can enable us to create more actionable and effective interventions for optimizing the future workforce.

This technological maturity not only enables us to create significant changes in employment opportunities, it also changes our access to information and data and affects the way Americans think, interact, develop, and seek jobs. Consequently, Americans' expectations for what a job will provide, how and where work will occur, and what their career trajectory will look like has also changed dramatically over the past 20 years. In response, the federal government must find new ways to accommodate these workers of the future so we can maintain a world class workforce for America. Accordingly, several key trends have been noted. First, **education is variable.** No longer do employers value formal degrees as necessary or sufficient for job success. Experience matters. Second, **competency-based badges measure more than formal education**. They measure and communicate traits, talents, skills, knowledge, preferences, and experience across employers, educators, and military. Finally, **age is not necessarily correlated with skill, rank, needs, knowledge, or capabilities.** We must therefore redefine ways for our workforce to measure personal success that reflects this developmental shift. Since it cannot be assumed that age is correlated with income, rank, ideas, or leadership, we must reimagine the definition of

worker value and how we communicate and satisfy the need to be seen as a useful contributor in our future workforce.

Thus, creating a framework for optimizing the future federal workforce could pivotally augment the way we employ the American people and fundamentally accelerate and improve the process of identifying, developing, and utilizing federal personnel. This technology-enabled framework will not only allow us to develop our workforce anywhere, anytime, it will create the structure needed to optimize talent development, management, and maximize personnel capability at an unprecedented pace.

Extensive research in technology development, psychology, and learning science has created a repository of complementary recommendations that when combined create an optimized framework for future worker development.

IMPLEMENTATION PLAN

To date, individuals have been hired into the federal government for specific positions at specific pay rates based on a combination of availability, work experience, time in government, and formal degrees. Training programs have been linear, didactic, group instruction, face-to-face, and based on civilian or military rank. In the future, this system could transform to be a fluid, eco-system of workers that are assessed by many factors using multi-dimensional whole-person assessments and defined by micro-skills and attributes. Personal learning experiences could be seamlessly inter-woven within both work and home life, provided at the point of need, anywhere, anytime, experientially. To begin the process of change for achieving this goal, we would need to use design thinking to create an optimized user experience, clarify what steps could be achieved through internal programs, and determine what external help is required. Human-centered design allows the federal government to not only improve the process for identifying future workers and organizing talent management, it enables us to be "transformational" and holistically re-imagine the future workforce framework.

Call out: Military Talent Management

The military's formalized structure is clearly defined by ranks, military occupational specialties (MOSs), and tasking. These structures have served the nation well and were put into place for specific reasons. Yet some of these reasons are no longer as relevant as they once were, leading to discussions about possible alternative pathways, opportunities, and skillsets to help defend the nation. For example, personnel passed up for promotion two times are forced to separate (Grisales, 2018). But what about those individuals who wish to remain in a particular billet long-term? Not everyone desires a leadership position and not all leaders are good at working their way up the system. This illustrates the point that talent management should aim to put the right people in the right place at the right time, not simply move people up a chain. Additionally, communication and decision making have traditionally relied on a clear chain-of-command. However, the information age allows people to share information instantaneously. Also, cyber, asymmetrical, and irregular warfare require the ability to be aware and the capability of making decisions at all levels. Further, as technological and data maturity equalize across the world, optimization of human capabilities becomes necessary for developing defense-advantage (CJCSI 1800.01E; CJCSI 1805.01B; DoDD 1403.03; USA: TP 525-2-7-01, USA: TP 525-8-2, USAF, 2013; USMC: 2008, 2015; USN: 2017). Therefore the military often questions the benefits of adding additional data to the rank-based system toward one that also includes talent management, human optimization, and cognitive capabilities. The goal is to develop a system that augments the benefits to decision making gained from experience, age, education, and information-access with the capability to also benefit from the unique attributes, expertise, interests, and capabilities of individuals across the system.

> **We're truly looking at talent management. It's not personnel management, it's not people management. It is talent management, because I want to describe each and every one of you based on your talents and the capabilities that you bring to the table.** – *BG Joseph McGee, U.S. Army, Talent management, iFest 2018*

Phase I: Assessment · Personalization · Data Capture

The first phase could consist of creating multi-dimensional assessment procedures, implementing data capture methods, and supporting manual personalization. For example, onboarding procedures could begin with a whole-person assessment that measures attributes, knowledge, skills, experiences, and personal goals. Assessment data could be captured electronically, tagged, and stored in a Learning Record Store (LRS) where the individual's supervisor would have access to the information needed to personalize education and training tracks as well as work placement decisions. There could be periodic assessments throughout the individual's career trajectory, and a virtual resume outlining completed training, tasks, or projects which could be maintained, stored in the LRS, and provided to the person's supervisor. Upon leaving, the individual could transfer the file like a transcript to another employer.

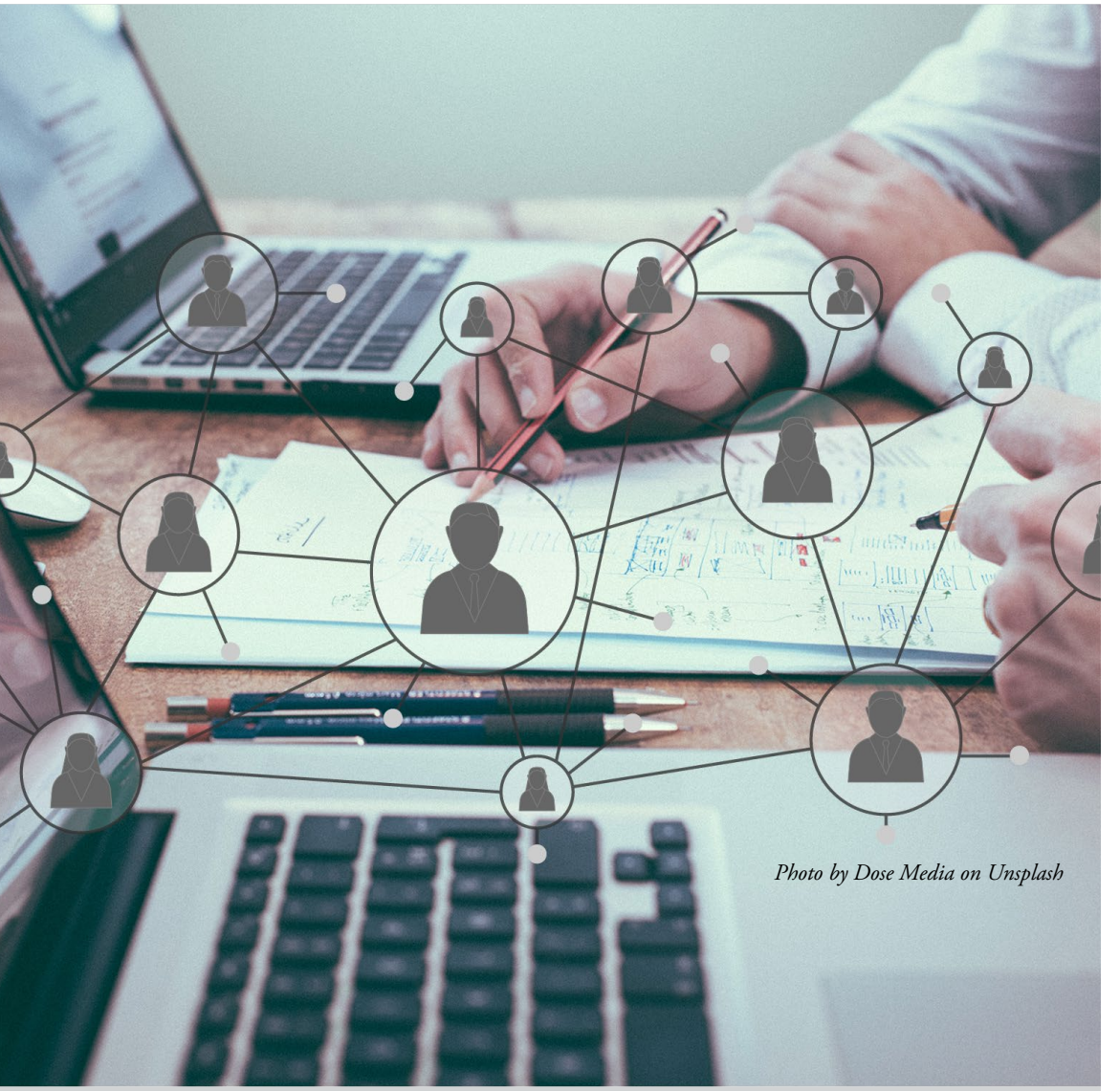


Photo by Dose Media on Unsplash

Phase II: Analyze · Automate · Experience

Tomorrow's nationwide talent management system will become competency-based, with learning experiences based on automated data analysis, personal need, and interest and accessible anywhere, anytime (Walcutt & Schatz, 2019). Rank will mostly be used for income regulation - it will be less of a factor for defining tasking, team organization, or personal learning experience recommendations. A general and specialized competency framework will be developed that defines technical skills, general knowledge, soft-skills, and stage of life. Employees will have several options for learning both in content focus and location.

Department of Treasury – Talent Management

We are taking on leading edge technology to be one of the first government organizations to put an integrated talent management system in place…The integrated talent management will replace 27 unique Treasury systems that keep track of personnel, learning, workforce planning, succession planning, and try and do…the integration for all of us to be able to get better reporting up to Treasury and amongst each of the eleven bureaus, that we're responsible for. The key around the integrated talent management that we've been focused on is, we've identified competency management as a key Rosetta Stone to the entire program. We've actually said the I in integrated means competencies and how it ties to our performance in our learning alone. If we get that started, in the next year, we will have a major win as we see it. The big areas that we're focusing on is…where we can reuse and provide a group of competency management across Treasury that can be borrowed, redone and shared because Treasury is a shared service provider to a lot of other government areas. We're trying to find those simple ways to address what's the 80% across the board.

An example for IT, as we are a competency working group and we've been together for a year, [we've] pulled together a lot of competency models to see what we have. In IT, we know three individual competency models across three of our bureaus. Everybody is special. So they need certain areas. But when we get to the 80% we'll realize most of its common. Finally, core competencies that we can build in the IT competency world and then the uniqueness of a certain group, in working with certain cyber acts and certain Congressional requirements we report to. The idea is try to get some commonality to report on. Then we can move across the agency and figure out where we have our gaps. Where do we have our strengths and weaknesses. Where should we be trained, and focus our resource dollars towards that.

– Mr. Gerald Leach, Department of Treasury, Talent Management Panel, iFest 2018

Phase III: Interesting · Meaningful · Valuable

The future federal work environment will need to identify top talent in the United States and could, in an optimized system, give potential candidates options for how to enter and how to engage within the government. Offering more flexible options in time, location, and focus would allow more Americans to engage in civil service without living in Washington, D.C. and without making a 30-year commitment. Project-based activities could support this flexibility and allow learning, working, and living to be intertwined. Value-reward metrics could be defined by the individual and could include anything from pay increases to travel opportunities to project flexibility. Cross-departmental, cross-state, and cross-nation experience could be highly supported. The government would benefit from an open system because creativity and diversity would be maximized. Americans would benefit because personal interest, meaning, and value would be maximized.

The future federal work ecosystem could be a fluid, seamless, efficient system that optimizes the greatest strengths of our nation: Diversity and Creativity.

CONCLUSIONS

Creativity and diversity will be of the highest value because teams that bring to bear ideas from multiple perspectives create the most effective outcomes. Workers could define their own value metrics, receiving rewards based on their personal goals, needs, and preferences. Automated emotional, cognitive, and physical support could be provided as needed based on data collected through wearable devices. Four key elements are needed to develop this system:

1. **Centralize talent management and learning systems** – To optimize the individual and the collective workforce, workers would need to be allowed to influence their own personalized pathways of success. The metrics for meeting their personally-defined goals would need to be aligned to metrics for meeting national goals. Combining these metrics grounds the value system in a win-win scenario. More importantly, it can potentially attract talented individuals who seek to solve the most challenging problems.

2. **Improve hiring processes, training, and job structures** – Currently, there are multiple hiring options (e.g., short-term or multi-year contracts, career positions, political appointees). However, these options could be expanded to include virtual internships, collaborative teams or boards, fee-for-service at the individual level, cyclical employment such as 2 days per month, and more. Also, using an internal database for individualized pathways would make the process of allowing individuals to take positions across different departments using project-based, short-term, or long-term options easier. This type of change could enhance workers' ability to maintain employment while balancing an interest in personal or professional growth, improving skill retention and continued learning.

3. **Match strategists to skillsets** –Decision making at the highest levels requires significant content expertise. However, since the current structure rewards time-in-service or external experience and connections, it can be challenging for individuals to lead without public sector managerial experience but likewise challenging to lead without content expertise. Thus, scholar-practitioners with joint knowledge of business, leadership, and content expertise are recommended.

4. **Reward excellence and cost savings** – Currently, contracts, grants, and programs are required to expend funds within the fiscal year. It is presumed that if all funds are spent, then the money was allocated appropriately for the defined tasking. However, this structure unintentionally rewards maximal spending habits rather than savings. We need to challenge this notion and instead reward excellence, innovation, task completion (mission success), and cost savings. To do so, new metrics that measure quality over time and cost would be needed.

In the future, Americans are expected to value opportunities they can experience at work that will enhance their home lives and personal interests more than treating jobs as a means to an end. As such, options for variable work lengths could allow all Americans to serve their nation, learn about government, build trust among our people, and share their talents. Giving future workers flexible options for location, focus, and experience would maximize their effectiveness. To remain competitive in the job market and to attract and retain a world class workforce for America, the federal government could evolve from a rigid, scheduled work week with few personal growth options to one that optimizes non-monetary opportunities and personally rewarding experiences such as travel, mentoring, and challenging problem solving.

Project teams could form across departments, the country, or the world automatically based on requirements data. Similar to a gig-economy where individuals or groups are hired per project, changing from standard work-weeks to more flexible work options opens the possibility of part-time work, reduced cost to tax payers because only time worked is paid, increasing effectiveness by hiring experts rather than relying on those available, and increasing trust between

Americans and government as they are given opportunities to play a role in defining solutions for the nation. However, this does not supersede the need for full-time consistent employees. They play the important role of providing continuity between projects, programs, and departments to avoid stove-piped solutions designed by individuals who lack the strategic information needed to ensure the overall mission is achieved. To counter the stove-piped solution concern, projects would need to be multi-focused and able to solve many problems simultaneously.

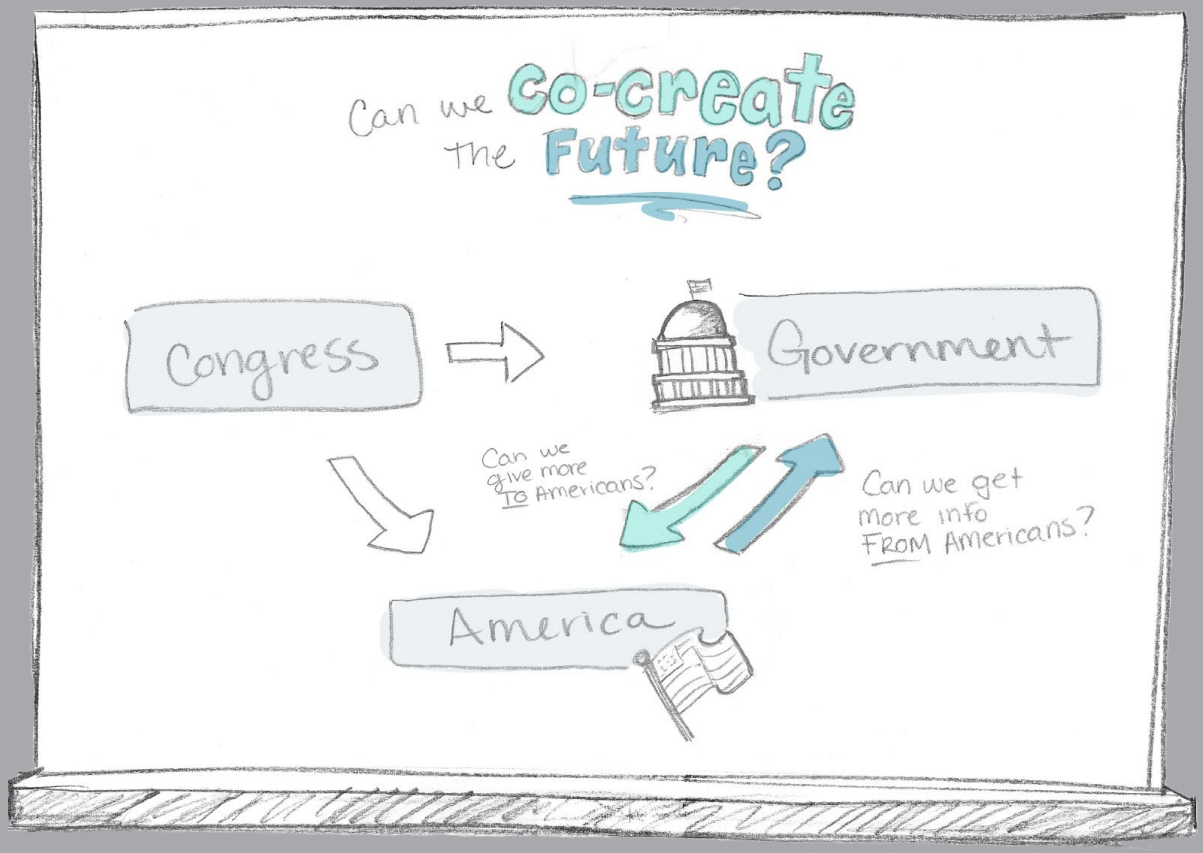
Taken together, this future federal workforce framework uses structural flexibility to optimize access to the highest quality workers in order to most efficiently create the best solutions for America.

10 NATIONAL COORDINATION FRAMEWORK

SUMMARY

Ultimately, the national goal is to be a prosperous nation that gives all our people the opportunities of life, liberty, and the pursuit of happiness. These words form the strategic foundation of our nation but at the tactical level, they also inspire disagreement. Ironically, these disagreements oftentimes have less to do with trying to define national solutions but instead focus on the pathway to create them. In other words, we focus our political debates on platforms rather than programs, solutions, and national goals. So the question becomes, how do we create a structure that is independent of current issues, power differences, and personal preferences to flexibly adjust to disagreements but remain functional in achieving both short-term and long-term goals for the nation? Additionally, as the communication pathways across the globe become increasingly accessible to anyone, anywhere and as financial incentives for businesses become increasingly globally-focused, how do we evolve our structures to adjust to, rather than fight against, these unavoidable changes? Using human-centered design methodologies, this chapter elucidates a system-of-systems partnership that emphasizes a national framework and lifecycle for innovation.

Co-creating the future means improved national efficiency and solutions



CURRENT STRUCTURE

Currently, there are three major groups that interact to build programs, develop people, conduct research, design advancements, and make decisions for our nation: government, academia, and industry. Although they act largely independently, their actions can impact the entire system. Congress allocates money to the government and military and writes the bills that become laws. Government writes the policies for the nation, creates the vision of the future, and acts as the civilian complement to the military in diplomatic action, though congress retains the right to declare war. While the Department of State, together with the President, lead with diplomacy, the military defends the nation but also leans on academia for solutions to current and future issues and industry for development of products. Academia and industry are both impacted by governmental policies. Academia impacts the government by preparing the nation for the future through higher education but also defines solutions to future problems through research funded by the government and military. Industry affects government by seeding innovative startups through government and military funding and developing needed products. There are many other interconnections, but these are the primary points. The benefit of this structure is that each community has a role and opportunity to affect the others, acting as an implied check-and-balance to ensure no one group can act as a single decision making or influential body. However, remaining inefficiencies in how information flows through these groups limit possibilities for progress.

In smaller nations, fluidity of change can be accomplished because innovations can be easily implemented. A nation the size of the United States, however, requires additional and different structures to achieve the same level of agility.

Government's Role: National Decision Making

To date, the government has served as a decision-making body for the nation. Inherent in making laws is the ability to write the rules of the country. Inherent in the power instilled in the executive and legislative branches is the ability to allocate enormous amounts of resources which creates the ability to determine how, where, when, and on what those funds are spent. Across the three branches, tasks include writing the laws, enforcing them, and creating programs to support

Americans. Connections with other communities exist currently but primarily act to advise the branch on best practices whether that be from academia or industry. Yet, while this branch and others have traditionally acted as decision makers, technology now gives individuals and groups power to speak for themselves, creating opportunities for crowdsourcing ideas and sharing decision making. Thus, emerging practices are being tested that focus on working with industry and academia to answer short- and medium-term challenges to ultimately define solutions together. **What options does this create and which would be beneficial to execute?**

Military' Role: Building Defense

The military's contribution to the national infrastructure focuses on international defense measures; they ensure the safety of the people of our country. To maintain the highest level of defense readiness, a number of key interactions and collaborations exist. Namely, the Department of Defense works with Federally Funded Research and Development Centers (FFRDCs), in-house innovation sectors, government and military researchers and educators, and contracted scientists, engineers, and developers. The National Defense Strategy and other related strategic documents help define how the budget is outline and disseminated after congressional approval. These funds are allocated for research and development projects that support our readiness for and strategic advantages in military operations. Additionally, the military develops personnel who not only serve the nation while in active duty or while serving as a civilian, once they separate or retire from service, they continue in future employment not only sharing their knowledge but also their experience working within the military culture. **How can these capabilities be shared with other communities across our nation?**

I've been preaching on the philanthropy side that the DoD spends more on educational technology than we have on the civilian sector but there is almost no cross-feeding. What we're learning in DoD with the civilian sector is that we should be working across fields as a manner of course.

– Dr. Russ Shilling, Lead Scientist, American Psychological Association, Former Director Chan-Zuckerberg Initiative; Former DARPA; Former Sesame Street

Academia's Role

Higher Education: Educating America

Academia, representing formal higher education, has spent significant resources - including time, money, policy, and research – to help young Americans earn a college degree by improving access, preparation, and areas of interest. Yet, according to recent findings (Bureau of Labor and Statistics, 2016) we are educating our next generation for jobs that will not exist in the future. This creates the need for education to focus on developing competencies over specific job skills. We are also expected to be short on workers in service, healthcare, and creative jobs such as design and engineering (Pink, 2005). Further, we expect Americans to hold 3-6 careers across their lifetimes, creating a new revenue stream for higher education to increase the capability of providing continuing education for older Americans (Dede, 2018). How will academic programs evolve to meet these needs? What is their role? How will government interact in this planning for the future? **Ultimately, the goal is to achieve a national balance that both supports access to affordable education and helps institutions to achieve their individual goals.**

What we need to do is expose children at a much younger age to what their experience could be at a school like the University of Chicago, a community college, or trade schools and then see where their passion takes them. We need to encourage them to be passionate in why they play an important role in higher education.

- Dr. Christopher Guymon, University of Chicago

Thus, one of the key questions is, how will higher education be structured in the future to support the needs of the nation? The common answer today is to increase the support for Science, Technology, Engineering, Arts, and Mathematics (STEAM) education and focus on ensuring that all students not only have access but are also highly encouraged to attend secondary formal education programs. **But seen through a lens of national strategy, Americans will be needed in a variety of job categories and locations not all of which require formal degrees** (bls.gov/emp)**.** Natural stratification of interests and skills across the nation will likely come close to matching the national needs without tremendous intervention. The difficulty lies in applying talent

empowerment practices at the strategic level to find key talent across the nation, respecting the need to create opportunities and provide equal access without creating a managed system that hinders or reduces freedom of choice. **The nation should ensure that the best people for positions or capabilities have the opportunity and support they need to fulfill those goals by creating a more optimized employment system.** Additionally, thinking forward, concepts like re-employment insurance, which would help bridge the financial gap and strain on those changing careers, are beginning to emerge. What role should the Government play in this forward planning space?

Research: Data for Decision Making

Higher education institutions also engage in research to enhance national decision making. The goal of this research and innovation is to imagine the future and test those concepts. In this case, the goal could be anything from curing diseases to understanding the beginnings of the earth to better anticipate its longevity or issues. The federal government provides financial support to research labs through grants and contracts (American Association for the Advancement of Science, 2019). Grants are then awarded in topic areas that match strategic goals but true cohesive outcomes derived across labs and departments are rarely coordinated. Rather, a repository of individual findings, but not an actionable holistic set of recommendations to enhance strategic planning and decision making, is created. The struggle is three-fold. First, the research-practice gap makes it difficult to provide results of studies to those who need the answers most. Second, the strategic-tactical gap compounds the problem by providing results that are not easily or commonly generalizable. Finally, the research is rarely shared across communities, including Congress, strategic levels of government, or the American people, reducing the impact of the data acquired.

Example: Information Sharing

IES and the Department of Education do not endorse curricula, practices, or policies. At IES, we fund research to develop and evaluate curriculum, tools, methods, etc., and we can provide the data on whether these methods improve education outcomes for students. The IES 'What Works Clearinghouse' examines causal impact studies to determine if they meet a set of research design standards, and if they do, reports whether there are statistically significant, positive education outcomes. From there, it is up to the education practitioner community to determine if or how to use those findings in practice.

– Dr. Erin Higgins, U.S. Department of Education

Industry

One thing we've learned in the start-up community is that they hate it when you tell them, "You must do it this way". Rather, let's tell you what state we want to be at and let you make recommendations how you might help us get there. They like the challenge but they want the opportunity to imagine the solution.

– Melissa Oh, Director of the DHS S&T Directorate's Silicon Valley Innovation Program

Industry has loose connections to the government, largely acting independently but connecting in three primary areas: policies that regulate businesses, financial support that funds start-ups and product development, and advisory boards or councils that advise strategic decision makers. Politically, there are disagreements about how much government should be involved with industry. These differences of opinion are primarily about how much government should control industry, not about sharing ideas, however. But the challenge with the relationships that exist with industry is that industry is both a partner to the government to accomplish the needs of the country but also an entity that is subject to federal regulations and laws to protect the best interests of the country. To capitalize on the advances of American businesses, we would need a transparent, yet seamless transition point of how, when, and where the industrial partners can become both self-supporting entities while simultaneously acting as important member of the nation-community, without fear of reprisal, promises of favoritism, or boundaries that would stifle progress.

> It's hard to be innovative when you're constrained by internal issues or the IT is limited to explore possible solutions due to ongoing cybersecurity threats.
>
> *- Dr. Gladys Brignoni - Deputy Commander, Force Readiness Command and the U.S. Coast Guard's Chief Learning Officer*

VISION

An open innovation model that extends outside of the government would create the opportunity for a synergistic, connected national system. In theory, this has been the intent behind the commonly used colloquialism, "the three-legged stool," where government, academia, and industry operate together to create a whole system. However, changes in the information highway allow us to expand this theoretical concept to one that is immediate, deeper, and which capitalizes on the unique skills, attributes, and interests of each community.

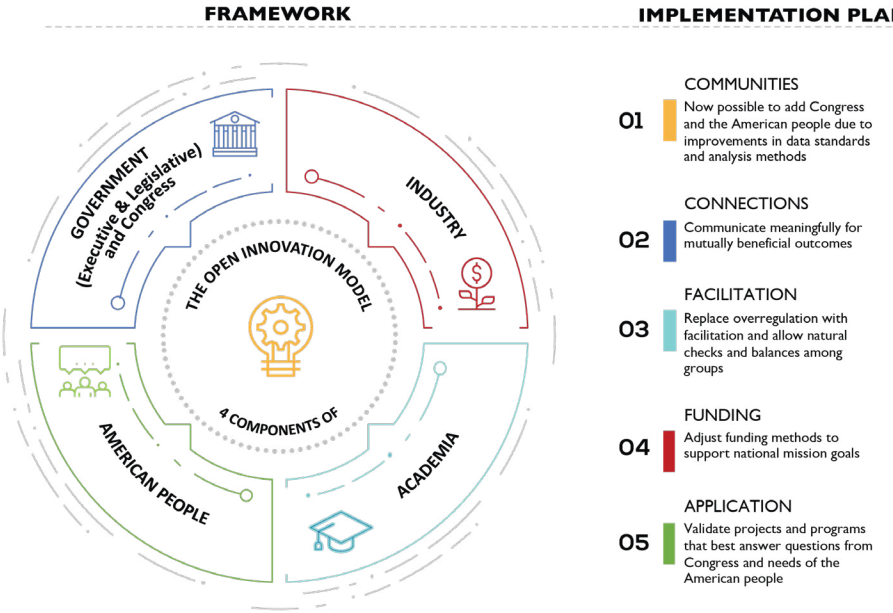
Defining a national mission allows for each of these communities to be working toward a common goal with benefits of cost-sharing and idea benefitting.

Expanding the concept of collaboration to the individual level has not been possible until now. Earlier it would have been too laborious to include so many people in the system. Hence businesses used to connect to universities that worked on government programs to solve specific issues or address specific requirements. However, these connections lacked a synergistic, holistic plan that produced benefits for everyone based on capabilities and contributions from each group. Opening the aperture and sharing the vision to include Americans at the individual, community and multi-community levels creates the opportunity to benefit from specific expertise or ideas at a lower cost. It also increases equity across the system by giving everyone a chance to be involved. Additionally, allowing more Americans to be part of developing the solution rather than merely the recipient of its implementation enhances trust in the solution. **Knowledge and involvement breed understanding.**

More practically, how does this multi-directional flow of information work? Since the goal is national talent empowerment stratified across content-focused communities, capabilities, and at the individual, group, community, and state levels simultaneously, a flexible structure that enables, rather than controls each entity, is required. This system would maintain the general connections currently in existence between industry, academia, and government but the depth, level and type of community, as well as number of entities involved, would be significantly greater. More, however, does not only mean the scale is bigger. Rather, it means a shift toward a collaborative, co-creative system that leverages everyone's capabilities.

IMPLEMENTATION

Five primary steps are needed to create an open innovation national system. The first step would be to define the key groups to be involved. The second would be to define, value, and measure the connections, the in-between spaces. The third would be to focus more on facilitation of the American system over regulation. Next, new funding methodologies and associated requirements would need to be developed. Finally, there would need to be explicit emphasis and requirements for how entities funded by the taxpayers are adding back to the system as well as empowering themselves to grow.



1. Communities

Industry, academia, and government have already been identified as participants, but Congress and the American people could have greater involvement in this future system. Specifically, the affordances provided by technological maturation and the development of interoperability specifications and standards as well as data analytics improvements, allow for an expanded, reorganized, integrated space that makes every entity a piece of the greater interdependent whole rather than mutually exclusive communities.

DHS S&T Silicon Valley Innovation Program

(goal) The goal is to leverage the commercial innovation community to get capabilities into the hands of operational users faster, to make Government more attractive to work with, and to help foster an innovation mindset across the Government community.

(method) Our mission is to support research and development through the technology lens. I'm from Silicon Valley originally and in 2015 there was a push to find innovation that didn't previously exist. They asked, "Where does innovation exist that we've not been able to harness and why – and then how to lower the barriers to reach that innovation?" We talked to start ups, venture capitalists. We found several barriers: time to contract, handling of intellectual property, and the perception of preventing a company from being independently successful. So the questions became, "How do we get to yes? How do we accomplish what we're trying to achieve within the contexts we have?" Through the Department's Other Transaction Authority (OTA) we could get awards to companies faster which helped with time to contract issues. And then on the general counsel side, we went to see what the Government really wanted. They said, "We want an operational product that we can purchase where the core technology intellectual property (IP) is theirs but we need whatever is being developed to achieve the mission. By demystifying what we really need from startups, we helped them to work with us.

(outcomes) The third leg of the issue is that we want commercial products, not just Government products. So we focus on requirements and needs that allow companies to stay on their technology roadmap because their investors don't want them to derail; they want them to stay on track. We're funding early stage start-ups – they're still early enough in their prototyping that we can describe our problem sets and they can determine if their goals are adaptable to our needs. Now we have an angle to help investors work with us in cases where we didn't before because we aren't asking companies to pivot off their roadmap. We intentionally focus on the types of topics that allow startups and small businesses to stay commercially-focused while opening their aperture to have a Government market complement. We keep solicitations open for an extended period of time—typically six months to a year—the companies submit applications 10 pages long, and we review with a Government panel. Then we have them pitch and provide an answer within 24 hours. After that it's approximately 45 days to fund. We're providing non-dilutive engineering funding to adapt commercial technology to address our problem sets and our use cases. provide and answer within 24 hours. Then it's just 45 days to fund. We're providing non-recurring engineering funding to adapt to address our problem sets and our use cases.

– Mrs. Melissa Oh, Managing Director of the DHS Science and Technology Directorate's Silicon Valley Innovation Program

It's a reason to do more cross-agency work. Interagency working groups are an effective tool for ensuring that agencies work together to share information. In my experience on interagency working groups, there were agencies who identified themselves as consumers of research (as opposed to funders of research), and many times, it was not until the interagency group discussed their needs that they realized that other agencies funded research that was freely available and useful for them. These interagency groups are really nice for these kinds of discussions and insights. They are an example of how we can better coordinate what we're all doing in areas where there may be some shared interests.

– Dr. Erin Higgins, Institute for Educational Sciences (IES), Department of Education

2. Connectivity

It is not just about connecting through distributed channels. Nor is it just about sharing information. It is also about communicating in meaningful ways to create mutually beneficial outcomes. To do so, those benefits must be defined and clarified for the other participants. How to measure return on investment (ROI) must also be transformed from easily measurable outcomes to measuring and analyzing indicators of improvement, impact, and the ripple effects across the greater system.

> We need to embrace connectedness. We're bridging silos. It astounds me how difficult it is to get people to work together.
>
> *– Dr. Jeff Borden, Executive Director, Institute for Inter-Connected Education; Chief Academic Officer, UCroo Digital Campus; Former Chief Innovation Officer, St. Leo University*

3. Facilitation

There are generally two ways to motivate behavior: support or force. Excessive regulation ensures nothing bad happens but also creates a tenuous and brittle system that can inadvertently stifle progress. To ensure safety while encouraging ideas and solution, overregulation could be replaced with emphasizing facilitation.

By creating natural supporting structures, de facto checks-and-balances can let each group limit the powers of the others. Similar to how crowdsourcing can empower consumers by allowing them to rate businesses, so too can this concept be used to effect natural regulation without excessive policy. This allows safety requirements to be balanced with the need to provide room for innovation to grow and change over time.

Example: Virtual Student Federal Service Program

When we started, we were a virtual internship program for U.S. college students. They could apply to work on specific projects with our diplomats posted overseas and we were known as the Virtual Student Foreign Service program. Then, we expanded to the five foreign affairs agencies. Soon after, NASA wanted in and they joined our program. We now work with 38 agencies. Everyone in the world, across the world, can visit our website and see projects across the federal government. We renamed ourselves to the Virtual Student Federal Service to reflect that our work cuts across federal agencies. VSFS opens the work of government to citizens at no cost to an agency.

We currently have 1200 virtual interns working on 530 projects. Students are gaining experiences and are opening their minds to ideas like applying for a Fulbright scholarship or pursuing a career with the federal government. To date, over 6000 students have participated in VSFS over the past 9 years and every year it keeps growing (vsfs.state.gov).

- Bridget Roddy, Departmentt of State

There are 4.5M in people working in the executive branch and we only hear from heads of agencies. This is such a great way to get people all across the nation who may not know a lot about the government to participate in government. It really opens up access without having to fund living in Washington

– Caitlin Bergin, Department of State

4. Funding

Funding methods would need to be adjusted to support national mission goals. When data and outcomes are not shared with all interested parties in packaging that is easy to digest and apply, the goal is not achieved. Similar to how assessments can now replace often inaccurate standardized tests with portfolio submissions or presentations of work samples, so too could funding assessments of ROI be provided to those needing the information. Doing so would create a more accurate assessment capability and a more robust ability to determine where funding would benefit Americans most.

5. Application

It is often necessary to start with promising ideas and then determine which are most viable along the way. However, clarifying how these projects or programs can add to the holistic vision can help better determine which ones have the possibility of eventual application and which do not. Further, it increases clarity regarding complementary versus overlapping solutions. **The application step needs to validate that what is being supported by taxpayer dollars is answering the questions posed by Congress and meeting the needs of Americans.** Currently, these communication pathways are limited by excessive rules and a lack of access. In some cases, there is open access but limited awareness. The bottom line is that the system should make it easy for the customers (Congress and Americans) to understand what their money funded and what can be applied to the American mission from those outcomes, findings, data, or development.

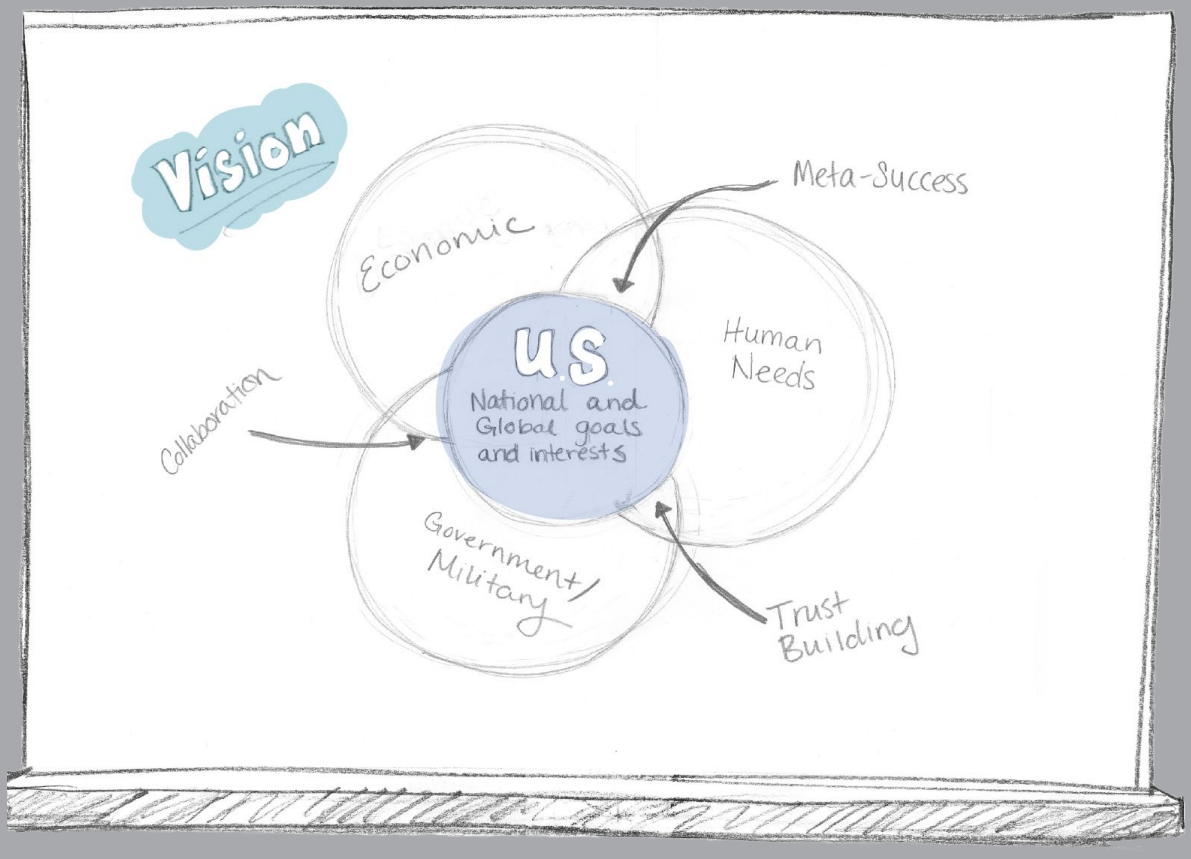
Transparency, effectiveness, and efficiency would be gained by a coordination of an organized, but flexible, living system of innovation.

INTERNATIONAL COORDINATION FRAMEWORK

SUMMARY

The National Defense Strategy notes as one of the three key goals to maintain and expand our global relationships with allied nations because the Department of Defense has determined that no current or future defense efforts will be carried out by only our nation. This goal suggests that joint military action will not only be the norm, but the constant. The Paris Agreement highlights another global issue. Caring for the environment, or lack thereof, in any one nation has the potential to affect every person around the world. This reality necessitates joint action but at the same time, how does a nation as large as ours ensure fairness in those agreements? Technology interoperability is now spanning the globe and access is only increasing. Data protection rights, rules, and enforcement will inevitably also become a global issue. Whereas previously, one country's decisions had little impact on other nations, we are now living in a world that is rapidly evolving into a globally interconnected society where each nation's decisions inevitably affect the lives of people in other countries. Accordingly, this chapter focuses on how innovation, communication, sharing, and thought leadership can evolve the current system into one that balances national interests with the necessity to be a global teammate.

We are evolving into an interconnected society that must be empowered to compete worldwide but also act as a global teammate



CURRENT STRUCTURE

There are many ways we interact at the global level. Through the government, the executive branch connects to other governments around the world at meetings and conferences of many sizes, focus areas, and formality levels such as the United Nations (UN), the G7, and others to further our foreign policy and economic goals. For national and international security, we interact at many levels through the military, including allied-nation partnerships like the North Atlantic Treaty Organization (NATO), which focuses on strategic planning and organization, joint large-scale exercises like Viking 18 (www.fba.se), and through joint operations in theater. Congress influences global interactions through its funding power and ability to declare war (Johnson, 2013). Through humanitarian efforts, we connect using both government-led programs and non-governmental organizations (NGOs, e.g., Action Africa) internationally to provide aid in the form of medical care, education, safety support, natural disaster response, and other help. American businesses, churches, and individuals also lead individual connections and aid projects. Through industry, we both sell and purchase products and services overseas. Increasingly, U.S. businesses are also employing individuals from other nations and many businesses that start in America are now growing to such a size that they have transformed into transnational corporations (TNCs) whose business goals transcend national boundaries. It is unlikely that current or future ventures originally rooted in the United States will remain only locally-focused. Much as our states compete and offer incentives to attract businesses to create jobs and sustain growth, this competition also exists at the global level. Encouraging international businesses to locate in the United States is going to be increasingly a competition at the highest scale. At the individual level, virtual connectivity provides access to anyone, anywhere, with any expertise, at any price, and for any length of time. This affordance is dramatically changing the workforce market and increasingly the necessity of Americans to be globally competitive.

Thus, it is inevitable that we will evolve into an interconnected global community. **Changes in the economic environment mean that every country, regardless of politics or preferences, is affected by every other nations' actions.** As businesses increasingly engage at the global level, nations will continue to be affected by how these mega-companies operate and influence the world. Some TNCs are large enough already that they have amassed economic and political power allowing them to transcend nations' laws and even influence their political affairs (Greer & Singh, 2000). Further, as the communication pipeline allows

access to anyone, anywhere, with any talent, borders become irrelevant. Although national military operations have always had global influence, irregular and asymmetrical warfare now empowers non-nation actors - small groups and individuals - to infiltrate any nation and engage in war-like activities. These changes have led the U.S. Military to recognize the need for maintaining and expanding global partnerships (National Defense Strategy, 2018). Finally, the increased focus on the environment highlights the fact that we cannot singularly fix issues for the Earth. For example, even if we were to eradicate all carbon emissions in the U.S., we would still be affected by other nations' actions.

Combined, it means that this global-connectivity is impossible to ignore, it is impossible to stop, and accordingly, it must be considered for future planning.

VISION:

Balancing American goals with the need to be a global teammate

As the world evolves into an increasingly interconnected global network, it will be necessary for our nation to compete in the global market by highlighting our unique assets and capabilities and acting as global teammates in matters of defense, natural resources, and commerce. Due to the distributed communication highway that operates across the globe and the way businesses are no longer forced to be country-specific in location, operation, or in sales, Americans will be forced to look beyond our borders to be competitive for the nation. As the climate and defense activities become increasingly globally-influential, the ability to operate singularly also closes. Three key elements could help the U.S. both protect and promote our people while also ensuring global needs are met. These include trust building, collaboration, and a focus on achieving meta-success.

Trust Building

From a human perspective, the best way to build trust is simply to spend time with individuals and groups. It allows people to understand one another, observe patterns of behaviors, and determine a predictable routine or outcome. Across the international business world, it is generally achieved through informal meetings and shared events. In academia, it is achieved through bi-directional

international education opportunities. Strategically and intentionally expanding Americans' knowledge of and interaction with the international partners could enhance our mutual understanding and build deeper trust. It is unlikely that there will ever be total trust established between and across nations because of course, each representative must always make decisions that benefit his or her country. However, the goal does not need to be complete trust to have an impact on improving cooperation and negotiation capabilities; rather, the goal is to maximize the possible.

The strongest position to take is one of multi-directional connectivity.

Collaboration

Creating collaborative space to co-create solutions is needed to ensure that all nations have a chance to listen, learn, be heard and understood. This creative space also allows the global-network to capitalize on the benefits of diverse experiences, capabilities, and methodologies that can be shared. By combining capabilities from multiple nations, the global pathways to success are enhanced. However, struggles can surface over differences in opinion as well as based on differences in national needs. What works for one nation may not work for another. For example, the agility gained by being a smaller nation can be hindered by limited resources. However, a large, resource-rich nation is equally hindered by slow-moving bureaucratic systems. Thus, solutions must be flexible, able to be applied in multiple ways, and most of all, organized in a fashion that optimizes the contributions of each nation's capabilities.

Associative Thinking Exercise

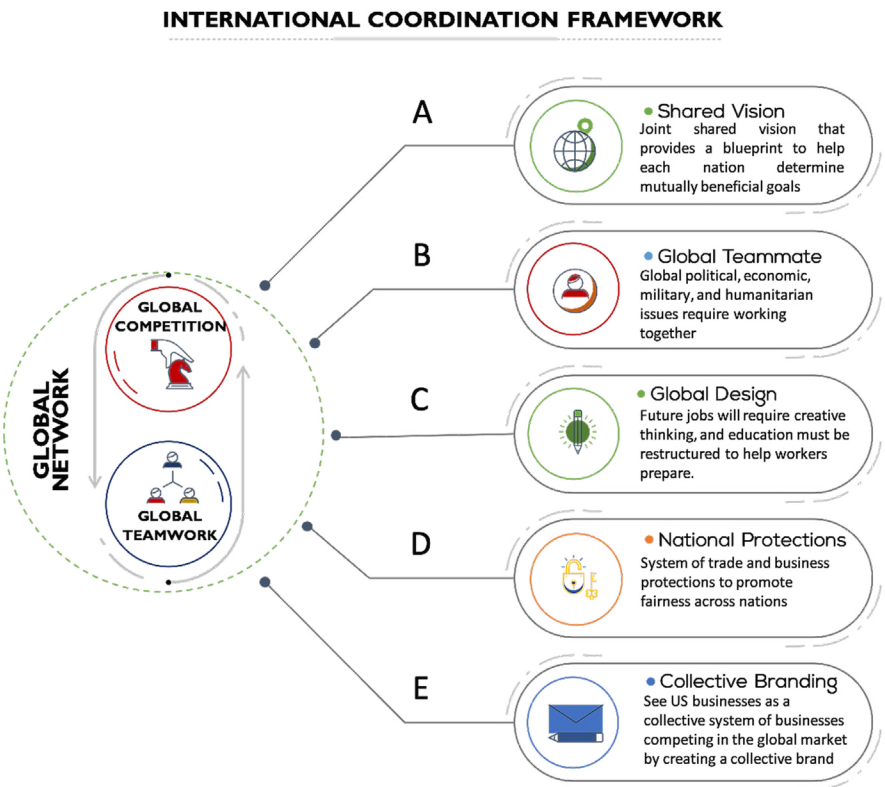
When you start to look at innovation and associative thinking, there are companies – some of the most innovative companies on the planet that do this exercise every year in the organization with everyone, even the people who clean the floors. They will say, "On your table are boxes with a lot of hats. Take one and put it on and then we're going to solve the following problem with the hat of the company that you're wearing." It allows you to associate. Associative thinking is the key to innovation – it's taking ideas out of your context, bringing them into your context.

– Dr. Jeff Borden, Executive Director, Institute for Inter-Connected Education; Chief Academic Officer, UCroo Digital Campus; Former Chief Innovation Officer, St. Leo University

Meta-Success

Finally, there needs to be an ability to ensure every nation has something to gain by participating and something to lose by not. These benefits and losses need to be measurable and trackable as well as inclusive of return on investment metrics that extend beyond immediate outcomes to include long-term and connected benefits. If these extensions are not explicitly included, negotiations will likely become myopic in focus and unclear to the public. Ultimately, stove-piped solutions and reduced impacts would be expected. **Meta-success refers instead to an idea of joint benefits within a larger system.** It suggests that while different nations bring different resources and capabilities to the negotiation table, each is intrinsically motivated to participate and contributes meaningfully, even if only by agreeing to participate. Optimizing a system under these conditions is less about everyone bringing the same resources and capabilities into the space and more about inspiring nationally-driven participation because only then will we achieve true cooperation and coordination.

IMPLEMENTATION PLAN



Shared Vision

A shared vision is a key foundational objective for global success.

To promote shared knowledge, defense readiness, and ultimately, global stability, agreeing on global goals can promote a shared vision that can provide a blueprint for joint success. This semi-structured pathway could help each nation determine how it can best contribute to achieve the global goals while still meeting their country's needs. Global efforts to address a myriad of issues are not new, however. Rather, **the goals and impact of these efforts have shifted from being focused on humanitarian support, intermittent joint military actions, and general coordination to being focused on global development to address issues affecting all nations regardless of participation.** For example, through the United Nations Development Programme (UNDP), the Millenium Development Goals (MDGs, 2000) aim to reduce worldwide poverty levels. In 2015, over 150 nations adopted the updated Sustainable Development Goals (SDGs), which are a more ambitious set of 17 goals aimed at achieving measurable change by 2030 (UNDP, 2015). However, a major challenge to overcome in international ventures is the level of trust or mistrust between nations. Accordingly, interactions, negotiations, and enforcement procedures are much harder to address than when these same actions are within a single nation. Nonetheless, they are not impossible hurdles to overcome and building a global vision, though challenging, is achievable in part or in whole with other nations. Thus, this is the first step in the pathway to increasing cooperation, collaboration, and implementation to achieve global success that recognizes finite resources and honors differing national interests, cultures, and needs.

Global Teamwork

Military efforts, environmental concerns, immigration, and humanitarian efforts will all be severely affected by how the nations around the world work together. As global interconnectivity gives nations more opportunities to coordinate efforts to solve these intractable issues, it becomes more difficult for nations to follow isolationist policies because those policies will affect other nations and they will still be affected by the actions of others. In the past, it was possible for nations to choose to participate. Now, however, the interconnectivity of the world makes it less of a decision point and more of an expectation. Ultimately, this represents a significant shift in the reasons for being globally-minded and alters the goals of

our nation. It creates the need to engage with others to remain competitive but also influential by forging new and strengthening existing alliances to share knowledge, information, capabilities, and methodologies.

Intentionally creating opportunities to promote positive interactions between global leaders, representatives, and individuals across nations can enhance human connectivity and build trust and understanding across the world. Using international education programs starting at the youngest ages could be a key contributor to creating global trust across nations while global virtual commerce may be a starting point for the adult population both in the private and public sectors. International conferences and meetings already occur but more emphasis on defining shared visions for those issues that affect all nations blended with clear opportunity costs and benefits for nations could enhance the productivity, solution-quality, and compliance across the world.

Global Design

Global design defines the pathway to achieving the joint mission goal as well as supporting U.S. competitiveness and security. As technology continues to mature, global connectivity for decision making becomes a realistic possibility. With the ability to better collaborate comes the ability to better address international issues. But simply providing space to work together does not in and of itself ensure coordinated efforts. Significant power and political divides will still exist, thus making trust a commodity that cannot be understated. Further, it supports the need for a shared global vision to explicitly respect the needs and goals of all nations, even those in disagreement. There will always be rogue actors but minimizing their impact can increase the likelihood of success for all.

Collective Branding

For the U.S. to maintain its competitive edge in global markets requires businesses to adapt to an ever-changing business environment (Tilmes, 2015). As global interconnectedness removes the traditional boundaries of time and place, the U.S. government must not only grapple with concerns about maintaining jobs locally, but also maintaining revenue locally. The ability to reach workers, services, and products virtually anywhere now allows everyone, everywhere to spend money across a virtual global market where few national boundaries can be maintained. Accordingly, the competition model necessarily changes from one that looks solely at maintaining jobs in the U.S. to one that begins to ask, "How can Americans individually and as companies compete for revenue from

anywhere?" and "How can the nation holistically create a brand that elevates all American businesses?"

Generally, there are three key options when building a business: build or provide something that is a) cheaper than the competition, b) better than the competition, or c) fulfills a gap that currently exists in the market. Each of these options is a rational reason for building a business and consumers will be attracted to one of them based on their needs. But as a nation, how do these concepts affect the role of the government? And how does strategic planning help American businesses thrive in a space where other nations can provide access to services and products that are cheaper than are available locally? Traditionally, businesses that interact at the global level, compete and brand themselves individually. However, if we were to look through a different lens and treat our nation as a collective system of businesses that competes in the greater global market, we would have the ability to elevate the entire system.

To do so, we would need to create a collective brand that transcends products and communities that highlights the unique education, opportunities, and culture of the United States.

A second piece to this equation though is the impact of automation on U.S. global competitiveness. It will allow us to increasingly complete tasks and produce products at a lower and lower cost. The result will be a leveling of the production pipeline and eventually a balanced system that will reduce the need for humans to work many of the jobs currently available. More positively, also stemming from the impact of automation is the increased need for service jobs and creative thinking jobs (Stillman, 2017) which will necessarily be local by design or instead, will be increasingly globally accessible due to the change in the information highway. Given these two points, restructuring education across the nation would benefit from creating innovative curricula and dynamic networks connecting educators and influencers that can prepare future workers to be globally competitive in the future intellectually demanding and creative space.

National Protections

The final element of consideration is how regulation is handled cross-nationally. Regulation can cover anything from humanitarian rules and defense agreements to environmental expectations to commerce regulation and digital privacy. In business, the U.S. government can create policies to control how products and services move to and from our nation (https://ustr.gov/issue-areas). Tariffs and treaties can also be used to define the rules and taxes that may or may not be imposed on imports (https://ustr.gov/issue-areas/industry-manufacturing/industrial-tariffs/tariff-schedules). Each of these activities aims to regulate the trade deficit to ensure that Americans are selling as much as they are buying or that if we are selling less, then we are making more money per item using these tax structures. From a business perspective, this is essentially adding rules to the structure to create a system that attempts to maintain balance through regulation so that money moves evenly through and across nations. The benefit is that it can protect a nation from a low revenue stream through required trade, but the potential costs are the secondary effects of forced rules that can impede collaboration, competition, innovation, and growth.

Humanitarian, environmental, defense, and data rights rules, however, can be more complex to regulate. Clarity is reduced due to cultural differences, religious beliefs, and power goals. It is beyond the scope of this book to make recommendations regarding how to specifically tackle each of these complex issues. However, with the use of innovative methodologies, coupled with a human design lens, a shift in general approach could be considered. Namely, there is a need to be seen as global teammates rather than branding ourselves as assumed leaders in the world. This perceptual shift has the potential to allow us to work within the global space more as a participant-nation that respects differences of other countries but more importantly recognizes the capabilities and resources they have that we need. For example, it is often assumed that "resources" refers only to technology or money. However, as we enter the digital age, human resources such as cognitive capabilities, national agility, and resilience are expected to be significantly important in maintaining global advantages.

The U.S. has something to gain from and give to nations of all sizes and backgrounds that can add to the collective capability repository and accordingly, we would be measurably enhanced by our allies and strengthened by maintaining these cooperative partnerships (National Defense Strategy, 2018).

SUMMARY

A review of the past three administrations' management agendas highlights a predictable interplay of policies, politics, and perceptions that have shaped the ebb and flow of the recent work conducted by the executive branch. It elucidates administrations that aimed to first define significant modern-day systemic issues across the government, then in response, brought significant additions of scientists and visionaries into the executive branch to dream new ideas for the future. But as these additions stretched the bounds of understanding across the nation, the most recent administration aimed to disrupt the system to find efficiencies. Inevitably, the next step in this path is to re-connect with purpose, vision, and a plan for progress across the nation.

In response to this anticipated need and the demands of the most recent administrations, we explored the current innovation programs across the executive branch both for their methodologies and their findings. It is impressive to note that so much innovation is already happening but concerning that little coordination of these efforts is currently in play. A major benefit to the nation would be to intentionally connect the programs exploring those issues that are affecting the nation today (e.g., environment, healthcare, defense, education, and employment) but also do so with an intentional plan for how emerging efforts can proactively prepare the nation for the future issues that are known as well as plan for the unexpected.

Creating a flexible, open innovation model would allow for the programs in the executive branch to better address the issues identified by the American people by increasing direct, meaningful collaboration between the government and our citizens but also by providing clarity regarding how tax payer dollars are spent. Defining a national mission would greatly encourage collaboration across all people and allow the country to capitalize on our greatest assets: diversity and creativity. In doing so, improved global teamwork to tackle international issues as well as competitiveness for global commerce is expected.

Ultimately, a culture of innovation may have the greatest chance of maintaining and progressing this great experiment we call the United States of America.

SECTION 3

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SECTION 4

APPENDIX

APPENDIX I

INNOVATION PROGRAMS

Department	Title	Summary	Site
Agriculture	Small Business Innovation Research Program	Innovation research in Agriculture	https://nifa.usda.gov/program/small-business-innovation-research-program-sbir
	Conservation Innovation Grants	Grants for resource conservation	https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?cid=nrcs143_008205
	Innovations Prize Competition	Food and Agriculture S&T with entrepreneurship training	https://nifa.usda.gov/program/innovations-food-and-agricultural-science-and-technology-i-fast-prize-competition
	Innovation Challenge	Data accessibility challenges	https://usdaapps.devpost.com/
	Program Integrity	Fraud reduction research	https://www.fns.usda.gov/program-integrity
	AgLaunch	Agtech startups, food value-chains, and farmer networks	http://aglaunch.com/
Commerce	eCommerce Innovation Lab	Cross-border ecommerce resources	https://www.export.gov/eCommerce
	SBIR: National Institute of Standards and Technology	Primary research in standards and technology	https://www.nist.gov/tpo/small-business-innovation-research-program
	SBIR: National Oceanic and Atmospheric Administration	Primary research in environment and natural resources	https://techpartnerships.noaa.gov/SBIR
	Office of Innovation and Entrepreneruship (OIE) (oversees RIS & NACIE)	Oversees economic development challenges; Provides innovation policy expertise	https://www.eda.gov/oie
	The National Advisory Council on Innovation & Entrepreneurship (NACIE)	Build innovation economy and workforce	https://www.eda.gov/oie/nacie/

Department	Title	Summary	Site
	Regional Innovation Strategies (RIS) (i6 Challenge & Seed Fund Support)	Regional high-risk commercialization support to entrepreneurs	https://www.eda.gov/oie/ris/
	National Institute of Standards and Technology	Physical science laboratory	https://www.nist.gov/
Education	Office of Education Innovation Programs	Non-traditional programs for student achievement	https://innovation.ed.gov/what-we-do/innovation/
	Office of Non-Public Education	Non-public education (leadership and outreach)	https://innovation.ed.gov/what-we-do/non-public-education/
	SBIR Education	Primary research in education	https://www2.ed.gov/programs/sbir/index.html
	Charter School Program	Charter school support and replication	https://innovation.ed.gov/what-we-do/charter-schools/
	Parental Options and Improvement	Parental options for arts, community programs, magnets	https://innovation.ed.gov/what-we-do/parental-options/
	Teacher Quality Program	Teacher and Principal quality	https://innovation.ed.gov/what-we-do/teacher-quality/
	Education Innovation and Research (EIR)	ESSA research and teacher education	https://innovation.ed.gov/what-we-do/innovation/education-innovation-and-research-eir/
	Office of Education Technology	Supports ideas for how technology can be used to transform teaching	https://tech.ed.gov/
	Institute for Educational Sciences	Support education research, evaluation, and statistics	https://ies.ed.gov/

Department	Title	Summary	Site
Energy	Science & Technology	Primary research in biological, chemical, supercomputing, exascale, environmental, materials, and physics	https://www.energy.gov/science-innovation/science-technology
	Title XVII Innovative Energy Loan Guarantee Program	Loans for accelerating innovation for clean energy technology	https://www.energy.gov/lpo/title-xvii
	SBIR: Energy	Grants for innovation in the energy sector	https://science.energy.gov/sbir/
	Advanced Technology Vehicles Manufacturing Program	Loans for automotive and component manufacturing	https://www.energy.gov/lpo/atvm
	Tribal Energy Loan Guarantee Program	Loans for tribal energy development programs	https://www.energy.gov/lpo/tribal-energy-loan-guarantee-program
	Advanced Research Projects Agency-Energy (ARPA-E)	High-potential, high-impact energy technology research	https://arpa-e.energy.gov/
	Ames Lab	DOE-University Research Partnership	https://www.ameslab.gov/about
	Argonne National Lab	Research lab studying biggest issues facing humanity	https://www.anl.gov/
	Brookhaven National Lab	Universe birth to sustainable energy technology research	https://www.bnl.gov/about/
	Fermi National Accelerator Laboratory	Particle physics research	http://www.fnal.gov/
	Lawrence Berkeley Lab	Universe to subatomic particle research	https://www.lbl.gov/about/
	Oak Ridge National Lab	Basic and applied energy and security research	https://www.ornl.gov/
	Pacific Northwest National Lab	Fundamental research in energy, environment, and national security	http://www.pnl.gov/
	Princeton plasma Physics Laboratory	A collective national center for fusion energy research	https://www.pppl.gov/

Department	Title	Summary	Site
	SLAC National Accelerator Lab	Visionary research in particle physics, astrophysics, energy, and cosmology	https://www6.slac.stanford.edu/
	Thomas Jefferson National Accelerator Facility	Partical science research	https://www.jlab.org/
	Idaho National Laboratory	Nuclear energy research	https://www.inl.gov/
	National Energy Technology Lab	Energy security research	http://www.netl.doe.gov/
	National Renewable Energy Laboratory	Primary research in fundamental science, new clean technologies, and integrated energy systems	https://www.nrel.gov/
	Savannah River National Lab	Applied research in complex technical security problems	http://srnl.doe.gov/
	Lawrence Livermore National Laboratory	Research to ensure the safety, security and reliability of the nation's nuclear deterrent	https://www.llnl.gov/
	Los Alamos National Lab	National security research	http://www.lanl.gov/
	Sandia National Lab	Research in science and engineering for security and technology innovation	http://www.sandia.gov/
	Build4Scale Training	Teaches manufacturing design for innovative prototype development	https://www.energy.gov/eere/amo/build4scale-training
	Energy Innovation Portal	One-stop resource for DOE Energy Efficiency and Renewable Energy technologies	https://techportal.eere.energy.gov/
	Mission Innovation	Accelerator for public and private global clean energy innovation	https://www.energy.gov/what-mission-innovation
	NREL Innovation and Entrepreneurship	Supports transfer of renewable energy and efficiency technologies into the marketplace	https://www.nrel.gov/workingwithus/entrepreneurship.html
	GAIN	Advancing nuclear power	https://gain.inl.gov/SitePages/Home.aspx

Department	Title	Summary	Site
Health and Human Services	Innovator-in Residence Program	Not-for-profit organization sponsored innovation entrepreneurs	https://www.hhs.gov/cto/initiatives/entrepreneurs-in-residence/innovators-in-residence/index.html
	The Centers for Medicare & Medicaid Services Innovation Center	Designing healthcare payment and delivery models	https://innovation.cms.gov/
	NIH High Risk High Reward Research	Sponsoring high-risk, high-reward biomedical and behavioral basic research	https://commonfund.nih.gov/highrisk
	Biomedical Research Informatics Computing System	Collaboration network to support the collection of research studies and clinical trials	https://brics.cit.nih.gov/
	HHS Ignite	Enabling program for internal innovation	https://www.hhs.gov/cto/initiatives/ignite-accelerator/about/index.html
	CDC- NIOSH Mine Safety and Tech innovations award	Awards for companies demonstrating exceptional mine safety	https://www.cdc.gov/niosh/mining/content/innovationsawards.html
	Social Security Administration: Vision 2025	Enabling program for improved services and solutions	https://www.ssa.gov/vision2025/organization.html
	NIH SBIR/STTR	Small business grants for technology commercialization	https://sbir.nih.gov/
	Office of the Chief Technology Officer	Enabling program for internal innovation	https://www.hhs.gov/cto/index.html
Homeland Security	SINET	Building a cohesive worldwide Cybersecurity community	https://www.security-innovation.org/about-sinet/
	PushButtonPD	Innovation enablement project for cyber security hiring needs	https://niccs.us-cert.gov/workforce-development/cybersecurity-resources/dhs-pushbuttonpd-tool

Department	Title	Summary	Site
	SBIR: Homeland Security	Primary research in national security	https://www.dhs.gov/science-and-technology/sbir
	US Cyber Challenge	Cyber recruiting challenge	https://www.uscyberchallenge.org/
	Science and Technology	Supports research in 9 areas to support national defense	https://www.dhs.gov/science-and-technology/our-work
	DHS Silicon Valley Innovation Program	Learning from and incorporating Silicon Valley practices and advances	https://www.dhs.gov/science-and-technology/svip
DHS - Coast Guard	The Coast Guard Innovation Program	Open innovation model sharing ideas up and down the chain of command	https://www.dcms.uscg.mil/Our-Organization/Assistant-Commandant-for-Acquisitions-CG-9/Innovation/Innovation-Program-Overview/
	Research, Development, Test and Evaluation Program (RDT&E)	Basic and applied research as well as innovation challenges to support maritime security	https://www.dcms.uscg.mil/Our-Organization/Assistant-Commandant-for-Acquisitions-CG-9/Research-Development-Test-and-Evaluation/
Housing and Urban Development	Community Assessment Reporting Tool	Maps community support expenditures	https://egis.hud.gov/cart/
	International and Philanthropic Affairs Divisions	Public-private partnerships for innovation	https://www.huduser.gov/portal/ipi/home.html
	Innovation and Open Government	HUD's plan to operate with transparency and openness	https://www.hud.gov/innovation_and_open_govt
	Innovation of the Day	Online voting poll for innovative housing solutions	https://www.huduser.gov/portal/iod/index.html
	HUD Innovation in Affordable Housing Program competition	Student housing community design competition	https://www.huduser.gov/portal/challenge/home.html

Department	Title	Summary	Site
Interior	Technology Innovation	Using innovative approaches to tackle invasive species	https://www.doi.gov/invasivespecies/technology-innovation
	Environmental Justice Screening and Mapping Tool	Data visualization tool for environmental and demographic information	https://www.epa.gov/ejscreen
	Federal Interagency Working Group on Environmental Justice	Collaborative council for supporting healthy environments for low-income and minority populations	https://www.epa.gov/environmentaljustice/federal-interagency-working-group-environmental-justice-ej-iwg
	SBIR: EPA	Primary research in environmental issues	https://www.epa.gov/sbir
	myScience	Search tool for finding citizen science projects	https://txpub.usgs.gov/myscience/
	Innovation at EPA	Awards, challenges, and research for environmental topics	https://www.epa.gov/innovation
Labor	Workforce Innovation Fund	Developed to fund enabling models, tools, and innovative practices to support innovation in public sector; currently inactive	https://innovation.workforcegps.org/
	Department of Labor Blog	Provides posts about the Department of Labor; many focus on innovation projects	https://blog.dol.gov/
State	Office of Management Policy, Rightsizing, and Innovation	Enabling team that supports data-driven business practices internally and externally	https://www.state.gov/m/pri/
	Virtual Student Federal Service Program	Virtual internship program with the government for course credit	https://www.state.gov/vsfs/
	Business, Entrepreneurship, and Intellectual Property	International outreach for global entreneurship	https://www.state.gov/e/eb/cba/
Transportation	The Secretary of Transportation's RAISE Award	Student research awards for aerospace science and engineering	https://www.faa.gov/about/office_org/headquarters_offices/ang/offices/management/coe/opps/

Department	Title	Summary	Site
	Research and Technology	Research in future technologies such as automated vehicles and roadway safety	https://www.transportation.gov/research-technology
	Innovation Speaker Series	University research speaker series about transportation of the future	https://www.transportation.gov/utc/transportation-innovation-series-archive
	Innovative Policy	Provides funds for public-private partnership revenue	https://www.transportation.gov/buildamerica/innovation-policy
	Innovation Agents	Public-private partnerships for innovation in transportation	https://www.transportation.gov/policy-initiatives/solving-safety/innovation-agents
	Center for Innovative Finance Support	Funds transportation projects across the nation through public-private partnerships	https://www.fhwa.dot.gov/ipd/
	Intelligent Transporation Systems Joint Program Office	Research, development, and education to enable society to move safer	https://www.its.dot.gov/
	Turner-Fairbank Highway Research Center, Federal Highway Administration	Research facility with 16 laboratories focused on transportation issues from vehicle-highway interaction to nanotechnology	https://highways.dot.gov/research/turner-fairbank-highway-research-center/facility-overview
	Small Business Innovation Research Program	Provides seed money to small businesses with transportation-related innovation ideas	https://www.volpe.dot.gov/work-with-us/small-business-innovation-research
Treasury	FIT Program	Supports internal cross-agency projects to improve the effectiveness and efficiency of financial management	https://www.fiscal.treasury.gov/fit/
Veterans Affairs	VHA Innovation Program	Provides funding support for internal, research, and business innovation ideas	https://connectedcare.va.gov/innovation
	Innovation in Health IT Awards	External innovation awards for innovative healthcare projects	https://www.va.gov/opa/pressrel/pressrelease.cfm?id=5076

Department	Title	Summary	Site
	VA Diffusion of Excellence	Identification and diffusion practices for improving healthcare delivery	https://www.blogs.va.gov/VAntage/26205/va-diffusion-spreading-and-implementing-best-practices-to-improve-care-for-our-nations-veterans/
	Simulation Learning, Education and Research Network (SimLearn)	State-of-the-art simulated health facilities for education and training	https://www.simlearn.va.gov/
	VA Innovators Network	VA's connection across innovators in healthcare	https://www.innovation.va.gov/innovatorsnetwork/
	VA Innovation Center	Enabling program that supports innovation solutions by VA employees	https://www.innovation.va.gov/
Justice	Bureau of Justice's Innovations Suite of Programs	Using data and scientific findings to reduce crime	https://www.bja.gov/Programs/CRPPE/innovationssuite.html
	Field Initiated Programs	Partnerships with law enforcement practitioners	https://www.bja.gov/ProgramDetails.aspx?Program_ID=105
	Supervision Initiative	Investing in data-driven probation and parole practices	https://www.bja.gov/ProgramDetails.aspx?Program_ID=122
	Prosecution Strategies	Uses lessons-learned from crime-fighting programs to develop prosecution strategies	https://www.bja.gov/ProgramDetails.aspx?Program_ID=121
	Comprehensive Opioid Abuse Program	Provides financial assistance to states for prosecuting and coordination handling opioid crisis	https://www.bja.gov/ProgramDetails.aspx?Program_ID=72
	Protect Safe Neighborhoods	Grants for law enforcement to keep communities safe and fight violent crime	https://www.bja.gov/ProgramDetails.aspx?Program_ID=74
	Smart Defense	supports criminal justice professionals using data-driven strategies	https://www.bja.gov/ProgramDetails.aspx?Program_ID=124

Department	Title	Summary	Site
	Strategies for Policing Innovation	Innovation to tackle chronic crime	https://www.bja.gov/ProgramDetails.aspx?Program_ID=80
	Innovations in Community Based Crime Reduction Program	Using data and evidence to reduce community-based crime	https://www.bja.gov/ProgramDetails.aspx?Program_ID=70
Defense	Defense Advanced Research Projects Agency (DARPA) - Information Innovation Office	High-potential, high-impact research to support defense-related needs	https://www.darpa.mil/about-us/offices/i2o
	Defense Innovation Unit Experimental (DIUX)	Acceleratorating commercial research innovation for national defense	https://www.diux.mil/
	Defense Digital Service	Projects and challenges using data including hacking, coding, and analysis	https://dds.mil/
	Office of Small Business Programs	Oversees multiple small business innovation opportunities for defense	https://business.defense.gov/
	MD5	Innovation accelerator connecting internal projects to external thought leaders and innovators	https://community.md5.net/md5/landing
	Defense Innovation Board	Advisory board of national technology leaders for the Secretary of Defense	https://innovation.defense.gov/
	Innovative Missions Capabilities (IMC) - NSA	Direct funding support to businesses and universities of any size or type that can help national security	https://www.nsa.gov/business/programs/programs-for-innovation/
	Defense Innovation Marketplace	Connecting DoD scientists and solutions through funding, coordinated meetings, and communities of interest	https://defenseinnovationmarketplace.dtic.mil/
	Defense Technical Information Center (DTIC)	Repository of research findings to better connect DoD scientists and solutions	http://www.dtic.mil/dtic/
	Coalition Warfare Program (CWP)	International joint research for defense	https://www.acq.osd.mil/ic/cwp.HTML

Department	Title	Summary	Site
	Hacking for Defense (H4D)	Short-term collaboration challenges with universities for DoD	https://www.h4di.org/about.html
	Small Business Innovation Research (SBIR) Program/Small Business Technology Transfer (STTR) Program	Innovation grants for small businesses	https://business.defense.gov/programs/sbir-sttr/
	Rapid Innovation Fund	Funding for small business mature technologies for transition	https://business.defense.gov/Programs/RIF/
	Rapid Reaction Technology Office	Funding for rapid prototype building to reduce development risk	https://www.acq.osd.mil/ecp/PROGRAMS/RRTO.html
Marine Corps.	Marine Corps Innovation Challenge	Commandant's challenge for internal innovative ideas	https://www.marines.mil/News/Messages/Messages-Display/Article/1671270/1st-qtr-fy-19-commandants-innovation-challenge/
	Rapid Capabilities Office (MCRCO)	Supports the rapid development of disruptive technology	https://www.mcwl.marines.mil/Divisions/RCO/
	MCWL - Experimentation Division	Multi-method innovation lab that supports strategic goals and uses operating forces for experimentation	https://www.mcwl.marines.mil/Divisions/Experiment/
	MCWL - Future Technology Office	Pre-screening innovative technology to support readiness and mission success	https://www.mcwl.marines.mil/Divisions/Science-and-Technology/Future-Technology-Office/
	Nexlog	Supports adoption of emerging technologies	http://www.secnav.navy.mil/innovation/HTML_Pages/2017/06/NexLog.htm
Navy	The Athena Project	Sailor challenge program to promote "intellectual courage"	http://www.secnav.navy.mil/innovation/HTML_Pages/2015/05/AthenaProject7.htm

Department	Title	Summary	Site
	Naval Agility	Transforming from innovation to agility focusing on emerging operational capabilities and building an adaptive workforce	http://www.secnav.navy.mil/innovation/Pages/Home.aspx
	Office of Naval Research (ONR)	Supports basic and applied research across 89 programs focused on topics ranging from maritime sensing to bio-inspired autonomous systems	https://www.onr.navy.mil/
	Velocity Lab	Innovation cell investigating high velocity learning	https://www.doncio.navy.mil/CHIPS/ArticleDetails.aspx?ID=9723
	University Research Initiatives	Supports defense-related research within the university system to access and build basic-level investigators	https://www.onr.navy.mil/en/Science-Technology/Directorates/office-research-discovery-invention/Sponsored-Research/University-Research-Initiatives
	PEO EIS Innovation Cell	Innovative methodology that uses challenges to identify promising solutions and enabling groups to scale enterprise-wide	http://www.secnav.navy.mil/innovation/inncell/Pages/default.aspx
	Naval Postgraduate School - Joint Interagency Field Experimentation (JIFX)	Naval Postgraduate School's program for connectivity to commercial innovators	https://my.nps.edu/web/fx
Army	Army Mad Scientist Lab	Collaboration network that attracts experts across multiple fields to imagine the art of the possible	http://madsciblog.tradoc.army.mil/
	US Army RDECOM	Supports basic and applied research for Army engineering needs	https://www.army.mil/info/organization/unitsandcommands/commandstructure/rdecom
	Army Rapid Capabilities Office	Focuses on mission ciritical issues to find and rapidly develop solutions	http://rapidcapabilitiesoffice.army.mil/
	TARDEC	Supports basic and applied research in tank automation and engineering	https://tardec.army.mil/

Department	Title	Summary	Site
	Army RDECOM Research Lab	Supports small business innovation for army needs	https://www.armysbir.army.mil/Default
	Army Medical Research and Materials Command	Supports basic and applied research to advance military medicine	http://mrmc.amedd.army.mil/
	Rapid Equipping Force (REF)	Using soldier-driven solutions to rapidly equip the force and close the research-practice gap	http://www.ref.army.mil/
US Airforce	Air Force Rapid Capabilities Office	Air Force advisory program for rapid saling of promising solutions	http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104513/rapid-capabilities-office/
	AF Small Business	Support for small business innovation answering Air Force needs	http://www.airforcesmallbiz.org/
	Air Force Research Laboratory	Supports basic and applied research focused on air, space, and cyberspace needs	https://teamafrl.afciviliancareers.com/
	Air Force Research Laboratory New Mexico	Leading the way in the nation's laser, optical, and space supremacy technologies	http://www.afrlnewmexico.com/
	Air Force Office of Transformational Innovation	Supporting ideas from junior servicemembers to distribute impact and innovation	http://www.transform.af.mil/About/What-We-Do/
	Comparative Technology Office	Focused on emerging capabilities and prototyping for better buying power	https://www.acq.osd.mil/ecp/programs/cto.html
	CyberWorx (USAFA)	Using design thinking to support advacements in cyber skills within developing airmen and outreach to the community	https://www.usafa.edu/af-cyberworx/
	Special Operations Forces Acquisition, Technology, and Logistics (SOCOM AT&L)	Supports basic and applied research for Special Operations Command	https://www.socom.mil/SOF-ATL
Government-wide	TechFAR Hub	The USDS #Procuremenati are tackling the toughest challenges in digital service acquisition.	https://techfarhub.cio.gov/

Department	Title	Summary	Site
	National Archieves Innovation Hub	Wikipedia Edit-a-thons, document scanning, and meeting space	https://www.archives.gov/innovation-hub
	LabCFTC	Using innovation to improve FinTech capabilities for commodity futures	https://www.cftc.gov/LabCFTC/Overview/index.htm
	SBA Office of Investment and Innovation	Oversees SBIC, SBIR, STTR, and GAF competitions to promote high-growth in small businesses	https://www.sba.gov/offices/headquarters/ooi
	Office of Science and Tech Policy	Gateway to the President for scientific and technology advances as they relate to policy and budgets	https://www.whitehouse.gov/ostp
	Central Intelligence Agency (CIA) - Directorate of Digital Innovation (DDI)	Enabling group that supports digital, cyber tradecraft, and IT infrastructure	https://www.cia.gov/offices-of-cia/digital-innovation
	Govt. Accountability Office	Promotes an open innovation model with Americans; Appears currently inactive	http://www.gao.gov/products/GAO-17-14
	US Postal Service Innovation	Idea-sharing community that reviews promising solutions from postal workers for scaling consideration	https://about.usps.com/transforming-business/innovations.htm
	TVA Enterprise Research and Tech Innovation	Public-private research and technology research in electric transportation and future energy challenges	https://www.tva.gov/Energy/Technology-Innovation
Gov. - Office of Personnel Mangement	OPM Lab	Enabling program that uses human-centered design specialists to support innovation government-wide	https://lab.opm.gov/
Gov. - USAID	Feed the Future	Uses partnerships and innovation to help countires around the world transform their food production systems in order to end chronic hunger and poverty	https://feedthefuture.gov
Gov. - National Science Foundation	SBIR: National Science Foundation	Innovation research in science and technology	https://seedfund.nsf.gov/
	NSF I-Corps	Developing commerical potenial of NSF funded ideas and talent	https://www.nsf.gov/news/special_reports/i-corps/

Department	Title	Summary	Site
Gov. - National Aeronautics and Space Administration	SBIR: NASA	Innovation research in space-related issues	https://sbir.nasa.gov/
	NASA I-Corps	Public-connection to encourage citizen-driven solutions to NASA's needs	https://www.nasa.gov/solve/index.html
	NASA Center of Excellence for Collaborative Innovation (COECI)	Using crowdsourcing as a tool to generate public-private innovations; Tournament Lab for challenges	https://www.nasa.gov/offices/COECI/about/overview.html
Gov. - Federal Communications Commission	Federal Communications Commission (FCC) Mapping Broadband Health in America	Visualization maps that display the cross-section of broadband internet access and use with healthcare issues	https://www.fcc.gov/health/maps
	FCC Data Innovation Initiative	Cross-department data sharing	https://www.fcc.gov/general/data-innovation-initiative
	FCC Accessibility and Innovation Initiative	Using technology to improve accessiblity, equity, and capability in people with disabilities; site appears inactive	https://www.fcc.gov/general/accessibility-and-innovation-initiative
Gov. - General Services Administration	GSA Digital.gov	Using modern technology and data to connect federal employees across time and space	https://digital.gov/
	GSA Acquisition Gateway	Centralizing acquision activities across the federal government to improve efficiency and joint usage	https://www.gsa.gov/portal/category/107699
	GSA Data 2 Decisions	Enabling program - analytics-as-a-service	https://d2d.gsa.gov/
	Global Serivces Administration (GSA) Around the Corner Blog	Highlights Innovative work: Government Innovation Blog	https://gsablogs.gsa.gov/innovation/
	18F	Enabling group of designers, engineers, strategists, and managers to support exceptional digital experiences	https://18f.gsa.gov/about/
US Govt. - Dir. of National Intelligence	Intelligence Advanced Research Projects Activity (IARPA)	35 high-risk, high-payoff research programs in the Intelligence Community from deep learning to superconducting electronics	https://www.iarpa.gov/

Department	Title	Summary	Site
Cross Departments	Challenge	Financially supported challenges for the U.S. citizens to provide solutions for the Government	https://challenge.gov/a/buzz/challenge
	Citizen Science	Citizen-driven science projects supported by tax-payer dollars to capitalize on crowdsourcing and distributed knowledge	https://www.citizenscience.gov/
	Federal Laboratory Consortium for Technology Transfer (FLC)	Nation-wide, formalized network of Federal Research Labs	https://www.federallabs.org/About
	SBIR Program	Seed money provided across three phases to encourage U.S. Innovation and solutions within small businesses	https://www.sbir.gov/about/about-sbir
	CENDI	Federal employee-volunteer program supporting the sharing of federally-funded data and publications	https://www.cendi.gov/

APPENDIX II

DEPARTMENT MISSIONS

Department	Mission	Strategic Goals	Website/Pages
Agriculture	Provide leadership on agriculture, food, natural resources, rural infrastructure, nutrition, and related issues through fact-based, data-driven, and customer-focused decisions.	(1) Deliver programs efficiently, effectively, and with integrity; (2) Maximize American agricultural producers to feed and clothe the world; (3) Promote American agricultural products; (4) Facilitate rural prosperity; (5) Strengthen stewardship with technology and research; (6) Ensure productive and sustainable use of national forests; (7) Provide Americans safe nutritious, and secure food supply	www.usda.gov 64 pages
Commerce	Creates the conditions for economic growth and opportunity	(1) Accelerate American leadership; (2) Enhance job creation; (3) Strengthen U.S. economic national security; (4) Fulfill constitutional requirements and support economic activity; (5) Deliver customer-centric service excellence	www.commerce.gov http://www.decsocal.org/NewsEvents/us_department_of_commerce_2018-2022_strategic_plan.pdf
Defense	To provide the military forces needed to deter war and to protect the security of our country.	(1) Build a more lethal force; (2) Strengthen alliances and attract new partners; (3) Reform the department for greater performance and affordability	dod.defense.gov 14 pages (summary)
Energy	To strengthen the integrity, economy and efficiency of the Department's programs and operations including deterring and detecting fraud, waste, abuse, and mismanagement.	(1) Provide independent, accurate, timely, and balanced information; (2) Conduct misconduct investigations; (3) Enhance and support workforce for excellence and innovation; (4) Facilitate transparency by supporting whistleblower, FOIA, and Congress	www.energy.gov 5 pages

Department	Mission	Strategic Goals	Website/Pages
Education	To promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.	(1) Support state and local efforts to improve learning outcomes; (2) Expand postsecondary opportunities, foster economic opportunity and promote an informed, thoughtful and productive citizenry; (3) Strengthen the quality, accessibility and use of data; (4) Reform effectiveness, efficiency and accountability of the Department	www2.ed.gov ; 31 pages
Health and Human Services	To enhance the health and well-being of all Americans, by providing for effective health and human services and by fostering sound, sustained advances in the sciences underlying medicine, public health, and social services.	(1) Reform, Strengthen, and Modernize the Nation's Healthcare System; (2) Protect the Health of Americans; (3) Strengthen the Economic and Social Well-Being of Americans Across the Lifespan; (4) Foster Advances in the Sciences; (5) Promote Effective and Efficient Management and Stewardship	www.hhs.gov web document
Homeland Security	To secure the nation from the many threats we face. With honor and integrity, we will safeguard the American people, our homeland, and our values.	(1) Prevent terrorism and enhance security; (2) Manage our borders; (3) Administer immigration laws; (4) Secure cyberspace; and (5) Ensure disaster resilience	www.dhs.gov web information
Housing and Urban Development	Create strong, sustainable, inclusive communities and quality affordable homes for all.	(1) Refocusing on HUD's core mission and modernizing HUDS' approach; (2) Leveraging private-sector partnerships; (3) Supporting sustainable homeownership and encouraging affordable housing investments; (4) Redesigning HUD's internal processes	www.hud.gov 33 pages

Department	Mission	Strategic Goals	Website/Pages
Interior	Conserves and manages…natural resources and cultural heritage… provides scientific and other information about natural resources and…hazards…and honors the Nation's trust responsibilities…to American Indians, Alaska Natives, and affiliated island communities…	(1) Conserving land and water; (2) Generating revenue and utilizing natural resources; (3) Expanding outdoor recreation; (4) Fulfilling trust and insular responsibilities; (5) Protecting people and the border; (6) Modernizing organization and infrastructure	www.doi.gov 52 pages
Justice	To enforce the law and defend the interests of the U.S.…ensure public safety against threats…provide federal leadership in preventing and controlling crime…seek just punishment for those guilty of unlawful behavior…ensure fair and impartial administration of justice	(1) Enhance National Security and Counter the Threat of Terrorism; (2) Secure the Borders and Enhance Immigration Enforcement and Adjudication; (3) Reduce Violent Crime and Promote Public Safety; (4) Promote Rule of Law, Integrity, and Good Government	www.justice.gov 39 pages
Labor	To foster, promote, and develop the welfare of the wage earners, job seekers, and retirees of the United States; improve working conditions; advance opportunities for profitable employment; and assure work-related benefits and rights.	(1) Support the Ability of All Americans to Find Good Jobs; (2) Promote Safe Jobs and Fair Workplaces for All Americans; (3) Administer Strong Workers' Compensation and Benefits Programs; (4) Optimize the Department of Labor's Enterprise Services' Opportunities	www.dol.gov 46 pages

Department	Mission	Strategic Goals	Website/Pages
State Agency for International Development	State leads America's foreign policy through diplomacy, advocacy, and assistance…Agency for International Development leads the U.S. Government's international development and disaster assistance…	(1) Protect America's security at home and abroad; (2) Renew America's competitive advantage for sustained economic growth and job creation; (3) Promote American leadership through balanced engagement; (4) Ensure effectiveness and accountability to the American taxpayer	www.state.gov 56 pages
Treasury	To maintain a strong economy and create economic and job opportunities by promoting the conditions… strengthen national security… and manage the U.S. Government's finances and resources…	(1) Boost U.S. economic growth; (2) Promote financial stability; (3) Enhance national security; (4) Transform government-wide financial stewardship; (5) Achieve operational excellence	www.treasury.gov 51 pages
Transportation	To ensure our Nation has the safest, most efficient and modern transportation system in the world, which improves the quality of life for all American people and communities, from rural to urban, and increases the productivity and competitiveness of American workers and businesses.	(1) Safety; (2) Infrastructure; (3) Innovation; (4) Accountability	www.transportation.gov; 56 pages
Veterans Affairs	To fulfill President Lincoln's promise to care for those "who shall have borne the battle" and for their families, caregivers, and survivors.	(1) Easy access, greater choices; (2) Timely and integrated care; (3) Accountable and transparent; (4) Modernize systems and focus resources	www.va.gov 58 pages

INNOVATION

is part of the United States' DNA and as modernization of these efforts are occurring, a more cohesive structure is being imagined. This book provides a snapshot of the different innovation programs across the U.S. Government and explores the idea of developing an **open innovation model** to support a synergistic national system of solution generation. The act of disagreement allows the best answer to rise to the top and the gestalt of the system to optimize the solution. Thus we recognize that **diversity and creativity are the greatest assets of the United States** but without access, these voices cannot be heard. Advances in the information highway, however, now allow us to expand collaboration between Americans and the executive branch to include individual, community, and multi-community involvement in **creating solutions that serve everyone.**