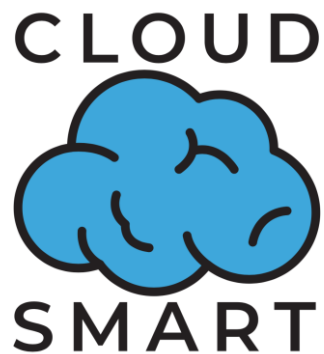


APPLICATION RATIONALIZATION PLAYBOOK



Introduction

This playbook provides Federal IT practitioners with a practical guide to application rationalization and IT portfolio management. As part of Cloud Smart, agencies should review their IT portfolios to determine modernization plans for existing tools. Many agencies are already doing this and have mature portfolio management processes in place. Other agencies lack a comprehensive view of their entire application portfolio and can use this playbook as a starting point to think through their approach. There is not a single, “one-size-fits-all” application rationalization effort. Agencies are encouraged to tailor the approach described in this playbook to fit their mission, business, technology, and security needs.

The purpose of application rationalization is to mature agencies’ IT portfolio management capabilities, empower leaders to make informed decisions and improve the delivery of key mission and business services. A mature application rationalization program is one of many inputs into a mature IT portfolio management and IT governance process. Application rationalization requires buy-in from stakeholders across the enterprise, including senior leadership, technology staff, cybersecurity experts, business leads, financial practitioners, acquisition and procurement experts, and end user communities. Without leadership support and continual engagement with stakeholders, many rationalization efforts fail to deliver sustainable change. This playbook speaks to the challenges and opportunities for IT leaders, management, and technical practitioners, as well as how to overcome structural, logistical, and other significant barriers to success.

This playbook is designed to be iterative and, as such, agencies are encouraged to collaborate cross-agency to share best practices and lessons learned. Further opportunities to learn and engage on application rationalization will be available at the Cloud and Infrastructure Community of Practice (C&I CoP). For more information on how to participate in the C&I CoP, please contact dcoi@gsa.gov.

Key Terms

This playbook uses these key terms throughout the document. Agencies may use their own nomenclature to denote similar roles, offices, and IT terms. For the purposes of this document, please refer to the following:

- Portfolio Manager - the individual or office responsible for executing application rationalization for the entire organization¹
- Program Office - the office or organization within the agency that owns or operates an application that delivers a business or mission function
- Application Owner - the individual or group within the Program Office that directly oversees an application
- Application - a software program that is used directly or indirectly to support the Program Office in delivering on a business or mission function, including mobile applications
- Component - a discrete unit within a Federal agency, such as a bureau or department

¹ For some organizations, the Portfolio Manager will be a senior member of the Office of the Chief Information Officer (OCIO), such as the Chief Enterprise Architect. Other agencies identify other offices and stakeholders to carry out the application rationalization effort. Per FITARA and [EO 13833](#), the CIO, must be involved in “all management, governance, and oversight processes related to IT”. While agencies are free to include other stakeholders in deciding the Portfolio Manager, the CIO, or a designee, must be included in the process.

- Enterprise - a term denoting the wider agency, which is comprised of Program Offices and Components
- Business Value - a qualitative and quantitative measure of the value an application provides
- Technical Fit - a measure of the technological health of an application

Disclaimer

The playbook was developed by the Chief Information Officer (CIO) Council and the Cloud & Infrastructure Community of Practice with input from key Federal IT practitioners and industry representatives. Nothing in this document should be construed as official policy or mandated action, nor does this playbook provide authoritative definitions for IT terms. Rather, this playbook supplements existing Federal IT statutes and policies, and builds upon the key components of the Cloud Smart² strategy: security, procurement, and workforce.

²See <https://cloud.cio.gov/>.

A Six-Step Process for Application Rationalization

The six-step process outlined below is a structured, iterative approach to application rationalization. The six steps provide discrete actions agencies should consider when undergoing application rationalization. Agencies are encouraged to tailor these six steps to meet their organizational structures, unique requirements, and mission needs.

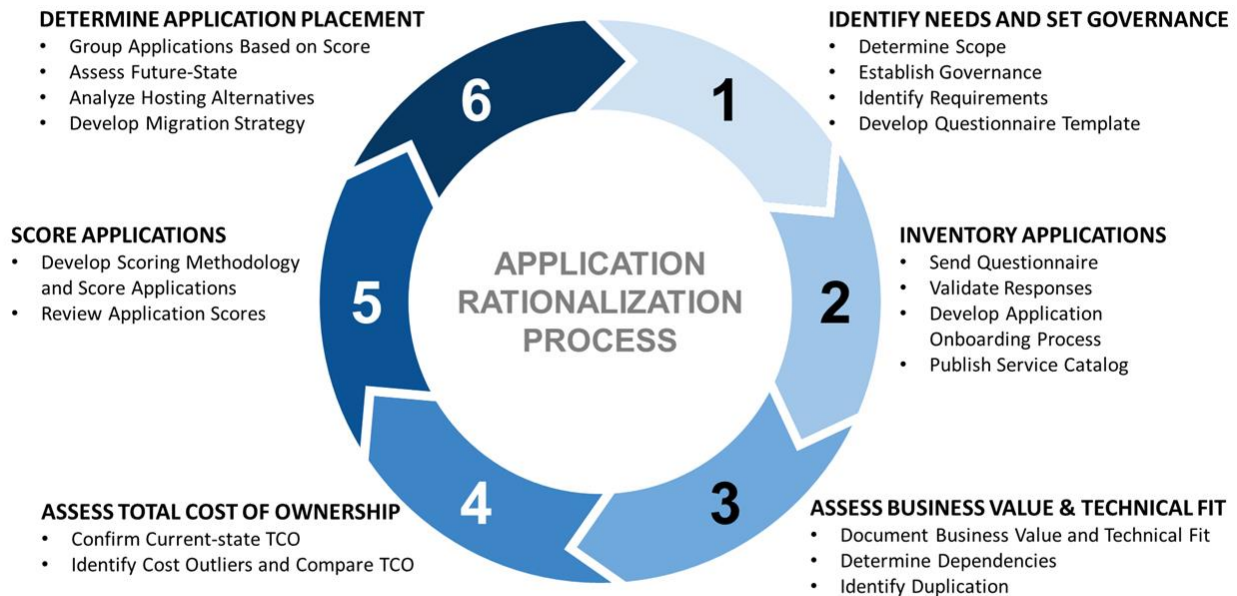


Figure 1: Application Rationalization Six-Step Process

In Step 1, the Portfolio Manager **identifies the needs and sets the governance** for the application rationalization effort. In this step, the Portfolio Manager, in consultation with relevant stakeholders, such as the agency OCIO or other enterprise-wide leaders, develops the governance for the effort, establishes the appropriate decision-making processes, identifies the right agency members to include in supporting the implementation of this effort, and creates working groups to provide insight from across the enterprise. Agencies can use existing governance structures and processes, such as the Capital Planning and Investment Control (CPIC) process, to inform the scope and governance of the application rationalization effort. Through CPIC, agencies have a baseline system and corresponding product component inventory that is reported to OMB, set IT governance structures, and a framework that can serve as a starting point for application rationalization.

In Step 2, the Portfolio Manager conducts an **inventory of applications** that are in-scope for the effort and validates this information against existing application inventory and financial systems of records. This entails sending a questionnaire to Program Offices, Application Owners, IT managers, end users and

other stakeholders across the enterprise (collectively, “Program Offices”) who provide relevant information pertaining to each application and service. An authoritative application inventory is critical for IT leaders to make informed decisions and rationalize the agency’s application portfolio.

In Step 3, the Portfolio Manager **assesses the Business Value and Technical Fit** of all applications in the application inventory. Business value and technical fit information is captured in the questionnaire sent to Program Offices in Step 2 and is analyzed and validated. Portfolio Managers engage Program Offices in an iterative manner to ensure collaboration across the enterprise. Furthermore, Portfolio Managers review the application inventory for dependencies and duplication in order to make informed rationalization decisions later in the application rationalization effort.

In Step 4, the Portfolio Manager **assesses the Total Cost of Ownership (TCO)** in collaboration with the Program Offices for all applications in the application inventory. TCO information is captured in the questionnaire sent to Program Offices in Step 2. The Portfolio Manager compares TCO in the current-state against estimated TCO in future-state architectures.

In Step 5, the Portfolio Manager **scores applications** based on the Business Value, Technical Fit, and TCO information gathered in Steps 3 and 4. This provides Portfolio Managers with relative scores for all in-scope applications and helps them determine whether an application should be reviewed, rewarded, removed, or refreshed.³

In Step 6, the Portfolio Manager collaborates with Program Offices and relevant stakeholders to **determine application placement** based on the application scores and other pertinent information gathered throughout the six-step process. Thereafter, Program Offices develop and execute an iterative change management and application migration strategy.

Application rationalization is an ongoing, critical part of IT portfolio management, and is a cyclical process as shown in Figure 1. The speed of technological change means agencies are constantly investing in new applications, decommissioning legacy IT, and refactoring applications to reflect changing technology and business environments. Agencies must routinely and continuously update and rationalize their portfolios to enable IT managers to make informed business decisions. Without developing the processes and tools to continuously update and rationalize application portfolios, including automating this process when possible, agencies will continue to experience application duplication, siloed business units, and unnecessary IT costs.

A full Technology Business Management (TBM) implementation of all IT expenditures and spend will contribute to this effort by providing a baseline of application portfolios aligned to business value, detailing the TCO and a breakdown of the infrastructure components and IT services.⁴ The application details should be updated as changes occur to maintain an up to date inventory for on-going application portfolio management.

³ These are non-technical terms. Agencies use different terminology when determining how to rationalize applications.

⁴ For more information on TBM, please visit <https://www.cio.gov/priorities/tbm/>.



Step 1: Identify Needs and Set Governance

The Portfolio Manager determines the scope and sets governance for the application rationalization effort, then develops a standardized questionnaire and templates for all resources shared with Program Offices during the application rationalization effort.

1.1 Portfolio Manager Determines Scope

To determine the scope of the application rationalization effort, the Portfolio Manager should consider leadership and mission priorities, existing rationalization strategies, resource constraints, and strategic objectives. Agencies can leverage artifacts developed for other purposes to help determine scope. For example, agencies could use their Agency IT Investment Portfolio Summary, developed during the annual Capital Planning & Investment Control (CPIC) reporting process, or their own strategic plan to help identify, scope, and prioritize applications as part of the application rationalization process.⁵ CPIC is a good starting point for agencies, since it requires agencies to report on their IT investments. While CPIC investments do not equal applications, the investments captured by CPIC can provide a reference to the Portfolio Manager as the application rationalization effort begins.

The CPIC guidance divides IT investments into Mission Delivery (Part 1); Mission Support Systems (Part 2); and IT Infrastructure, Security, and Management (Part 3). IT investments that fall under Part 2, Mission Support, are prime candidates for application rationalization, but by no means should the agency limit its scope to this area. CPIC defines an investment in this area as those supporting services that are common across all agencies including financial management, HR, acquisitions and grants management.⁶ Applications in this area are typically not mission critical, and therefore should be the first to be rationalized. Agencies can even use these applications as use cases for other applications that are more mission critical.

CPIC reporting also leverages the TBM taxonomy to generate granularity by disaggregating IT spending into Cost Pool and IT Towers costs for each investment, which can be associated with the related application investment costs. Beginning with the reporting cycle for Budget Year (BY) 2020, agencies will be required to report Application IT Tower costs as part of their CPIC submissions. This reporting will create cost data for the Portfolio Manager to leverage and can be used as an opportunity to open a dialogue with Chief Financial Officer (CFO) offices about how to best determine costs at the application level. Portfolio Managers can use existing reporting mechanisms, such as CPIC, to scope the rationalization effort to meet the needs of the agency.

⁵ FY 2020 IT Budget - Capital Planning Guidance: <https://www.whitehouse.gov/wp-content/uploads/2018/06/fy-2020-it-budget-guidance.pdf>.

⁶ Ibid.

1.2 Portfolio Manager Sets Governance

The Portfolio Manager should establish transparent and inclusive governance structures that signal a willingness to engage openly across the enterprise with all Program Offices. Many agencies note the importance of codified governance that establishes clear project objectives, decision-making procedures, and ownership responsibilities. Furthermore, application rationalization typically affects every functional component of the enterprise. Agencies noted the importance of senior leadership buy-in to guarantee the success of application rationalization effort. Additionally, many agencies establish working groups comprised of IT practitioners, mission support personnel, financial and CPIC officers, acquisition experts, and end users from across the enterprise. These working groups ensure application rationalization decisions are not made in a vacuum and that decisions are widely disseminated.

Governance will also varies depending on agencies. For example, some large, federated agencies use a decentralized approach to application rationalization, which empowers component-level CIOs to make rationalization decisions. Furthermore, agencies may already have robust governance set up, so the Portfolio Manager may not need to create new structures and can leverage established ones instead. Finally, the Portfolio Manager can use this step to determine the makeup of the application rationalization team, which will directly support the Portfolio Manager. This team should incorporate the varied perspectives within the agency while also remaining agile enough to push the effort to completion. Without clear governance structures, leadership buy-in, and input from a diverse array of agency perspectives, rationalization efforts often fail to bring about meaningful change.

1.3 Portfolio Manager Identifies Requirements

The Portfolio Manager should ensure the application rationalization effort aligns to current legislation (e.g., FITARA, FISMA), OMB policies (e.g., CPIC budget guidance, Software Category Management), key mission areas, and agency-specific leadership priorities. Cloud Smart pushes agencies to identify requirements and intended outcomes before deciding to purchase vendor solutions, migrate systems, or rationalize applications. By developing a **Requirements Landscape**, the Portfolio Manager will be able to identify applications performing core mission services and applications providing support or other auxiliary functions. A list of relevant government-wide legislation and policy can be found in **Appendix III**.

1.4 Portfolio Manager Develops Questionnaire and Templates

The Portfolio Manager, in coordination with working groups and input from across the agency, develops a questionnaire that captures all relevant information and reporting requirements for each application. The questionnaire should have clear instructions and capture financial, business, and technical information for each application. The information captured in this questionnaire will inform Steps 3, 4, and 5 of this playbook.

An **Example Questionnaire Template** is attached as a spreadsheet. Agencies are encouraged to tailor the attachment to meet their individual business and mission needs, or use the template as inspiration in developing their own template. Questions can be modified, added to, or replaced, and the weights associated with each question can be changed to meet agencies' priorities. Additionally, a

comprehensive list of Business Value and Technical Fit Questions is attached in **Appendices I and II**, respectively. Agencies are encouraged to review these questions and use them as appropriate.

Case Study: Identifying Needs and Setting Governance

Successful implementation of an application rationalization strategy requires agencies to develop proper governance structures that reflect a diverse set of agency stakeholders. This case study will demonstrate how one agency component created a robust governance structure to ensure successful implementation of an application rationalization strategy.

The component recognized that the business, mission, and IT groups within the component needed to collaborate on matters pertaining to applications and technology. The component brought these disparate groups together under one governance. With the backing of the component's senior leadership, three recommendation bodies were chartered: (1) the Enterprise Architecture Board (EAB), chaired by the Chief Information Officer and Vice Chaired by the Deputy Chief Financial Officer; (2) the Enterprise Investment Board (EIB), chaired by the Chief Financial Officer and Vice Chaired by the Deputy Chief Information Officer; and (3) the Enterprise Steering Board (ESB), chaired by the Chief Operating Officer. An approval body, the Management Council (MC), was also chartered to oversee the boards' recommendations.

Today, these three boards plus the MC oversee proposals for new investments as well as the implementation of mandatory initiatives. Furthermore, the MC acts as the Information Technology Investment Review Board (ITIRB), as outlined by FITARA, to ensure appropriate oversight for IT-related investments. To ensure the process is flexible, a Triage group—which consists of each Board's Chair, Vice Chair, and Executive Secretary—meets weekly to review new submissions to ensure IT-related items are referred to the EAB first, prioritize critical items that need to be fast-tracked through the streamlined process, oversee the appropriate processing of requests, and plan MC or Joint Board meetings to ensure mission needs are met.

Each board has specific responsibilities. For example, the EIB is responsible for making recommendations on resource requirements and impacts while the EAB recommends ways to reduce costs by leveraging shared services and reduce technical debt through sunseting legacy investments. These boards, with representation from across the component, work collaboratively to assess both proposed projects as well as the implementation of mandatory requirements. The structure is created to ensure that no single board could hold up the entire process. Upon completing review within these boards, recommendations are sent to the Management Council for final approval.

To supplement the work for these boards, the component created two governance artifacts. The first is a decision tree designed to advise when it is necessary to engage the governance structure to employ a new project or mandated requirement. The second is an evaluation form where new requesters identify how the request aligns with the components business needs and

strategic plan goals, what the resource requirements are, what are the risks, and other relevant parts. This form is then submitted the governance groups for adjudication.

This entire structure promotes successful application rationalization for at least three reasons. First, it promotes cross-pollination since boards are chaired and supported by different groups relevant to an application. The mission, business, IT, and operations sides for applications all are represented in this structure, ensuring that all relevant perspectives are heard and accounted for. Second, duplicative applications are prevented from growing since program offices must account for how new applications fill in a specific need that is not met in the current portfolio, and the rationale is then vetted through a robust process. Third, having established charters sends the signal that IT modernization is a priority and that all efforts to support it, including application rationalization, must be supported by the component. This process also provided regular opportunities to review the IT portfolio and assess each investments value through three lenses. Each program area, no matter the size, scored each investment on these three criteria. The results were tallied and averaged, and a final meeting allowed for a final review of the results with the lowest scoring investments identified for modernization or elimination. Without an executive champion, the component was unlikely to achieve its desired outcomes efficiently or effectively.

It is key to highlight that developing a governance structure alone does not lead to successful application rationalization. The component, upon establishing the structure, still needed to create artifacts and provide guidance to its constituency on how to navigate the process. This component was keenly aware of staff experiencing information overload. To alleviate this a process, an IT procurement toolkit was developed that linked to policies and tools to ensure each components success while complying with FITARA. Creating a robust governance structure not only assisted in application rationalization, but ensured the component had an iterative, thorough structure to handle various strategic and operational needs in order to achieve its mission.



Step 2: Inventory Applications

The Portfolio Manager sends the questionnaire on applications as described in Step 1.4 to all Program Offices. The questionnaire captures information pertaining to each application’s Business Value, Technical Fit, and Total Cost of Ownership (TCO). Application Owners may need to request CIO or CFO staff help to identify the TCO. The Portfolio Manager validates all questionnaire responses and collects them into an authoritative application inventory. The Portfolio Manager then uses the application inventory to develop a service catalog to be shared with application customers and end users.

Many agencies struggle to collect authoritative application data because they lack a unified process to collect data from across their enterprise. By implementing a strong Software Asset Management (SAM) and portfolio management processes, agencies gain more reliable inventory data and are able to better comply with the reporting requirements established by FITARA, the MEGABYTE Act, and CPIC Guidance. If the agency has implemented the broader TBM framework, this should provide the initial inventory of applications and can be used to complete portions of the questionnaire.

2.1 Portfolio Manager Sends Questionnaire to Program Offices

The Portfolio Manager should ensure that the same questionnaire is sent to each in-scope Program Office. This ensures the collection of uniform and reliable data that enables applications to be compared in subsequent steps. The questionnaire should instruct agencies on who is responsible for responding, how data fields are coded, and when the questionnaire is due. Example instructions are included in the questionnaire template.

2.2 Portfolio Manager Validates Questionnaire Responses

The Portfolio Manager reviews questionnaire responses from all in-scope Program Offices for completion and accuracy, then compares them with existing inventory sources. Example inventory sources that agencies can leverage include:

- Capital Planning and Investment Control Reports (such as those submitted to OMB);
- Financial Reporting Tools;
- Authorization to Operate Lists & Management Tools;
- Cybersecurity Assessment and Management Tools;
- Software License Optimization (SLO) Tools and Inventories⁷;
- Configuration Management Database (CMDB) Tools;
- Continuous Diagnostics and Mitigation (CDM) Tools;

⁷ M-16-12: Improving the Acquisition and Management of Common Information Technology: Software Licensing: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2016/m-16-12_1.pdf.

- Continuity of Operations Plans (COOP) and Disaster Recovery (DR) Plans;
- Data Center Inventory Management (DCIM) Tools;
- Data Management Systems;
- Hardware Tracking Systems;
- Licenses and Service Level Agreements;
- Security Operations Tools;
- Software Asset Management (SAM) Tools; and
- Virtualization Management Systems.

OMB Software License Management Policy

When seeking out existing inventory sources, Portfolio Managers should be aware of previous guidance that OMB has provided on software licenses. M-16-12: Improving the Acquisition and Management of Common Information Technology: Software Licensing⁸ requires agencies appoint a software manager responsible for managing agency-wide commercial and commercial off-the-shelf (COTS) software service agreements and license, maintain a continual agency-wide inventory of software license and subscription services, and analyze inventory data to ensure compliance, consolidate redundant application, and identify cost saving opportunities.

Furthermore, M-16-12 specifically mentions commonly used IT that enables software license management including: “Software Asset Management (SAM) tools, Software License Optimization (SLO) tools, Continuous Diagnostics and Mitigation (CDM) tools, Continuous Monitoring as a Service (CMaaS), network management tools, and finance and accounting systems to report on software inventory, prices, and usage. This technology should automate: IT hardware and software asset discovery; IT asset inventory tracking; software inventory normalization; contract, purchase, and product use rights reconciliation; software license optimization; and SAM data sharing capabilities.”

The Portfolio Manager follows up with the Program Offices if there are disparities between questionnaire responses and information from existing inventory sources. The Portfolio Manager now has an authoritative application inventory.

2.3 Portfolio Manager Establishes New Application Onboarding Process

The Portfolio Manager works with the CIO, CFO, Chief Acquisition Officer (CAO), Chief Data Officer (CDO), Chief Human Capital Officer (CHCO), Chief Information Security Officer (CISO), and other leadership as applicable to ensure the relevant information captured in the questionnaire is reported for all new applications purchased from vendors or developed by or for the agency. This ensures the application inventory is continuously updated and provides value to future iterations of application

⁸ M-16-19. Data Center Optimization Initiative: Optimization of Physical Data Centers. 8/1/2016. pp. 1, 7, 8, 10-12. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2016/m_16_19_1.pdf.

rationalization.

2.4 Portfolio Manager Publishes Service Catalog

The Portfolio Manager consolidates information from the questionnaire with information from existing inventory sources to produce a service catalog. The service catalog should align to the TBM Service Layer taxonomy and include information necessary for customers and users to select services that meet their needs. By leveraging the TBM Service Layer in the service catalog, agencies will ensure that both the creators of the catalog and their users share a common language, one that is being adopted across the Federal Government. Please note that, as the government continues to adopt TBM, the TBM Taxonomy, including the Service Layer, is subject to change. Therefore, agencies should update the service catalog accordingly.

The service catalog is different from the application inventory in that the application inventory is intended to provide the Portfolio Manager with discrete information about specific applications the Portfolio Manager needs to make business decisions. While agencies vary in the type of information included in their service catalogs, most include the following:

- Name;
- Description;
- Service category⁹;
- Purchase price;
- Business and technical requirements;
- Key licensing considerations; and
- Advice for using the service.

The service catalog should be updated when the service details are updated to ensure the latest service offerings are available to customers. Without continuous updating, agencies risk offering out-of-date services to customers and users. Furthermore, service catalogs that are not continuously updated lead to service portfolio duplication within agencies, which wastes time and effort that could be spent on more high value activities.

If the agency has not yet established a service catalog, the Service Layer of the TBM taxonomy can serve as a reference for agencies in categorizing services. If the agency has implemented the TBM framework, they can use the Service Layer as a baseline to begin formalizing their service catalog.

⁹The TBM Taxonomy 2.1 breaks out the Service Layer into six separate categories: Business Application Services, Platform Services, Infrastructure Services, End User Services, Delivery Services, and Emerging Technology.

Agency Experience: Inventorying Applications

How agencies approach enterprise-wide application inventorying will depend on how accurate their inventories are at the start. One interviewed agency stated that they had been building a reliable inventory since their enterprise governance efforts started in 2009, so when they rationalized their full portfolio they merely had to ask program offices targeted questions to arrive at a uniform data set. Part of the goal of the application rationalization effort should be to create a reliable and reusable process to onboard new applications and remove retired applications to keep the inventory updated.

Another agency started by finding anything resembling an existing IT asset inventory, which ended up coming from a variety of sources. The agency used the sources listed in Section 2.2 to identify and attempt to fill their information gaps without requiring too many data calls.

Several agencies have noted the limits of using automated tools to discover applications. Specifically, automated tools generally cannot capture qualitative information pertaining to an application such as:

- Who within the organization has the institutional knowledge or skills required to run the application;
- What are the testing requirements for the application; and
- What types of clients or customers use the application and whether there are skills, access, or geographic user limitations or requirements for the application.

Agencies stressed that while automated tools are a good place for the Portfolio Manager to start when conducting an application inventory, they should be cross-referenced with data calls and existing inventory sources to ensure accuracy and reliability of application information.



Step 3: Assess Business Value and Technical Fit

The Portfolio Manager reviews the Business Value and Technical Fit responses captured in the questionnaire.

3.1 Portfolio Manager Reviews Application Business Value and Technical Fit Responses

Business Value can be both qualitative and subjective. For the purpose of scoring applications, however, agencies should develop quantitative ratings around Business Value so that it can be weighed against more quantitative and objective metrics like Technical Fit and TCO. This Business Value rating system should include, but is not limited to, the following factors:

- Effectiveness - the extent to which an application is a solution for the goal agencies are trying to achieve;
- Mission criticality - the degree to which an application is critical in supporting and executing the agencies' mission;
- Utilization - usage data for the application. Inventory tools can help agencies measure usage without relying solely on requirement information provided by an Application Owner;
- Complexity - the customization, unique features and functions enabled by the application. Applications with greater complexity typically require unique skills to develop and maintain, satisfy more technically difficult requirements, or pull from multiple data sources; and
- Usability - how easy it is for the user or customer to operate or learn.¹⁰

Even if an application serves a core business function and is generally well-reviewed by users, it must be evaluated in a forward-looking manner. Applications can become entrenched in large organizations, leading to applications being used past their support horizons, increasing their costs to operate, and becoming far more vulnerable to security breaches. Assessing the Business Value of an application must therefore also involve assessing the potential cost of leaving it unchanged. Program offices should be able to refer to Business Impact Analyses (BIAs) and other response plans to answer questions such as, "What effect would a 24-hour unplanned outage of this application have on your organization's reputation?"¹¹ If the agency has implemented the full TBM framework, the Business Capabilities layer can provide insight into the applications that are used to enable those capabilities or mission goals for further assessment. Each application will be mapped to its relevant capability and reporting will enable

¹⁰ For information on usability, agencies can leverage the system usability scale as a way to measure customer experience. Please visit <https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html> for more information.

¹¹ Example questions like this one are provided in Appendices I and II, as well as in the attached Example Questionnaire Template.

the agency to start assessment at each capability, then drill down for further TCO and technical details provided by the agency's TBM cost model.

Portfolio Managers may choose to weigh application responses based on unique agency requirements. For example, an application's mission criticality may be more important in determining its Business Value than complexity or utilization. An application's ability to perform core mission services, such as a legislative mandate, administration priority, or leadership objective, is often the most important factor when assessing that application's Business Value. The Portfolio Manager should weigh Business Value factors in the same manner for every application under consideration to prevent bias in the application rationalization effort. The weight assigned to a given question will be factored into the application scoring process in Step 5.

Technical Fit questions help agencies determine the fitness of their technology environment. These questions should capture the extent to which applications are capable of operating. Developing a rating system for the following factors can help agencies determine the technical fit for their applications:

- Technical requirements - what levels of storage, bandwidth, data, maintenance, and support are needed to make an application run;
- Software and hardware version control - how often is an application updated and how much marginal effort does each update require from administrators and users;
- Dependencies and interoperability - to what degree do other applications or systems depend on this application to run, and what disruptions in other applications would affect it;
- Scalability and adaptability - can an application be scaled to onboard new users and can it be augmented to fit the needs of new user groups; and
- Security standards - is an application vulnerable to security attacks and does it fit into agency risk tolerance models.

Incorporating Risk into Business Value and Technical Fit

While this playbook does not present risk as its own metric in the scoring of applications, risk assessment and management principles must be applied and considered throughout the application rationalization effort. This includes both the risk associated with cybersecurity vulnerabilities and the institutional risk associated with potential changes in mission, management, or contracts.

Application rationalization and cybersecurity are parallel efforts. For example, probability impact analyses for systems should be a factor in determining their Business Value and Technical Fit. A system with a high likelihood of attack, for example, will have significant constraints on its potential hosting options, and therefore should be weighted differently than a system with a low likelihood of attack. Agencies should leverage existing BIAs when determining their risk strategy for application rationalization.

Agencies will need to consider the cost of securing applications during and after migration using the same risk management principles they currently use to make security control decisions. An application that is a prime candidate for migration from a technical point of view may cost a great deal to secure in a new environment. Because security considerations can have a significant impact on returns on investment, CISOs and other security personnel should be engaged in the application rationalization effort from the start.

Additionally, agencies must consider the probability of changes to the agency or component itself impacting the viability of applications. The risks associated with changes in mission priorities, budget, or leadership must be considered during any enterprise-wide effort, and application rationalization is no exception. Agencies should leverage their existing processes for managing this kind of institutional risk.

Migrating or removing applications could also have specific implications for IT contracts. If, for example, an application's usage is tethered to a contract, that contract's life cycle will impact the Business Value and Technical Fit of the application. The end of a contract also carries the risk of institutional knowledge leaving with the contractors.

3.2 Portfolio Manager Determines Application Dependencies

The Program Offices should list application dependencies as part of the questionnaire responses. Determining applications' upstream and downstream dependencies will provide the Portfolio Manager with a more comprehensive understanding of the applications place in the ecosystem. Many systems and applications share code, databases, and functionality. Applications with many dependencies tend to have higher Business Value and applications that support many other applications are typically more costly to migrate or refactor. However, some types of dependencies (e.g. data, GUI) may not necessitate maintaining costly systems. Agencies may choose to use existing inventory sources or dependency mapping software to assist in this part of the application rationalization effort. Dependencies are a critical factor Portfolio Managers should consider before making rationalization decisions or

recommendations.

Agencies can leverage commercial tools to help map and produce visualizations of their application dependencies. However, many software tools do not capture all dependencies, such as training and knowledge dependencies. Therefore, Program Managers should still use the questionnaire to validate dependencies in the application inventory. While each agency's environment will ultimately influence how these tools operate, they typically can produce results within a short timeframe.

3.3 Portfolio Manager Identifies Application Duplication

The Portfolio Manager reviews the application inventory for duplication. If components are using different applications to perform similar standard software functions, there is likely a good business case for an enterprise solution or intra-agency shared service. Often duplication occurs because Program Offices do not have an updated service catalog of available applications. Service catalogs that are continuously updated reduce the risk of duplication and allow Program Offices to more rapidly procure existing applications and services that may be already available to them.



Step 4: Assess Total Cost of Ownership (TCO)

The Portfolio Manager reviews the Total Cost of Ownership (TCO) quantitative responses for each application and identifies outliers. The Portfolio Manager works with Program Offices to capture the most comprehensive TCO data in the current state. Current-state TCO data for applications will be used in subsequent steps to assess future-state architectures and hosting options.

In calculating TCO, agencies should leverage TBM (e.g., Total Application Cost). Agencies can use the information gathered from the questionnaire in tandem with data from implementing TBM. If the agency has implemented the full TBM framework, beyond the CPIC requirements, they will have the TCO of applications in their portfolio, which will provide the details of their infrastructure makeup and alignment to business capabilities.

4.1 Portfolio Manager Confirms Current-State TCO

The Portfolio Manager works with the Program Offices in a collaborative manner to review TCO-related fields captured in the questionnaire and confirm all hidden and indirect costs are considered for each application. Agencies report difficulty in accounting for all costs associated with their applications for the following reasons:

- Application Owners may not account for infrastructure, network, storage, security, or other costs required to run the application;
- Application Owners may not take into consideration depreciation costs;
- General problems accounting for enterprise and local IT;
- Program Offices may not consider relevant factors such as workforce productivity and skill requirements, operational resilience, and business agility when considering the TCO for on-premise applications; and
- Program Offices may not have a good view of cross-business and enterprise level costs, such as licensing, training and HR costs, and compliance costs.

The TBM framework helps address these issues by accounting for all IT expenditures and allocating them across all IT services and applications that are supported; however, there are costs that are relevant to applications that are non-IT in nature that agencies should account for in calculating TCO. Focusing on IT costs alone will not provide agencies with a full TCO for their applications, but, where IT costs are concerned, TBM can help guide agencies in identifying those for costs for applications.

The tables below list IT costs and other costs that the Portfolio Manager should consider as part of an application's TCO. While most of these examples are focused on cloud migration, not all rationalization paths lead to cloud, and not all agencies will experience cost changes in the same way. Furthermore,

costs identified in these tables can also apply to non-cloud environments. These costs and considerations have been mapped to the TBM Services and IT Towers to highlight how TBM can identify IT costs that agencies should account for when determining TCO for applications.

IT Costs¹²

TBM Taxonomy - Cost Pool	TBM Taxonomy - Cost Sub-Pool	Considerations
Operating Expenditures (OpEx)		
Internal Labor	Expense	<ul style="list-style-type: none"> ● Moving to the cloud can lead to a smaller internal labor force to maintain and support applications
External Labor	Expense	<ul style="list-style-type: none"> ● External labor, such as contractors, could decrease when migrating to the cloud since this work will predominantly be handled by the cloud service provider ● In preparation for a migration, agencies may need to contract more external labor to prepare the agency for the new environment, at least in the near term
Outside Services	Consulting	<ul style="list-style-type: none"> ● Outside services costs could depend on how agencies contract with different cloud service providers concurrently, especially in a multi-cloud environment
	Managed Service Providers	
	Cloud Service Providers	
Hardware	Expense	<ul style="list-style-type: none"> ● Rationalization could potentially result in the need for fewer servers ● If applications are migrated to the cloud, hardware maintenance will be performed by the cloud service provider
	Lease	
	Maintenance & Support	
	Depreciation &	

¹² Please note that these tables use the TBM Taxonomy 2.1. Please visit the TBM Council webpage for more information: <https://www.tbmcouncil.org/>.

	Amortization	
Facilities & Power	Expense	<ul style="list-style-type: none"> As applications move the cloud, data center footprints cloud shrink, lowering facilities and power costs in general
	Lease	
	Maintenance & Support	
	Depreciation & Amortization	
Telecom	Expense	<ul style="list-style-type: none"> As applications move the cloud, the telecom footprint could shrink since agencies will not be liable to support and maintain telecom hardware and networks
	Lease	
	Maintenance & Support	
	Depreciation & Amortization	
Other	Other	<ul style="list-style-type: none"> N/A
Internal Services	Shared Services	<ul style="list-style-type: none"> N/A
Capital Expenditures (CapEx)		
Internal Labor	Capital	<ul style="list-style-type: none"> If moving to the cloud, agencies should transition away from a CapEx model to an OpEx model. As agencies adopt a pay-as-you-go model, they may experience reduction in costs
External Labor	Capital	
Hardware	Capital	
Software	Capital	
Outside Services	Capital	
Facilities & Power	Capital	

Telecom	Capital	
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TBM Taxonomy - IT Tower	TBM Taxonomy - Sub-Tower	Considerations
Data Center	Enterprise Data Center	<ul style="list-style-type: none"> ● Moving to the cloud allows agencies to decommission purpose-built data centers and server closets that house and protect IT equipment. However, many agencies note that it often takes several years to recoup cost savings from moving applications from on-premise data centers to the cloud.
	Other Facilities	
Compute	Servers	<ul style="list-style-type: none"> ● Software <ul style="list-style-type: none"> ○ New platforms or security requirements may necessitate software changes ○ Moving to cloud providers may decrease costs through volume purchasing ● Hardware <ul style="list-style-type: none"> ○ Rationalization could potentially result in the need for fewer servers ● Decommissioning <ul style="list-style-type: none"> ○ Applications to be decommissioned may incur costs (e.g., scrubbing and returning hardware)
	Unix	
	Midrange	
	Converged Infrastructure	
	High Performance Computing	
	Mainframe	
Storage	Online Storage	<ul style="list-style-type: none"> ● Storage <ul style="list-style-type: none"> ○ Costs will be shared by multiple applications instead of being dedicated. Moving to cloud providers may decrease costs through volume.
	Offline Storage	
	Mainframe Online Storage	
	Mainframe Offline Storage	
Network	LAN/WAN	<ul style="list-style-type: none"> ● Bandwidth <ul style="list-style-type: none"> ○ Increasing the number of users of an

	Voice	<p>application may incur costs to increase that application’s bandwidth</p> <ul style="list-style-type: none"> ○ If an application is migrated to the cloud, upticks in usage could be absorbed by the cloud provider
	Transport	
Platform	Database	<ul style="list-style-type: none"> ● Upfront <ul style="list-style-type: none"> ○ Initial configuration and implementation will incur costs ○ Using pre-configured system images can decrease configuration costs
	Middleware	
	Mainframe Database	
	Mainframe Middleware	
Output	Central Print	<ul style="list-style-type: none"> ● Moving to the cloud is unlikely to affect Output
End User	Workspace	<ul style="list-style-type: none"> ● Once agencies have migrated, many of the support and troubleshooting work, like an IT Help Desk, will be handled by the cloud service provider, potentially decreasing costs for agencies
	Mobile Devices	
	End User Software	
	Network Printers	
	Conferencing & AV	
	IT Help Desk	
	Deskside Support	
Application	Application Development	<ul style="list-style-type: none"> ● Moving to the cloud reduces costs associated with developing and supporting existing applications. However, customized application lift-and-shifted into cloud environments may require increased development and support functions, increasing the associated costs. Many agencies noted the significant cost of refactoring and modernizing application to work effectively in the cloud.
	Application Support & Operations	
	Business Software	

Delivery	IT Services Management	<ul style="list-style-type: none"> Agencies may experience cost savings as responsibility for IT Services Management and Program, Product & Project Management are given to cloud service providers as part of the overall services support they provide to agencies.
	Program, Product & Project Management	
	Client Management	
	Operations Center	
Security & Compliance	Security	<ul style="list-style-type: none"> Intrusion Detection and Prevention <ul style="list-style-type: none"> New technologies increase potential for misconfiguration, introducing new vulnerabilities. Mainframes typically face fewer intrusion attempts than servers or cloud instances Fewer applications will result in fewer potential vulnerabilities Continuity of Operations Plan (COOP) <ul style="list-style-type: none"> Cloud service provider develops COOP plan when applicable after migration Disaster Recovery (DR) <ul style="list-style-type: none"> Cloud service provider develops DR plan during migration Trusted Internet Connection (TIC) <ul style="list-style-type: none"> May require secure network connections to cloud service providers Moving to TIC-like controls in the cloud may be more cost-effective than traditional gateways
	Compliance	
	Disaster Recovery	
IT Management	IT Management & Strategic Planning	<ul style="list-style-type: none"> Licenses <ul style="list-style-type: none"> Where enterprise-wide licenses are unavailable, individual licenses could increase cost per application Migration and rationalization should result in fewer licenses overall, or volume purchases
	Enterprise Architecture	
	IT Finance	

	IT Vendor Management	
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Below are other relevant application costs that may not appear to be immediate IT costs but are still relevant in determining TCO. If agencies do not account for the non-IT costs relevant for their applications in determining, they may struggle to capture the true cost of their applications in any future-state scenario.

Other Relevant Costs

Costs	Considerations
Certifications	Current employees may require new certifications
Reassignment	Current employees may need to be onboarded in new roles. Staff moving to new roles may require incentives
	Moving to modern technologies may reduce the need for reassignment of staff from outmoded roles over time
Human Resources	Onboarding current employees in new roles and leveraging HR offices for change management processes will incur costs
IT Training	Targeted training around DevOps, Agile, cloud, and other modern technologies may be required for current employees, and new specialists may need to be hired
	Fewer training support staff may be needed due to a decrease in overlapping software solutions
Software Patching	Fewer applications will decrease the hours spend on patching. Cloud providers typically automatically patch for many OS vulnerabilities
Authority To Operate (ATO)	Initial changes in authorities will require new ATOs
	Migration should result in fewer authorities overall

Many agencies have functional and business silos throughout their organizations. For example, business units are often not responsible for cross-functional costs, such as the operation of a network or agency-wide data center. To overcome these types of challenges, agencies must encourage and allow all relevant stakeholders to participate in the application rationalization effort. Populating working groups with individuals from across functions and business units can mitigate some of the risks of business siloing.

Another challenge for agencies is that vendors rarely break out costs to the granular level needed to

conduct TCO analysis. For instance, IT vendors send invoices to agencies for services delivered, but rarely break out costs in a way that is useful for agencies to analyze the TCO for the application. This is especially true for firm fixed price contracts. Agencies must also consider additional costs that vendors do not typically account for, such as the cost to train employees on how to use an application or additional hardware costs required to use the application.

A full TBM implementation helps address some of these issues by compiling disparate data sources needed to determine application TCO. These may initially be high-level estimates, but can provide the framework for continuous improvement as additional details become available. The initial implementation will highlight areas that need additional granularity in data, which can provide opportunities for better agency solutions as new solutions are developed to capture data.

Finding appropriate data needed to accurately calculate application TCO requires an iterative process involving many stakeholders including an Application Owner, other business managers, and vendors. As such, Portfolio Managers should work with Program Offices to review the list of potential costs listed in the table above and work collaboratively to overcome cost accounting barriers. A complete view of the TCO for applications remains a challenge for agencies and industry. Agencies are encouraged to think through the Cost Pools and IT Tower categories that affect TCO.

4.2 Portfolio Manager Identifies Outliers and Compares Applications in the Inventory

The Portfolio Manager works with Program Offices to ensure the most accurate and complete current-state TCO information is captured in the questionnaire, especially in the event that the Portfolio Manager identifies outliers, applications whose TCO are decidedly different when compared to other applications. While what constitutes an outlier will differ by agency, an application that demonstrates extreme variances in cost when compared to the entire inventory takes priority in validation.

Upon determining the current-state TCO, the Portfolio Manager should also leverage the governance structure for review. In doing so, the Portfolio Manager ensures that effort includes the perspectives of senior leadership, like the chief enterprise architect, thereby supplementing any review or validation performed with Program Offices.



Step 5: Score Applications

The Portfolio Manager, in coordination with working groups, develops a methodology to score applications based on information from previous steps. An application score helps Portfolio Managers determine whether to Review, Reward, Remove, or Refresh existing applications, but it does not determine the final application end-state. Step 6 will explain in further detail the distinctions between Review, Reward, Remove, and Refresh and how they relate to applications.

5.1 Portfolio Manager Develops a Consistent Methodology and Scores Applications

The Portfolio Manager, in coordination with working groups, develops a scoring methodology that incorporates Business Value, Technical Fit, and TCO. A consistent scoring methodology ensures scores are unbiased and clear. The case study at the end of this section goes into greater detail about how one agency developed a scoring methodology to meet the agency's needs. Agencies can leverage existing methodologies like those listed in **Appendix IV** or develop their own.

5.2 Portfolio Manager Engages Program Offices for Transparency and Feedback

The Portfolio Manager shares application scores with Program Offices and Application Owners. This ensures all stakeholders have visibility into how applications perform compared to other applications in the inventory. Additionally, this provides the Portfolio Manager the opportunity to discuss alternative solutions that better meet the Program Office's business or technical requirements.

Portfolio Managers must develop a communications strategy that allows stakeholders to learn about the scoring process and provide feedback. Agencies should anticipate that some Program Offices will be reluctant to share information on their applications, especially if they believe their applications might be decommissioned. To mitigate resistance and to promote collaboration, the Portfolio Managers must be proactive in soliciting feedback from the Program Offices. This feedback loop will also serve as a check on Portfolio Managers. Constant communication with Program Offices will not only provide ample opportunities to collect feedback, but can develop trust and relationships for future iterations of application rationalization and or IT initiatives. The more iterative, agile, and collaborative the Portfolio Manager and the application rationalization effort becomes, the more likely Program Offices will support the effort overall.

Agencies can host office hours where Application Owners can talk to the application rationalization team or can create an easily accessible FAQ about the scoring process and the rationale behind the questionnaire. If need be, agencies should arrange workshops where the application rationalization team walks through scoring one application with the Program Offices to ensure that the offices are acclimated to the process.

Case Study: Scoring Applications

There several scoring methodologies agencies can select when implementing an application rationalization strategy. One agency, for example, chose to use an established methodology while modifying it to meet agency needs. The agency used a method similar to Gartner’s Tolerate, Invest, Migrate, Eliminate (TIME) methodology, but broke out Tolerate and Migrate into different levels. The agency’s modifications are described below:

Tolerate	T1 - Considered in ‘keep the lights on’ mode and only critical fixes are completed (i.e., resolve issues only if an application cannot be used at all or without major workarounds or for significant vulnerabilities). No development, modernization and enhancement (DM&E). Only operations and maintenance (O&M).
	T2 - Tolerated with enhancements. Mostly O&M with some DM&E.
	T3 - Tolerated, likely to be considered for migration in the next one to three years and a migration plan is needed. Mostly O&M with DM&E for migration planning.
Migrate	M1 - Applications whose technology/platform/hardware are being modernized; applications satisfy drivers to move to a new platform or technology. Technology focused.
	M2 - Applications whose capabilities are migrating to a new solution; applications satisfy drivers including improved integration with other applications. Technology/platform/hardware should be modernized as part of this migration. Business focused.

The Invest and Eliminate quadrants do not have any further breakdowns, but they do require certain prerequisites. For example, to tag an application for investment, an application must have an approved business case or 50% or more budgeted for DM&E; for elimination, an application must have a data migration plan. The agency added another level of granularity to their TIME-based methodology to make the scoring methodology more intuitive for Application Owners. To support this level of specificity, the agency ensured that the questionnaire sent to application managers mapped back to the specific quadrants and levels.

Upon settling on a standard methodology, the agency embarked on a communications strategy to explain the methodology to stakeholders. The agency created a presentation to show to Application Owners at several briefings. These briefings allowed Application Owners to ask questions about the application rationalization strategy and allowed Portfolio Managers another opportunity to collaborate with Application Owners. The presentation included information on the scoring methodology, definitions of key terms, the project schedule, and other relevant information.



Step 6: Determine Application Placement

The Portfolio Manager recommends an application placement based on the application score, in collaboration with relevant stakeholders.

6.1 Portfolio Manager Groups Applications Based on Application Scores

The Portfolio Manager groups applications into the appropriate categories and develops a structured process to assess the hosting options for each application. In the template, applications are grouped into four categories: Review, Reward, Refresh, or Remove.

- Review - applications with low Business Value and high Technical Fit. These applications are candidates to maintain current funding levels, explore opportunities to enable greater Business Value, and consider lower-cost alternatives.
- Reward - applications with high Business Value and high Technical Fit. These applications are candidates for increased investment, enhanced functionality, and expanded use across the enterprise.
- Refresh - applications with high Business Value and low Technical Fit. These applications are candidates for increased investment to ensure the same high-level Business Value is delivered by more modern and secure systems.
- Remove - application with low Business value and low Technical Fit. These applications are good candidates to decommission or consolidate the functions within another application.

Figure 2, which uses dummy data, visualizes how applications will be scored. Agencies are free to modify the parameters of their scoring quadrants to best meet their needs.

Alternative scoring methodologies use different terms and criteria. Examples of alternative scoring methodologies are found in **Appendix IV**.

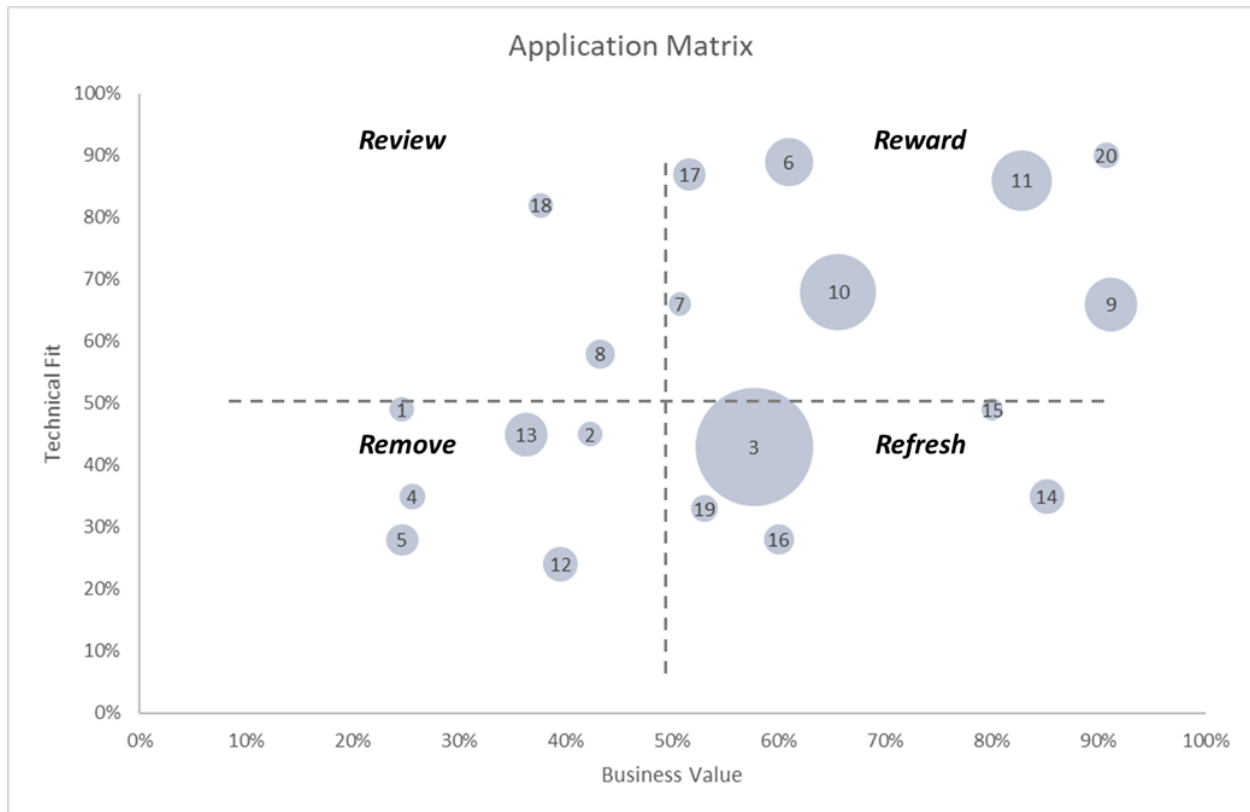


Figure 2: The application matrix with quadrants overlaid. Applications with a greater TCO per user will appear as larger circles. Portfolio Managers should determine the appropriate point to delineate between applications to review, reward, refresh, and remove based on agency needs and available resources, including the relative sizes of each quadrant.

6.2 Portfolio Manager Assesses Future-State Total Cost of Ownership and Hosting Options

Since agencies have already determined their current-state TCO drivers, they can use the current-state as a guide for the future-state, post-rationalization TCO. While the current-state TCO may not be able to inform all aspects of the future-state TCO, it will at least provide agencies with a reference point. For example, in Step 4 agencies may have identified HR costs related to their applications. As agencies determine the future-state TCO, they must account for potential changes in those HR costs alongside changes in service delivery costs. Agencies should strategically build out future-state TCO accounting to include all costs identified in Step 4.

Future-state TCO will be an important factor in assessing hosting options, but agencies should remember that improved service delivery and customer satisfaction are major goals as well. Just because a hosting option saves money does not necessarily mean it is the option agencies should choose. Agencies should compare the hosting options by costs, resiliency, reliability, agility, security, and service delivery. These options should be weighted in a manner that is consistent with agency business and mission goals. For example, the agency whose primary mission involves working with classified or otherwise sensitive information may have to weigh security considerations more heavily than other factors. Similarly, cost may eventually become a primary consideration for agencies that face budget constraints that would otherwise hamper their primary mission objectives. While there is no one

method of weighing these factors, the process of assigning weights should be conducted by the Portfolio Manager transparently with input from major stakeholders across the enterprise.

6.3 Portfolio Manager Analyzes Hosting Alternatives for On-premise Applications

When migrating from on-premise solution to a new hosting environment, there are up-front costs associated with:

- Assessing the current-state;
- Planning for migration;
- Getting stakeholder buy-in;
- Running parallel systems;
- Vendor management;
- Training and reskilling; and
- Refactoring and replatforming existing applications if necessary.

Therefore, agencies will often experience a “migration bubble.” As agencies act on these decisions, they will realize the benefits of hosting in a new environment (e.g. increased worker productivity, greater scalability and agility, and operational resilience). This establishes a new cost baseline resulting in eventual O&M and DM&E cost savings, as seen towards the right tail of the graph in Figure 3.

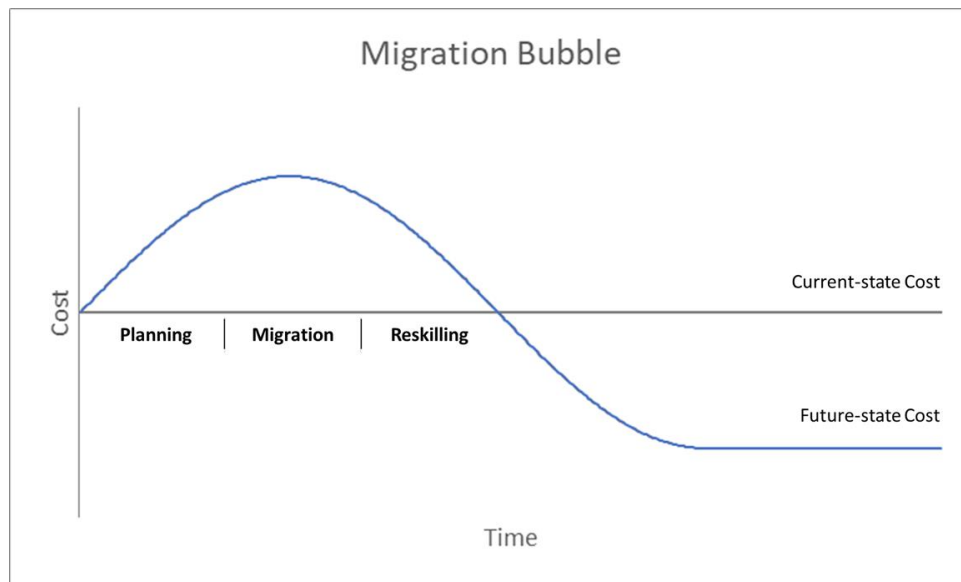


Figure 3: The Migration Bubble. This figure illustrates the significant increase caused by running current-state and future-state systems in parallel. While the future-state shows a rebaselining of costs below the current-state costs, the actual cost of operating future-state systems depends on how many servers and support systems can be decommissioned or consolidated as part of the application rationalization effort.

Hybrid solutions wherein applications or systems are run in the cloud and on-premise simultaneously can greatly increase the size of this migration bubble. In such cases, the technological solution has to be weighed against the increase in costs. Given the high cost of running on both environments, a hybrid solution will usually not be the best investment in the long term. However, some vital systems could be worth the increased cost to ensure they are secure before, during, and after migration.

Once the agency has taken the initial step of “lifting and shifting” a portion of its portfolio to an Infrastructure as a Service (IaaS) solution, for example, the agency will likely be able to build out its cloud capabilities over time. This must be done with caution. Many applications cannot be effectively lift-and-shifted into cloud environments without significant refactoring and modernization. Lift-and-shift is the least mature cloud migration option, so agencies are unlikely to realize all of the benefits of cloud until they consider, for example, a containerization or serverless model. Increasing maturity can continue to decrease costs, but eventually the agency is likely to see diminishing returns from increasing their cloud capabilities. It is important to keep in mind that beyond a certain point, marginal improvements in service delivery from advanced cloud services may not realize the cost savings described in Figure 3 or the benefits described above.

As automation and abstraction capabilities mature over time, agencies will be able to focus more on mission and service delivery while also streamlining their business functions. Automation can increase productivity as staff are freed from low-level maintenance on applications and can spend time innovating or focusing on other high-priority issues. With staff productivity increasing as agencies mature, there will be less need to hire new, full-time staff. Beyond automation, tools in the cloud abstraction layer have the potential to streamline access to huge amounts of data and improve service delivery, but only certain mission functions will have both the criticality and the data needs to justify an investment in cloud abstraction.

6.4 Portfolio Manager Develops a Migration Strategy and Change Management Plan

To achieve the benefits of application rationalization, agencies require cultural buy-in from across the organization. Successful IT migration strategies require:

- Buy-in from senior leadership, the CIO, and CFO to provide funds and backing for the migration effort;
- A communications strategy to inform and continually engage stakeholders;
- A vendor management plan to ensure contracts align to migration strategy;
- A workforce development plan to help end users adapt to the new environment; and
- A migration timeline and workflow map to execute migration strategy.

Workforce development is a critical part of Cloud Smart and is essential to a successful application rationalization and migration strategy. Agencies must not only train their staff on how to migrate into the new environment, but they must have enough competency to use the tools to make key decisions regarding future modernization plans. Agencies that outsource O&M or DME risk losing significant institutional knowledge when contracts end or new vendors are added.

Case Study: Application Placement

Since migrating to a new environment is both a technical and cultural challenge, successful migration plans will account for both. A small component of a much larger agency successfully migrated its applications to the cloud by strategically addressing the technical and cultural parts of migration. While implementing a cloud migration is a huge task that requires its own playbook, this case study will highlight the key areas that the component focused on:

- **Cloud roadmap** - the component created a roadmap articulating what the component sought to achieve from the cloud, the relevant stakeholders that needed to be engaged, the processes that needed to be established, the resources available for a successful migration, etc. The purpose of the roadmap was to understand the current environment from a skills and technical standpoint and to map out what the shared vision for the cloud was among relevant stakeholders. The component ensured all IT staff had a chance to provide input and briefed senior management on the cloud roadmap to establish executive buy-in.
- **Network considerations** - many applications have intra-agency or inter-agency network considerations. A full understanding of the network topology and path to the cloud is critical for success. This understanding allowed the component to quickly identify any business outages as it moved into a new environment, additional costs required to support applications, as well as other stakeholders who needed to be involved with the cloud migration effort. Being fully engaged with network vendors and shared service providers, coupled with internal network expertise, are key factors for success.
- **Training** - ensuring Federal and vendor IT personnel could continue to support applications in the new environment allowed the component to keep costs low because new talent did not need to be brought in. It also increased cost savings because the remaining the component staff could take advantage of cloud benefits. The component hosted formal training supported by vendors; ran virtual labs; and posted information on internal chat rooms, internal blogs, and LinkedIn for staff's convenience, in addition to encouraging attendance at external trainings. The component also hosted pilots with vendors where staff could experiment in the new environment. Training was a key component in driving the cultural changes needed for a successful migration because it demystified the cloud for staff and gave them the confidence to operate in that new environment.

- **Lift and shift, refactor, rehost** - before moving any application into the cloud, the component had to determine which method it would use to deploy applications. Depending on their business value, costs, and technical capabilities, the component determined that certain applications were ready for lifting and shifting into the new environment while others needed code updates to operate in the cloud. Because the component recognized that different applications needed to be treated differently, the method of delivery also required application-specific resources and planning. In the long term, the component is going through a major system modernization effort to update their application architecture and take better advantage of cloud services.

While every agency will require a tailored approach for migration, whether to the cloud or to a different environment, the above characteristics should be captured in any agency's migration plan. The component, when compared to the larger agency, had a smaller universe of stakeholders to collaborate and satisfy. While this made developing and implementing the migration simpler than an enterprise-wide migration, their practices are still applicable for any size organization. As with other topics in application rationalization, constant and clear communication between the mission, IT, and business sides of the enterprise will ensure necessary buy-in for any migration strategy while also guaranteeing the right information is shared, regardless of into which environment an application is moved.

Conclusion

Application rationalization is integral to portfolio management and IT modernization. The six-step application rationalization process contained in this playbook provides a structured approach agencies are encouraged to use as a launchpad for future portfolio management and cloud migration strategies. Agencies that develop an authoritative application inventory will empower their leaders to make more informed IT strategies, allow procurement offices to buy services more efficiently, and enable users to deliver mission services to customers.

For some agencies, the cost to migrate on-premise applications to the cloud is prohibitively expensive and does not enhance service delivery. For other agencies, the benefits of hosting applications in cloud environments, such as increased productivity, scalability, agility, and operational resilience, outweighs the upfront costs. This playbook encourages agencies to take a holistic view of the costs and benefits of migrating from on-premise to different environments including the business value, technical fit, and TCO of existing applications.

This playbook is designed to supplement the Federal Government's Cloud Smart strategy, which focuses on workforce, security, and procurement. This playbook reinforces the need to reskill Federal employees to operate and deliver mission service in any environment, comparing security and backup costs in on-premise versus cloud environments, and rethinking procurement processes to make smarter buying decisions that account for the TCO and interface with existing CPIC guidance. Ultimately, application rationalization is a component of a broader Federal strategy to use IT and services in a way that enables agencies to perform their missions faster and more effectively.

This playbook is intended to be a living document and is subject to future updates. As such, readers are encouraged to provide feedback and engage with other IT practitioners across the Federal Government. To provide feedback or learn more about potential collaboration opportunities, please reach out to the Data Center Optimization Initiative (DCOI) PMO at dcoi@gsa.gov.

Finally, agencies are encouraged to join the Cloud & Infrastructure Community of Practice (C&I CoP) and the C&I CoP's Application Rationalization Working Group. The CoP is a forum where Federal practitioners meet to collaborate with their peers on matters relating to cloud and IT infrastructure. The Working Group will serve as a dedicated space to add to this playbook and to discuss other relevant application rationalization matters. C&I CoP meetings are held on the first Wednesday of each month, except in August and January. For more information on the C&I CoP, the Application Rationalization Working Group, and to learn how to join either, please email dcoi@gsa.gov.

Appendix I

Business Value Questions:

- What problem was this application designed to address?
- List the business process(es) this application supports (e.g. quarterly reporting to OMB, internal project management, Order Management transaction processing).
- When was this application originally developed?
- Who is paying for this application and how is it being funded?
- Which department business lines are using this application and in what regions are they located?
- Is this application used by customers outside of the department?
- What is the application's average utilization (yearly)?
- Does the information within this application need to be kept and stored? If so, how long must it be kept?
- Does the capability/functionality exist within another application?
- If yes, please provide the name of the application(s). If no, reply None.
- When new employees or users start using this application, how are you training users?
- What is the strategic direction of this application? Is there documentation for this plan?
- What is the importance of the application to the user's duties?
- How satisfied are you with the features of the application?
- How satisfied are you with the usability of the application?
- What effect would a 24-hour unplanned outage of this application have on your organization?
- How well does this application meet its intended business requirements?
- Is this application an authoritative source/Exclusive record of origin (ROO) for the data it stores?
- Does this application have security controls in place?
- Does this application have redundancies in place to ensure continuity of operations?
- Does this application interface with and/or depend upon other applications?
- Is the application stack aligned with supported versions, or do parts of the application depend on obsolete technology?
- Does the application have maintenance issues that affect business operations?
- Is the application flexible and able to meet changing business requirements?
- Does this application require specialized expertise to maintain?
- Can this application quickly scale to handle greater transaction volumes and support additional users (internal or external to your organization)?
- What impact does upgrading the application software version have on other components of the application (e.g. custom features, permissions, etc.)?
- What is the timeline for this application to be sunsetted or retired?
- Can the application be moved to and run in a cloud efficiently?
- Does the application developer utilize the following modern development practices (e.g. Continuous Development/Continuous Integration; Configuration as Code; Version Control; Automated Testing; Agile (e.g. Scrum, Lean, SAFe)

- How much data does this application store?

Appendix II

Technical Fit Example Questions:

- What office or component is responsible for the IT support/administration of this application?
- Please list all contractor companies that support this application.
- Who is hosting this application? Is this application in the cloud?
- How many change requests do you receive per year?
- Does this application receive information from other applications?
- Does this application send information to other applications?
- What licenses are associated with the use of this application (if applicable)?
- Does this application have a valid ATO?
- Is the application web-enabled? Please provide URL.
- Is this application mobile-enabled?
- How do users access/log-in to this application?
- What databases are used by the application?
- What Reporting and Analysis (BI) technology is used by the application?
- What Application and/or Web Server is used by the application?
- What Programming Languages are used by the application?
- What Operating Systems are used by the application?

Appendix III

Below is a non-exhaustive list of official policies and guidelines that can impact how agencies determine their requirements in developing an application rationalization strategy:

Short Title and Link	Full Title
PMA	The President's Management Agenda
MEGABYTE Act	Making Electronic Government Accountable By Yielding Tangible Efficiencies Act of 2016 or the MEGABYTE Act of 2016
FITARA	Federal Information Technology Acquisition Reform Act
FITARA Scorecard	House Committee on Oversight and Government Reform (OGR) Biannual IT Scorecard (See page 6)
FITARA Guidance	Templates, resources and guidance to help agencies implement FITARA
CAP Goals	Cross-Agency Priority Goals

FY20 IT Budget - Capital Planning Guidance	FY20 IT Budget - Capital Planning Guidance
OMB Circular A-130	Managing Information as a Strategic Resource (See Appendix II: Responsibilities for Managing Personally Identifiable Information)
M-15-14	Management and Oversight of Federal Information Technology
M-16-02	Category Management Policy 15-1: Improving the Acquisition and Management of Common Information Technology: Laptops and Desktops
M-16-12	Category Management Policy 16-1: Improving the Acquisition and Management of Common Information Technology: Software Licensing
M-16-21	Federal Source Code Policy: Achieving Efficiency, Transparency, and Innovation through Reusable and Open Source Software
M-17-22	Comprehensive Plan for Reforming the Federal Government and Reducing the Federal Civilian Workforce
M-18-23	Shifting From Low-Value to High-Value Work

Appendix IV

Below is a list of scoring methodologies. Please note that inclusion in this list is not an endorsement of any methodology, but to provide a sample on universe of methodologies. Agencies are encouraged to research application scoring methodologies, adopt a pre-existing methodology and tailor it to their needs as appropriate, or develop a new methodology altogether:

- Gartner's Tolerate, Invest, Migrate, Eliminate (TIME)
- Forrester's Wave Methodology
- Deloitte's Application Rationalization Methodology