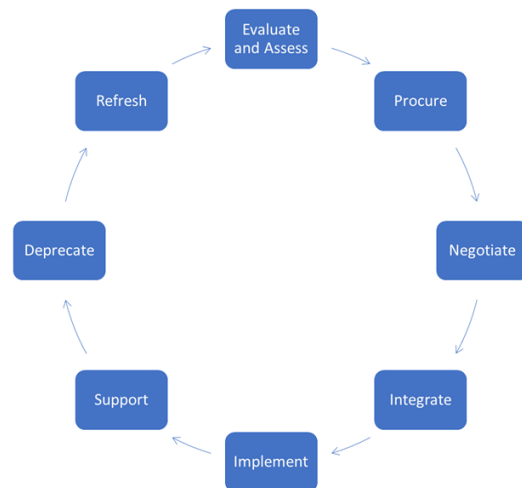Technology Lifecycle Management In The Federal Government

Executive Summary

Technology lifecycle management is the compilation of disciplines managing all aspects of technology, from concept to disposal, throughout the technology's useful life to the business. There are many different methodologies in play across the government that address the mechanisms and processes in place to manage their technology. This document is intended to be a general reference of common stages of the technology lifecycle and how the ITVMO interacts within the various stages.

The ITVMO plays a pivotal role throughout many stages of the technology lifecycle. At the front end The ITVMO can assist in providing resources that evaluate new technologies against past purchases and future needs. It enhances the purchasing process through vendor relationships. And in the latter stages the ITVMO can utilize historical data to aid in the vendor selection and purchasing of replacement technologies.

The lifecycle begins and is initiated by business needs, driven by the mission of the agency in strong alignment with its technology organization. It flows from the need assessment to pre and post award until it is integrated into the steady state operations of the organization. The agency benefits from the technology throughout its useful life supported by the technology organization until it needs to be replaced due to age or being supplanted by newer, more effective technology solutions.

Introduction

Technology is not only transformative, it's invasive. The sheer volume of technology has been increasing exponentially recently. It is incorporated everywhere and impacts how we work, how we live and how we interact with the world around us.
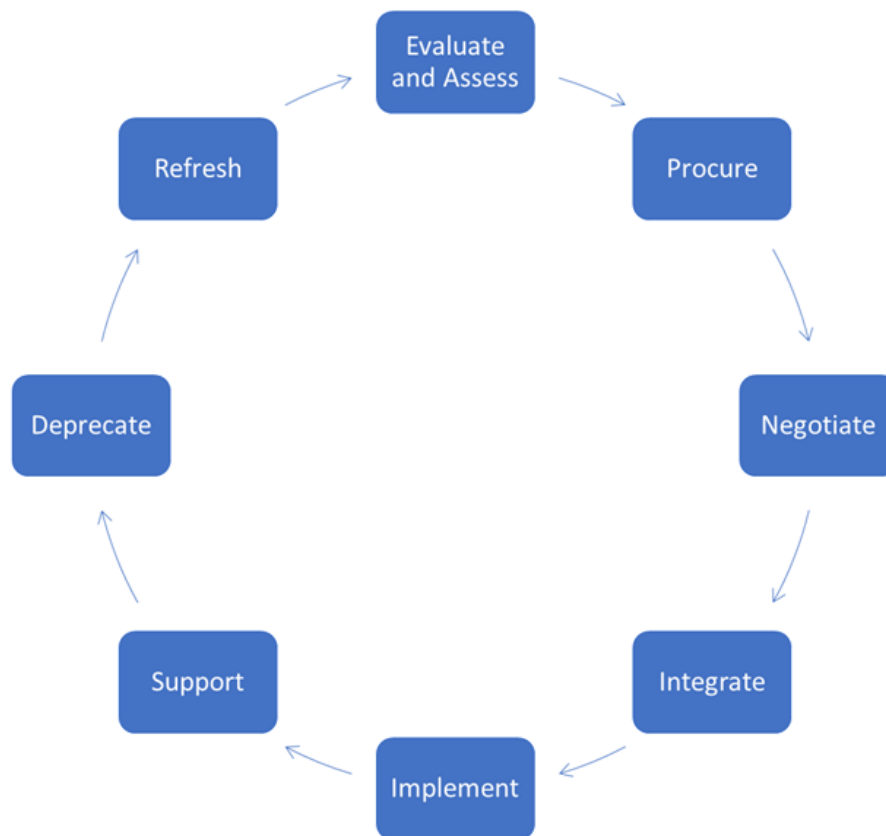
Managing technology within an enterprise is becoming more complicated than ever. It changes rapidly and it is important for an organization to understand all the phases of its lifecycle to maximize the benefit of every dollar spent. When to introduce new technology or when to deprecate an existing technology must be strongly aligned with the value such technology brings to the organization. Monitoring and maintaining equipment and keeping it up-to-date for patches or software updates can be daunting. Managing risk, managing cost, managing productivity and managing security are all aspects that surround managing the technology itself.

This document discusses the technology lifecycle (TLC). It is described as a series of process stages that follow any given technology's use and adoption within an organization. It will show how the technology lifecycle interacts with other lifecycles and processes that influence the impact and integration of technology to the federal government.

Throughout each phase of the technology lifecycle we will describe the key roles of vendor management and its impact to mitigate risk while improving the value technology brings to the organization. We will also discuss and distinguish between the technology lifecycle and the technology lifespan since they both follow the same process flow. Technology lifecycle being focused on the development of new technologies, their maturity and the timing of adoption to maximize impact while minimizing risk. While technology lifespan is focused on the useful life and capabilities of the physical items delivering the technology. Within the technology lifecycle there are likely to be many technology lifespans. This impact and distinction is lessened in some areas by cloud and XaaS (Software as a Service, Infrastructure as a Service, Platform as a Service, etc) but is still very prominent (in network, voice, workspace, etc) and will be addressed within the framework of this document.

For example if you look at voice, over time voice has transformed from traditional telephony to VoIP to unified communications (UC). Each one of those has its technology lifecycle and within that lifecycle there is the useful lifespan of the devices that implement that technology. So there is the transformation of when is most important and most valuable to move from traditional to VoIP to UC. And there is the refresh due to the lifespan of the devices that sit (physically or virtually) on our desks or the infrastructure that supports them. Both follow the same process cycle described below.

 The technology lifecycle is a multistage approach that intersects many other disciplines. It is based on repeatable processes that adapt to a changing technology landscape. The lifecycle begins and is initiated by the business needs of the organization. In general, it is driven by the mission of the agency foremost and typically relates to one or more of the following:

- Improve operational efficiencies
- Increase speed
  - Data throughput
  - Response time
  - Automation
- Enhance customer experience
- Solve a problem
- Digital transformation

The interaction between the business need and the technology is key to the success. Technology or the IT department should not drive the solution for technology's sake but should influence the decision with the best outcome for the business in mind. The CIO and CTO have the awareness of new and emerging technologies and understand the connection between such technology and the business needs. End user needs analysis from the business perspective is followed by technical analysis providing the foundation for best fit solutions and leads into the procurement process.

Let's look at each of the technology lifecycle stages in more detail.

Evaluate and Assess

Business Assessment

This stage of the TLC begins with a clear understanding of the business need, use cases and requirements. Business analysts and business leadership need to communicate with technology analysts (Enterprise Architecture, Business Analysts and Data Analysts) and technology leadership to brainstorm viable paths forward. It is also the primary point to look for innovation opportunities to improve process, performance and productivity. It is with this understanding that the intersection between the business needs and the technical environment comes to consensus on appropriate technologies to create the solution. The solution does not necessarily imply a 100% new approach. It should leverage existing assets, software, services and technologies that can support the need. Evaluation of those items and the phase of each of their respective lifecycles and lifespans may also influence the direction. It may increase scope or decrease

scope of the solution due to a variety of constraints. Resources, legacy systems, regulations, security and compliance are some of the constraints that impact the solution.

Gap analysis

During the assessment and requirements analysis, gaps in features, functionality, performance, and capacity may rise to the surface. These gaps should be documented and be part of the Request for Information (RFI) process. They could become the distinguishing characteristics that highlight one vendor over another. These elements also inform product direction toward Commercial Off The Shelf (COTS) solutions vs. Modifiable Off The Shelf (MOTS) solutions vs. fully custom solutions.

Planning

Within this evaluate stage an initial plan needs to be created that looks at net new, integration with existing, O&M and possible obsolescence. It is not a comprehensive plan at this point but enough detail to address all aspects of the lifecycle not just from an impact and implementation perspective but also from a budgetary perspective. Both short term and long-term mechanisms to address the requirements need to be evaluated. Supply and demand estimates should be made from both a business perspective and an overall growth potential of the product or service.

These planning characteristics are key in understanding capacity increases that will drive the contract, negotiations and implementation logistics.

Evaluate & Assess - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Resources
ITVMO	Available technologies and standards to meet business's need	What vendors provide cloud based services that are FedRamp certified? How many data loss events has the vendor experienced either internally, or with client data? What is a vendor's performance against Service Level Agreements (SLAs) over the last [time period]? How much of the vendor's product is proprietary and not compatible with other systems? What is the best value across the vendor market for my product or service needs? What products and services are other agencies using that are similar to my needs?	Fedramp Marketplace IPTs reports Gartner Info-Tech

Procure

The procurement stage utilizes the requirements and objectives laid out in the assessment phase. It identifies the necessary technology assets and the timeline of required purchases, as well as the funding sources for them.

The appropriate contract vehicles and qualified vendors are evaluated to determine the pool of suppliers that can best fulfill the requirements. Vendor evaluation criteria must meet (but not be limited to) the standards of a vendor health assessment which determines:

- Financial stability

- Risk and security assessment

- Supply chain constraints

Certifications or authorizations such as FedRamp can aid in this evaluation.

Acquisition strategy

The acquisition strategy is a high-level business and technical approach designed to ensure the success of the initiative through the business need requirements from the evaluate and assess stage. It considers resource availability, funding, timeline and other constraints to execute the established plan and move the initiative forward to contract and negotiation.

An RFI is then generated to gather information and approaches in fulfilling the business need. The RFI is potentially the first line of communication with the applicable vendors. It provides the awareness of the initiative to the vendors while providing the government with the opportunity to get questions answered.

Procure - Roles, Responsibilities, and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
ITVMO	Market landscape for technology Contract landscape	What is the relative and actual monetary difference between a BIC and non-BIC contract? Does the agency have any duplicative contracts, or multiple contracts with the same vendor for similar services? Which BIC provides the best customer experience for my product or service? What services and products are available by BIC? What contracts are expiring and could potentially move to BIC solutions? What percentage of a product or service available via BIC solutions are provided by small businesses?	3rd party platforms like Govshop Fedramp Historical contract data - FPDS Operational workbench dashboard

Negotiate

Vendors love large distributed autonomous organizations so they can establish many different contracts at many different price points. In this stage of the TLC it is important to look at the big picture and understand contracts and contract term periods. This is the stage where consolidation can occur and economies of scale can be leveraged for the organization.

Although oftentimes impractical, it is useful for the contract period to align with the funding period. It provides for smoother transactions on the financial side and over time can better align multiple contracts to increase buying power and economy of scale. Some of the key tenants are:

- Contract (end date) alignment

- Maintenance agreement alignment

- Contract for the future but purchase for today

- Volume pricing

The growth projections established in the previous stages are used here so that phased growth can be incorporated in the negotiation and the contract. It potentially reduces initial outlay of funds but provides for better unit pricing over the life of the contract. Any maintenance or support should also be considered at this time. Maintenance agreements should align with the product, asset or system lifespan to avoid vendors changing pricing ratios late in the product lifespan. Vendors typically offer hardware that will have a 5-6 year lifespan and a maintenance or support contract for 3 years. Renewing the maintenance on older assets incurs a cost increase.

Contracts should have upper limits for renewal so that vendors can't low ball as a mechanism to win business and then unrealistically raise pricing at time of renewal. This is very critical in the cloud and XaaS space.

Service level agreements (SLA) should be established and be part of the contract and contract renewal. Tracking to the SLA will be critical upon renegotiation. Most SLAs are

designed by the vendor, for the vendor. Where possible influencing or tailoring the SLA should be done to meet the needs of the initiative and the government.

Contracts should be binding to performance metrics where possible so that the government retains leverage for discounts or better terms in future renewals.

Care must be taken when negotiating bundled or enterprise wide licensing agreements. Oftentimes there are exceptions that provide the vendor with loopholes that allow them to audit and increase usage counts where they impose additional fees or fines.

Negotiate - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
ITVMO	Cost and Volume data	What have other agencies paid for a similar product or service? What were the prices paid, and terms and conditions that are committed to by other federal agencies purchasing the same or similar product?	Prices Paid data - submitted by BIC contracts or seen in Acquisition Analytics dashboard. Spend Under Management

Integrate

This stage of the TLC begins the operational lifecycle. It is where considerations around change, down time, risk and operational disruption are evaluated to finalize the implementation plan that integrates into the current technology landscape. Depending on the type of initiative, many different disciplines (ITIL, Service Management, PMI, SDLC, etc) may be engaged to follow through from the design effort to implementation. A critical aspect of this stage of the TLC is inventory tracking and management. Physical assets as well as soft assets, such as software licensing, are inventoried by an auditable process to safeguard the organization's expenditures and meet compliance (vendor, government) requirements. The inventory and asset management practices established at this point are key to tracking the disposition and dependencies of the items throughout their useful life.

Replacement, refresh, updates or new emerging technology all have to be integrated into the current technology landscape with a minimum of disruption to ongoing operations of the organization. Operational Change management, production change management and organizational change management are engaged at this time to plan and follow through into the implementation stage to execute the plan. The impact to business continuity and disaster recovery should also enter the discussion. Moving to the cloud may provide opportunities to rethink business continuity with more flexibility and options.

Inventory Management

Inventory management is the first step in tracking and creating an auditable trail for both physical assets and software licensing. It shows the disposition of the item against the contract, provisioning and deprovisioning for licensing and the physical location for assets. For physical assets, in addition to physical location it will show the status of the asset in real time. Types of status include but are not limited to online, stock, setup, deployed, vendor (repair), disposed.

Asset Management

Asset management is important for ensuring continuity in the business and efficient operation of IT services as well as many ancillary benefits from assets metadata and information. Effective asset management requires a well-planned implementation of data repositories (asset database, CMDB) that store and manage such logistical information, dependencies, configuration information, tagging and other metadata (purchase date, deploy date, lifespan, etc).

Integrate - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
Agency Level Resources	Existing environmental dependencies	Does the vendor product or solution require legacy technology or software to maintain? Do the CMDB or asset databases contain a lifespan in months or an end of life date	CMDB Configuration resources

Implement

Implementation consists of all the items related to deployment and achieving steady state. This would include all types of quality assurance, regression testing, performance testing, acceptance testing and preparation of production environments. It provides a plan and roadmap that takes the initiative to the point where it is in use and provides value to the organization. Communication to the impacted constituents is critical to the success of the implementation. Whether it is an enterprise-wide system replacement, network speed, architecture change, or simply provisioning a license, the constituents must be informed of the schedule, trained appropriately and understand the impact. The

results and execution of the change management plans from the integration stage are critical to the success of the actual deployment.

Phased Implementation

In many instances implementation does not follow a big bang approach. It is more typically a phased approach following some level of agile methodology where not all functionality is deployed at once or not all constituents are impacted at the same time. This iterative mechanism has a positive impact on the success of the overall initiative and eases some of the change management aspects around training, acquiring new skill sets and overall adoption.

Steady State

Part of the communication plan needs to provide guidelines for steady state so that constituent groups can prepare and understand the transition period. The transition period may require some functionality to exist on the current platform while other functionality might exist on the new platform. Even if this is not obvious to the end user community, steady state is not achieved until all functionality has migrated to the new platform or system.

Implement - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
Agency Level Resources		Does the vendor product or solution require legacy technology or software to maintain? Do the CMDB or asset databases contain a lifespan in months or an end of life date	CMDB Asset Databases

Support

No technology system or service operates without support. Support provides the basis for long term client success in enabling the mission with technology. Support comes into play in many facets and is likely provided in a tiered structure by the operational team or a specific support team. It includes but is not limited to direct assistance to the client base, ongoing maintenance, patching and upgrades of SaaS systems to the current release. Some support may be implemented by automated tools while other is done manually by the operational or support team.

Help Desk

Part of the plan and within the integrate and implement stages would be to bring the Help desk up to speed on the new technology deployment, and the expected tier 1, tier 2 and tier 3 support roles and responsibilities as well as escalation levels. Also ticketing and incident management systems might have to be modified or tailored to any new functionality or service. Support may be provided through self-service tools, FAQs, in-person, phone, or chat depending on severity and urgency of the issue.

Performance Metrics

Support and performance data should be collected and used to optimize performance and improve customer satisfaction. Types of support, such as, repair needs to be distinguished from usability issues or configuration issues. These data should be compared against any SLA or warranty contract obligations and can be used to benchmark or compare similar technologies across the government. The performance metrics are a tool to influence and inform future vendor and product selections.

Service Level Agreement (SLA)

Although there may be a SLA from the vendor there should also be a SLA for the clients of the technology being delivered. It is a useful mechanism to show the consumers of the technology how committed IT is to delivering technology that supports and enables the mission of the organization.

Support - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
Agency Level Resources	Qty of incidents Mean time between failure Costs of repair Response time	Are any products or services not meeting client expectations or the SLA	Ticketing system Incident response

Deprecate

Near the end of the technology lifecycle some technologies themselves or features and functions of the technology may lose favor in light of newer technologies, faster performance, richer feature set, etc. Although the technology may remain available or allowed, at this point it is possibly not secure, not recommended, inefficient, or its shortcomings overshadow its value. This impacts all forms of technology, including software, hardware, systems, architecture and process.

Being aware of what is fading away and proactive on what is on the horizon is a key driver for modernization and potentially improves client performance, effectiveness and impact.

 It is at this stage of the lifecycle that new solutions need to be planned for, developed and funded or risk a negative impact on the operation of the organization and a reputational risk to IT.

Repurpose or Resale

In many cases it doesn't mean that the system or asset has no value, just that the value is waning. The value in its current rendition may not suffice but it may still have value to a lower level task or another organization or industry. It is important to note that getting ahead of this curve can maximize a reuse or resale effort and offset some of the cost of a modernization effort.

Depreciation

Asset Depreciation can work to the organization's advantage when used in planning for new technologies. Consider the end of lifespan of an asset as an input into the planning process for newer technology. It can aid in determining the sequence that items are moved to the cloud or SaaS vendors

Disposal

Considerations for disposal must first address security and can then entertain repurpose, resale or e-recycling

Deprecate - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
Agency Level Resources	System dependencies Upgrade requirements Risk assessment	Are there better solutions to meet the business or mission need? What secondary markets exist? Can the government take advantage of secondary markets?	CMDB Vendor Roadmap and versioning

Refresh

Whether it is the modernization of old technology to new, or the replacement of existing technology at the end of its lifespan (typically 3-6 years), it is important to determine the value to the organization and government as an input for evaluating and assessing future technology needs. Refresh objectives are driven by past performance and future business strategies to optimize the devices and system components supporting the goals of the organization. Data gathered from other aspects of the TLC should inform which products or vendors have fallen short of expectation and which products or vendors have exceeded expectation. These data generally relate to physical hardware assets in the areas of network, voice and end user devices but also should apply to software related services. Being able to spot scenarios where downtime, cost of repair or quantity of defects are increasing may be a trigger that action is required before the expected end of life of a product or system.

Continuous Refresh

In planning for repurchase, it can be advantageous to stagger purchasing of servers, switches, and end user devices, so capital expenditures are smoothed out year over year.

Refresh - Roles, Responsibilities and Interactions

Roles Involved	Stage information needs	Stakeholders Needs	Data Sources
Agency Level Resources	Reliability, downtime Failure rate and repair cost SLA details	Should the vendor product or solution be replaced 1 for 1 or are there better, faster, cheaper alternatives.	CMDB Asset Databases Ticketing system Incident response system

Conclusion

As technology becomes more of an integrated part of every function and mission of the organization, effective planning and management through each stage of the lifecycle and the handoff between stages is pivotal for operational and cost efficiency. The interaction of the IT VMO with the lifecycle stages adds value by addressing large scale purchases, minimizing risks, lowering TCO, and leverage past purchases for future needs. The technology lifecycle provides a comprehensive mechanism to follow any given technology through its useful life adding value to the business.