Recommended Roadmap for IT Modernization in Government

This roadmap is not a waterfall model, but rather a circular model. This is because modernization is not a single event, but rather an ongoing process requiring continuous attention. By treating modernization as a process, organizations can better manage technology investments and continue to stay on pace with change, rather than having to engage in a costlier “catch up” situation. Finally, a feedback loop from each stage to the prior stage reflects the fact that modernization solutions need to be continuously assessed and considered. With the feedback loop, important insights can be gathered and made actionable...

Any successful modernization effort addresses the people, processes, and technologies currently in place and develops a plan to reduce risk, promote adoption, and realize benefits. This report distills the essence of numerous modernization strategies and experiences into the roadmap approach recommended in Figure 6, and is consistent with the guidance on implementing MGT.

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Strategic Plan

IBM Center for The Business of Government (CTBG)

Stakeholder(s):
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Interviewees:
List of Those Interviewed for This Project.
Bo Reese:
Chief Information Officer, Office of Management and Enterprise Services, State of Oklahoma
David Bray:
Currently Executive Director for the People-Centered Internet coalition and former Chief Information Officer of the FCC
Dickie Howze:
Chief Information Officer, State of Louisiana
Ed Toner:
Chief Information Officer, State of Nebraska
John MacMillan:
Chief Information Officer, Commonwealth of Pennsylvania
Renee Wynn:
Chief Information Officer, NASA
Stu Davis:
Chief Information Officer and Assistant Director of Administrative Services, State of Ohio
Todd Kimbriel:
Chief Information Officer and Deputy Executive Director, Texas Department of Information Resources, State of Texas

Vision
Government IT is modernized

Mission
To better manage technology investments and continue to stay on pace with change.

Values
Principles: Implicit in modernization are several core principles, which in many ways are present in any innovative approach to solving existing problems:

Execution: Principle 1: Most organizations are good at generating modernization ideas (e.g., cloud or SaaS) but weaker at bringing the ideas to fruition. As a result, modernization advocates often get frustrated by organizational inertia to enact change, and quickly give up.
Inclusiveness: Principle 2: Modernization ideas both big and small emerge from every part of the organization and all may have merit. It is important not to rely solely on a single individual (e.g., the CIO) or even a small group of individuals to generate all valid modernization ideas.

Focus: Principle 3: Modernization is a process and not an event. So, while tempting to focus on the short term, modernization must remain a strategic focus of the organization. Doing otherwise merely solves an immediate problem while setting up the organization for an unending future of crisis-centric approaches.

Prioritization: Principle 4: All modernizations are not created equal. Some modernizations involve quick-hit technology-centric solutions, while other modernizations are longer-term efforts that require substantial personnel and process-centric changes.

Resources: Principle 5: Modernization is a complex undertaking and requires dedicated resources with specialized knowledge and skill for successful program execution. If sufficient and appropriate resources are not available in-house, outside support may be required.

Management: Principle 6: Industry can provide valuable insight in adapting private-sector practices into the public sector. However, this process needs to be very carefully managed and deployed.
Stage 0. Planning

Form and charter the core modernization team and establish their overarching goals

In this stage, modernization starts to move from concept to action. Major outputs: • Project charter document • High-level plan for modernization

Step 0.1. Team

Appoint team lead and cross-functional core team members.

In the first step (0.1), the agency director, likely in concert with the entire organizational leadership structure, formalizes IT modernization as a key agency goal and forms the core modernization team that will guide the modernization effort. The core team should act as an executive steering committee for the project, and team members should have sufficient stature within the organization to command respect and be able to cajole or, if necessary, force actions. The CIO can act in the role of core team leader, consistent with the role of the CIO under FITARA. In this context, the CIO is more of a “first among equals” who leads by persuasion. This will ensure that the project has required executive support, key to successful implementation and called for under the MGT Act.

Stakeholder(s):
Agency Director (or designate):
Primary responsibility

Step 0.2. Charter, Governance & Goals

Develop/approve project charter, establish governance protocols and codify goals for the modernization effort.

In the second step (0.2), the core team, under the facilitation of the core team leader, develops a project charter document to guide the interaction between team members, clearly establishes a governance structure for the organization, and codifies overall goals for modernization. As previously discussed, core team members should stratify numerous modernization goals into levels of importance, consistent with overall federal guidance. Additionally, the project charter should include the guiding principles of a communication plan to inform and educate agency staff, including mission leaders and cross-functional personnel. To prevent modernization from being an “IT thing,” the communications plan should frame the activity as involving business issues that happen to have an IT component. Similarly, the plan should address people and process in addition to the technology. By framing the plan around business problems, modernization is far more likely to be accepted by senior management and cross-functional staff. This keeps the focus on business issues and agency mission issues that MGT supports. Once developed, the project charter should be reviewed and approved by the Agency Director and then distributed as appropriate under the communications plan.

Stakeholder(s):
Core Team Leader:
Primary responsibility

Step 0.3. Plan

Develop/socialize high-level plan for modernization.

After the project charter has been approved, work on a high-level plan for modernization (step 0.3) can begin. The plan will have numerous tracks to be developed and rationalized, and these tracks should generally align to the people-process-technology triad needed for long-term modernization. In addition, tracks should be cross-functional rather than system-centric. For example, procurement related issues across systems can be treated together in the process track, shifting the modernization dialog from a system-by-system approach to an enterprise view. The high-level plan should not fall victim to “paralysis by analysis” and should focus on the
broad brush strokes necessary to get modernization moving. Said differently, the high-level plan should create a scaffolding by which each modernization initiative can hang and evolve, rather than being fully comprehensive. Once the high-level plan is developed, each core team member needs to socialize the plan with key internal and external stakeholders—not for approval, but rather to gain beneficial insights and support for the plan. Finally, these plans could be submitted to a central authority – for example, OMB at the Federal level — to track implementation progress. This creates a momentum for moving forward on modernization since successes and lessons learned will be highlighted. Second, it offers an avenue for cooperation and sharing best practices among agencies.

**Stakeholder(s):**
Core Team:
Primary responsibility
Stage 1. Environment & Performance

Assess current environment and establish performance deltas.

Objective: Capture the organization’s as-is state in order to have a baseline of organizational assets and to define relevant performance deltas... In this stage, the organization begins to understand what it has and how far it needs to go to accomplish its modernization goals, consistent with the template for TMF funding. Major outputs: • Inventory of current assets • Readiness report

Step 1.1. Assets

Plan and conduct an inventory of current assets.

In the first step (1.1), the organization, led initially by the core team, plans and conducts an inventory of all of the relevant systems, including technology, people, and processes. Initially, each core team member should lead work groups to capture the major systems that are part of their department. As one federal CIO said, “if you don’t get a handle on what you have, it could be nearly impossible to define a roadmap, identify duplication of applications draining resources, or make a business case for new IT investments and projects.” ... Once this document has been developed, work teams for the various offices can begin the inventory. Generally speaking, most of the inventory work can be done via email and on-line forms, but each function can devise its own data-capture strategy. The output of this step is a complete, enterprise-wide inventory. It is important to also capture people and process data in addition to the systems data. Simply put, people use technology to solve business problems and use processes to implement and manage technology. As Reese of Oklahoma noted, technology can come and go but people hold the institutional knowledge of how the business works. Without this focus, as people move on the institutional knowledge will be lost and services will suffer. This will also help ensure that knowledgeable staff can make reasonable estimates to meet repayment requirements, like those in the TMF.

Stakeholder(s):

Core Team:
Primary responsibility — The core team should develop a data capture strategy that will ensure that all of the relevant data is captured for each system. At a minimum, the document should capture: • Technology (including hardware, software, and telecommunications infrastructure) • Type of technology (brand, manufacturer, etc.) • Age (initial purchase date and any major upgrades since then) • Estimated useful life • Usage (number of users, concurrent, named, etc.) • People • Number/type of people performing all tasks associated with the system • Experience of people • FTEs assigned • Internal business processes and functions, and external contracts • Internal business processes and functions • Hardware contracts, maintenance, duration • Software contracts, maintenance costs, duration • Services contracts, costs, number of people

Work Groups:
Primary responsibility

Dickie Howze:
CIO Howze of Louisiana followed this strategy as well. His goal was to “leave the lights on” while they learned what they had inherited, to understand and document the “as-is.” Once they understood the current environment, they were able to make informed decisions on what to consolidate, what to standardize on, who would help, and what the processes would be.

John MacMillan:
This effort is not a walk in the park. As noted earlier, when MacMillan of Pennsylvania asked state IT offices which programming languages their applications were built with, the most frequent answer was “I don’t know” or “I am not sure.” Considerable digging may be required to get the correct answer.

Step 1.2. Performance

Determine performance deltas.

In the next step (1.2), performance deltas for each system can be determined. There are numerous ways to do this... This report recommends the use of performance deltas as follows. The first piece, business goals, focuses on how well the system meets its primary business purpose, addressing multiple relevant questions: Is the
system fully compliant with its core mission? Are critical dates generally met? Are users generally satisfied with performance? Are there any upcoming mandates that would require a major overhaul (e.g. analytics)? Have any performance issues been noted either internally or externally to the agency? The second piece focuses on systems vulnerability, defined broadly as including cybersecurity obsolescence, staffing, and other factors. Putting the two pieces together allows for stratifying systems as shown in Figure 6... From the chart, systems can be placed in one of the four quadrants in order to develop an initial stratification. Systems in Quadrant 4, low business goal achievement and high vulnerability, would naturally rise to the top of modernization efforts, while those with high business goal achievement and low vulnerability (Quadrant 2) would be less pressing. A similar prioritization is part of the TMF funding criteria.

Stakeholder(s):
Core Team:
Primary responsibility

Renee Wynn:
At NASA, Wynn divides assets into three categories: keep, decommission, and modernize. “Keep” assets are satellites that generally have a 7–10-year life cycle (although some have been functioning since the 1970s). NASA does what it can to upgrade these assets, but the primary focus is on managing them from a cybersecurity position. Wynn describes “decommission” assets as looking at future business needs and tracking backwards to current processing needs, to see what the future requires from a technology, people, and process standpoint. If no future business need exists, the system is decommissioned. If a future need exists, the system (people, process, and technology) are “modernized” (or upgraded). This approach focuses on the future needs of the organization rather than just the status quo.

Michael Hermus:
Michael Hermus, U.S. Department of Homeland Security Chief Technology Officer, recommends that CIOs “take legacy systems that are the most expensive to operate and divide them into two categories: those that get a lot of attention and support core business needs, and those that aren’t part of the core business. Then, take the ones that aren’t part of the core business and decommission them.”

Step 1.3. Readiness
Assess modernization readiness.

In the final step (1.3), work teams would develop a readiness profile for each system. The readiness profile should focus on readiness for cross-functional goals, including analytics and shared services, and address technology, people, and process readiness. In this step, systems will begin to cluster together in terms of stratification and readiness. Systems in the low-business-goal and high-vulnerability quadrant that is more ready for cross-functional goal achievement would rise to the top. All of the readiness information, along with the supporting documentation, should be prepared by the work groups and then reviewed and validated by the core team. This ensures that the core team takes a cross-agency perspective and can readily understand better targets.

Stakeholder(s):
Work Groups:
Primary responsibility
Stage 2. Execution

Identify and begin to execute the modernization strategy.

In this stage, the focus is on identifying and executing the modernization strategy with key insights gained from prior steps... Outputs: • Modernization guidance • Initial modernized systems

**Step 2.1. Initiatives**

Identify cross-functional initiatives.

In the first step (2.1), the core team needs to identify and formalize cross-functional initiatives. These initiatives, many of which are part of “long tail” discussion, can be leveraged across the enterprise and include such things as moving to the cloud, implementing cognitive computing, and shared services models of usage. The entire enterprise can benefit, but the costs should not be placed on any single system or program. By focusing on cross-functional initiatives, the core team can also align progress with individual initiatives. It makes sense that cloud computing initiatives are among the first to be implemented, since they are the most mature of modernization initiatives and offer the quickest potential savings... Both moving to the cloud and implementing shared enterprise systems requires significant transition work, including planning for necessary downtime. Clearly, business demands will drive how quickly this can happen and in what order. Running in parallel with this step is the task of updating old and cumbersome procurement processes. Previously, most modernizations were associated with purchasing new hardware and software, and the procurement vehicles fit that model. However, a significant percentage of upcoming modernizations will be based on acquiring a service rather than a product.

**Stakeholder(s):**

Core Team:
Primary Responsibility

Public Sector:
The U.S. is the leader in cloud adoption—but the public sector is considerably behind, despite the federal “cloud first” policy commenced in 2011.

**Professional Services Council:**
The Professional Services Council’s (PSC) 2016 Federal CIO Survey found that only 5 percent of federal IT leaders felt that sufficient effort had been made to move strongly into the cloud... Procurement rules need to be updated as the cross-functional initiatives are being developed, to ensure that they work together. The PSC has listed necessary procurement changes as good starting points, including: • adopting performance-based contracting • supporting consumption-based purchasing for cloud computing • taking advantage of current flexibility in the Federal Acquisition Regulation (FAR) to speed introduction of new technologies • discouraging the use of lowest-price technically-acceptable (LPTA) evaluations for complex technology procurements

**Federal Government:**
Migrating to the cloud can be a win for the federal government, since adequate knowledge of how to do it and a strong base of service providers exist. It fits the “do once, use many times” approach. This is not to suggest that everything should be moved to the cloud. Certain data has a much higher requirement for protection, and analysis needs to be undertaken to ensure that a cloud provider can provide equal or better security under federal guidance. Applications that are not appropriate (either technically or programmatically) for the cloud should still be considered targets for in-place modernization.

**Government Agencies:**
The other cross-functional initiative that should be on the forefront is an expansion of the shared, reusable enterprise services that span government agencies, reducing duplication of major business systems (e.g., Financial Management, HR, payroll, and benefits). These shared services can be commercially owned, or government owned and commercially supported.

**Federal Aviation Administration:**
Several agencies have already ventured into the shared services model (among others, these include the Federal Aviation Administration at DOT, the Financial Management Services at Treasury, the Department of Commerce, the Department of Veterans’ Affairs, and the General Services Administration), and are seeing some success. Shared services could span across agencies or expand fully within an agency.

**Financial Management Services**
**Department of Commerce**
**Department of Veterans’ Affairs**

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General Services Administration:
The General Services Administration's Unified Shared Services Management Office is leading significant activity in this space, working with OMB and both customer and provider agencies. This is also consistent with the MGT and similar precepts that encourage use of commercial products and services. OMB

Step 2.2. Targets

Develop and apply the modernization scoring rubric to select initial modernization targets.

In the second step (2.2), the agency needs to develop a scoring system34 to guide modernization progress based on the drivers for the modernization developed in the project charter discussed in Table 1, consistent with guidance provided under MGT. Once defined, a scoring system can help with selecting modernization candidates in a host of ways. Various State and Federal experiences demonstrate different approaches to prioritization ... At this point, the organization needs to decide whether to use a two-step or a greenfield model; each could be of value. In cases where full functionality needs replacement, the greenfield model may be preferable. In cases where customer-facing functionality needs immediate replacement but the backend functionality is relatively stable, a two-step approach may be preferable. A new and final consideration for modernization targets will be the newly issued rules surrounding the IT modernization funds authorized under the MGT Act. While the operational processes for this fund are just now being shared, the criteria for project funding will be an important determinant for project selection.

Stakeholder(s):
Core Team:

Ed Toner:
Toner of Nebraska suggests that the easiest place to start modernization is at the heart of the organization—its network. Once Toner created a single network from the “mess” of numerous networks, modernization targets became much easier to identify and implement. For example, after Toner fixed the network “mess,” he could build a business case to create a private cloud for the state. Rather than using a commercial cloud provider, the CIO’s office drives private cloud activity and passes savings along to user agencies.

John MacMillan:
MacMillan of Pennsylvania takes a risk-based approach to identifying and selecting modernization initiatives. He looks at the supportability and sustainability of the current environment relative to the needs of the business, assessing both technology and labor market support issues. The CIO then takes a portfolio approach to decide what initiatives to undertake and when. MacMillan carefully selects high and low-risk initiatives to be done together, to stretch the organization but without introducing undue risk. Cloud technology is a good example of the need for planning. According to MacMillan, while cloud technology can be a great solution to modernization and relieve internal network pressures, organizations need to avoid the “siren’s song” of the cloud and ensure that the systems are “right placed” to improve performance and reduce risk.

Stu Davis:
Davis of Ohio made an interesting discovery while working with agencies to modernize and migrate their IT infrastructure. He found that the agencies with strong IT processes and discipline often vied to be first in modernizing, while many reluctant agencies did not have formalized processes. Davis attributes this to the incredible scrutiny that modernization puts on the agency. Generally speaking, a well-performing IT organization will be comfortable with scrutiny, while under-performing IT organizations will be uncomfortable.

David Bray:
Bray suggests looking for quick wins in order to build momentum for larger initiatives. In Bray’s case, selecting the first initiative was easy. The Chairman of the FCC in 2014 was at a function at the Commission’s Gettysburg offices when he noticed that consumers were all filling out hardcopy forms. He encouraged Bray to identify a better solution. This led the CIO team to modernize the consumer helpdesk as a quick win with the backing of the Chairman.

OMB:
Once modernization targets have been selected and initial planning has taken place, performance metrics for each initiative should be developed and the planning documents and performance targets should be developed for tracking, publication, and central coordination (by OMB in the federal environment).
Step 2.3. Execution

Execute modernization initiatives.

In the final step (2.3), modernization execution begins. There are myriad ways to modernize, but the most compelling involves Agile development methods... An Agile strategy will enable the agency to plan and execute a phased approach that achieves quick wins to increase momentum while reducing resistance. This is a pragmatic means of dealing with the considerable planning and effort associated with a large-scale modernization effort, since sufficient evidence from the private and public sectors shows that larger projects more frequently fail than smaller projects. Agile also lowers risk and allows for mid-course corrections as required.

Stakeholder(s):

Work Teams:
Primary Responsibility

FBI:
As evidenced by the FBI VCF’s troubled implementation, stakeholders often pile on requirements that may not directly relate to the targeted modernization effort. To resolve problems like this, Agile approaches can be a valuable strategy to address these issues.

FCC:
In the FCC case, since the overall goal was to shift away from 207 legacy systems that were “on-premise” in agency-operated servers and move them to the cloud in an extremely short period of time, the risk of migration issues was real. As a result, the FCC approached this complex effort in phases, with the first demonstration phase (replacing the customer help center) accomplished in six months and for about $450,000—vs. what had been quoted for a legacy, on-premise approach of 12-16 months and $3.2 million. The FCC CIO team showed that modernization was possible, and the team could then start to address more complicated legacy issues with greater momentum.

Agencies:
In concept, agencies may wish to halt legacy system funding as modernization initiatives unfold, but this may not be practical to support continued mission support and delivery.

PSC:
As pointed out by the PSC report, delaying or canceling such contracts could put the government at an unacceptable level of risk.
Stage 3. Initiatives

Measure and track initiatives.

Objective: To track and measure the success of initiatives. Output: • Reports

Step 3.1–3. Metrics

Capture and report metrics.

The final step is to track successes, failures, and lessons learned from each modernization initiative, using performance metrics discussed in step 2.3. There may also be advantages to implement performance incentives at this point, such as gain sharing or share-in-savings approaches. While the federal government does not have a great deal of experience in implementing such models, data from the private sector and the States show that this may be of value for multi-year modernizations. Finally, the metrics will indicate when additional modernization efforts are necessary, which completes the loop back to Stage 0. Additional modernizations are inevitable and need to be anticipated.

Stakeholder(s):

Government Coordinating Offices:

Once these metrics have been agreed upon and the scoring has been accepted, the appropriate government coordinating office (OMB at the federal level) should track the achievement of metrics as well as adjustments necessary to improve performance, also consistent with the MGT Act guidance.

OMB