



Guide to IT Modernization

How to plan, deliver, and thrive in a constantly changing world

May 14, 2019

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Executive Summary

Many businesses increasingly struggle to survive in our fast-paced and ever-changing technology and competitive landscape. Therefore, companies need more adaptable approaches that continuously align information technology (IT) assets with high-level business strategies and operational objectives. Additionally, new planning and operational approaches that incorporate IT assets into the overall business model and transition the organization into a digital business must be adopted.

The solution for businesses of all sizes and industries is to adopt a continuous modernization strategy that delivers rapid results, reduces organizational risks and costs, and proactively improves products and services to continually meet customer demand.

In this three-part series, we present a business case for modernization, discuss the challenges, considerations, and approaches, and provide a practical framework for planning, architecting, implementing, and maintaining modernized solutions. We also include examples and case studies gleaned from our experience in helping public sector and commercial clients tackle the modernization challenge.

PART 1: BUSINESS CASE FOR MODERNIZATION

Digital business, aging technology, and the pace of innovation are the main drivers for modernization.

PART 2: STRATEGIES FOR MODERNIZATION

Planning, business needs assessments, incremental change, and architecture pathways are key strategy considerations.

PART 3: MODERNIZATION IMPLEMENTATION AND OPERATION

Product management takes precedence over project management for implementing and maintaining a continuous modernization strategy.

Business Case for Modernization

1

Modernization is the process of adapting something to fit “modern” needs and habits. In this regard, IT modernization has been a continuous endeavor ever since automated systems were first installed. IT modernization involves replacing or enhancing existing or legacy systems into more functional, “modern” applications that meet constantly evolving business needs and user expectations.



Though modernization has been a continuous process for decades, it is particularly challenging today due to the profound transformation of business that is occurring, which is enabled by the rapid adoption and convergence of technologies such as AI, analytics, Internet of Things (IoT), social, mobile, and cloud services.

Modernization also has far greater strategic implications today than past practices of simply replacing or updating applications. A well-planned modernization strategy can help fulfill strategic organizational goals and objectives and create exponential value from digital business optimization and transformation.

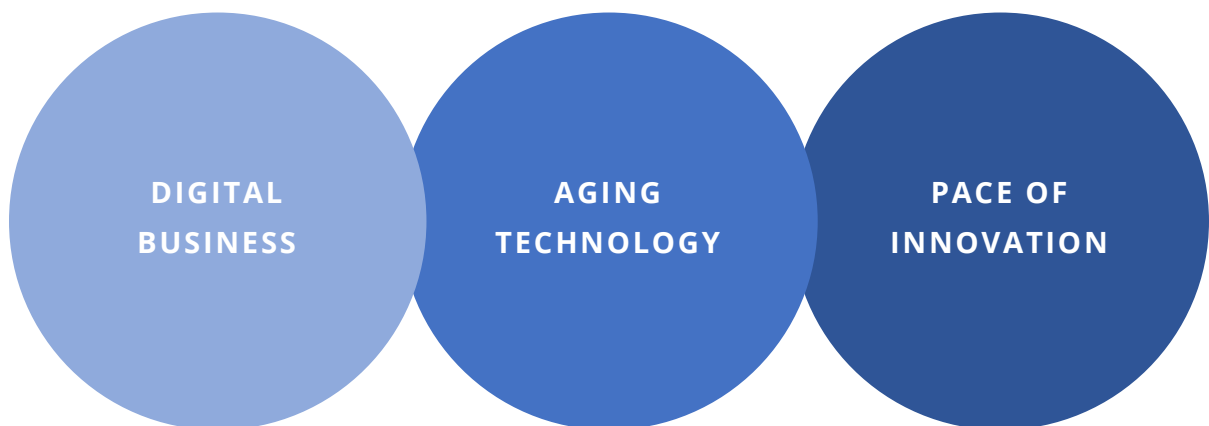


DRIVERS FOR MODERNIZATION

Ever since the first IT solutions were implemented, advancements in technologies – from mainframes, to client servers, to the web, and now to the cloud – have compelled organizations to modernize. Each wave of technology has brought exponential increases in capabilities at lower cost points. In parallel, industries enabled by these advancements and driven by consumer demands have massively transformed, making the business case for modernization more than just a competitive advantage – it is now a matter of survival. At a macro level, global economies have evolved from industrial-based to information-based and are now trending towards a transactional-based gig economy. Organizations face constant pressure to continuously modernize and adopt new technologies to remain relevant, meet customer and constituent demand, and stay ahead of their competition. As history has proven, those who embrace modernization as strategic differentiators and enablers for efficiency, scale, and new business opportunities, will ultimately prevail.

“Maturing digital businesses focus on integrating digital technologies, while less-mature digital businesses solve discrete business problems with individual digital technologies”

MIT Sloan and Deloitte’s 2015 Digital Business Global Study



DIGITAL BUSINESS

A key driver for modernization today is digital business. E-business, a term coined by IBM in the late 90s, described the evolution of the Internet from informational websites to a digital platform for commerce and business transactions. Today, practically every business has transformed into an e-business in some way. Most notably, native e-business companies like Amazon and Google have become the most valuable enterprises in the world within just a few decades.

As the Internet has grown and evolved into an omnipotent platform to globally interconnect businesses, people, and things, the lines between the physical and digital worlds are blurred. D-business, or digital business, is the convergence of business, people, and things into a digital platform that offers far greater transformational opportunities than e-business. It is hard to imagine anything more transformational, but the combined exponential impact of merging physical

and digital worlds offers capabilities to create new products, services, and entirely new business models that will surpass the innovations from past decades. Uber is just one example of a gig economy business model made possible by a digital business platform that integrates customers, cars, drivers, communities, traffic, weather, analytics, and core back-end systems in real-time.

The first step to understanding digital business is to learn the components that constitute a digital business. Gartner Research has developed a framework that allows organizations to visualize the interlacing aspects of what digital business is and can be. Gartner states that a digital business is supported by a technology platform in five areas:

1. Information system platform
2. Customer experience platform
3. Data and analytics platform
4. Internet of Things (IoT) platform
5. Ecosystems platform

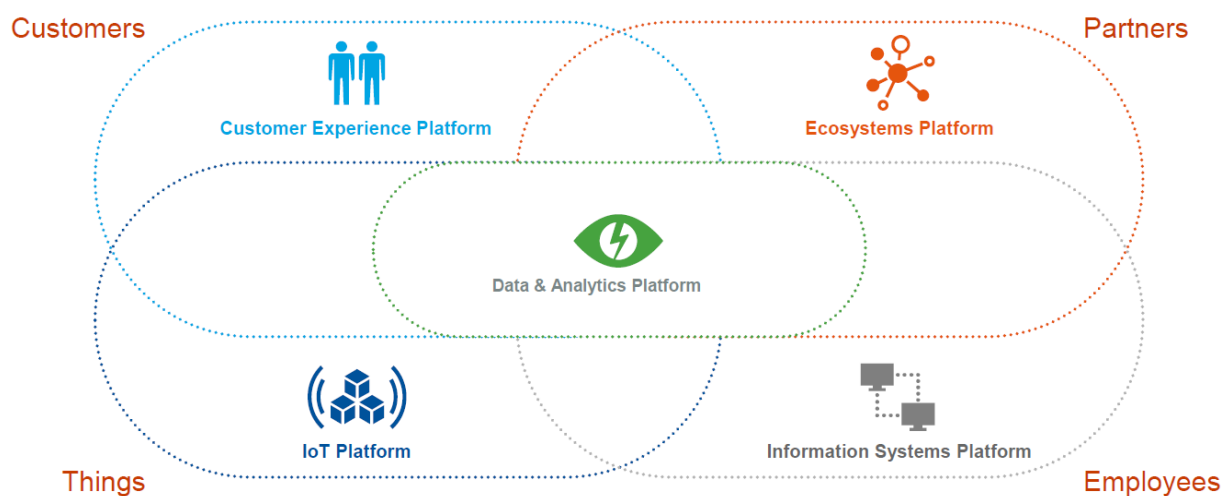


Figure 1. Gartner, "How Do I Build a Digital Technology Platform," November 2018



INFORMATION SYSTEMS PLATFORM

Supports the back office and operations, such as core enterprise and line-of-business systems. This has been the focus of traditional IT for decades.



CUSTOMER EXPERIENCE PLATFORM

Contains the main customer-facing elements, such as customer and citizen sales and service portals, chatbots, multichannel commerce, and customer apps.



DATA AND ANALYTICS PLATFORM

Contains information management, machine learning, AI, and analytical capabilities. Data management programs and analytical applications fuel data-driven decision-making, and algorithms automate discovery and action.



INTERNET OF THINGS (IOT) PLATFORM

Connects physical assets for monitoring, optimization, control, and monetization. Capabilities include connectivity, analytics, and integration to core and operational technology (OT) systems.



ECOSYSTEMS PLATFORM

Supports the creation of, and connection to, external ecosystems, marketplaces, communities, and new business models. Integration, API management, control, and security are main elements.

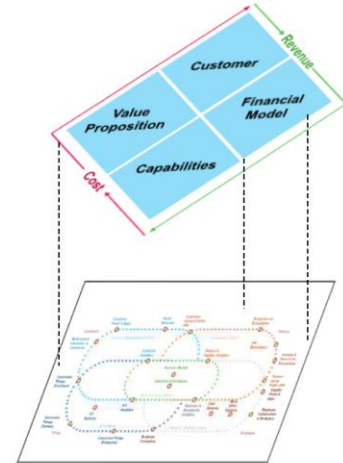
The information system platform is the most understood and has been the focus of IT since its beginnings. Many organizations have deployed customer portals and analytic solutions and have well-established analytics and customer experience platforms. An ecosystem platform that includes partners and communities streamlines business-to-business transactions, improves efficiencies, and has the potential to create new channels and business models. IoT may be the least familiar, but many organizations have already deployed physical sensors and other forms of IoT devices. When combined, all these interconnected platforms form a strategic framework for planning, designing, and developing capabilities that enable a digital business.

DIGITAL BUSINESS FRAMEWORK

The digital business framework presents a strategic model for planning digital business initiatives. Digital business initiatives range from optimizing existing business processes to creating new business models and revenue streams to truly transform the business. The decision to optimize versus transform depends on each organization's digital ambition, state of industry transformation, and competitive stance. However, regardless of ambitions, organizations constantly face competitive, regulatory, and political changes, all of which require continual modernization of existing systems.

Traditionally, IT initiatives have been centered on the information system platform. A digital business technology platform is driven by an overall business strategy and is aligned with the business model of the organization. This strategic approach shifts the IT center of gravity towards the middle to include customer experience, IoT, analytics, and ecosystem application components. The interlacing platforms depict integration as a cornerstone to the digital business model, since no single application or technology covers all platforms.

Business Model
Digital Business Technology Platform



Lessons learned from the e-business era taught us to embrace the fundamental shifts that occur in all industries across local, national, and global economies. Therefore, a digital business strategy is not a luxury but a necessity.

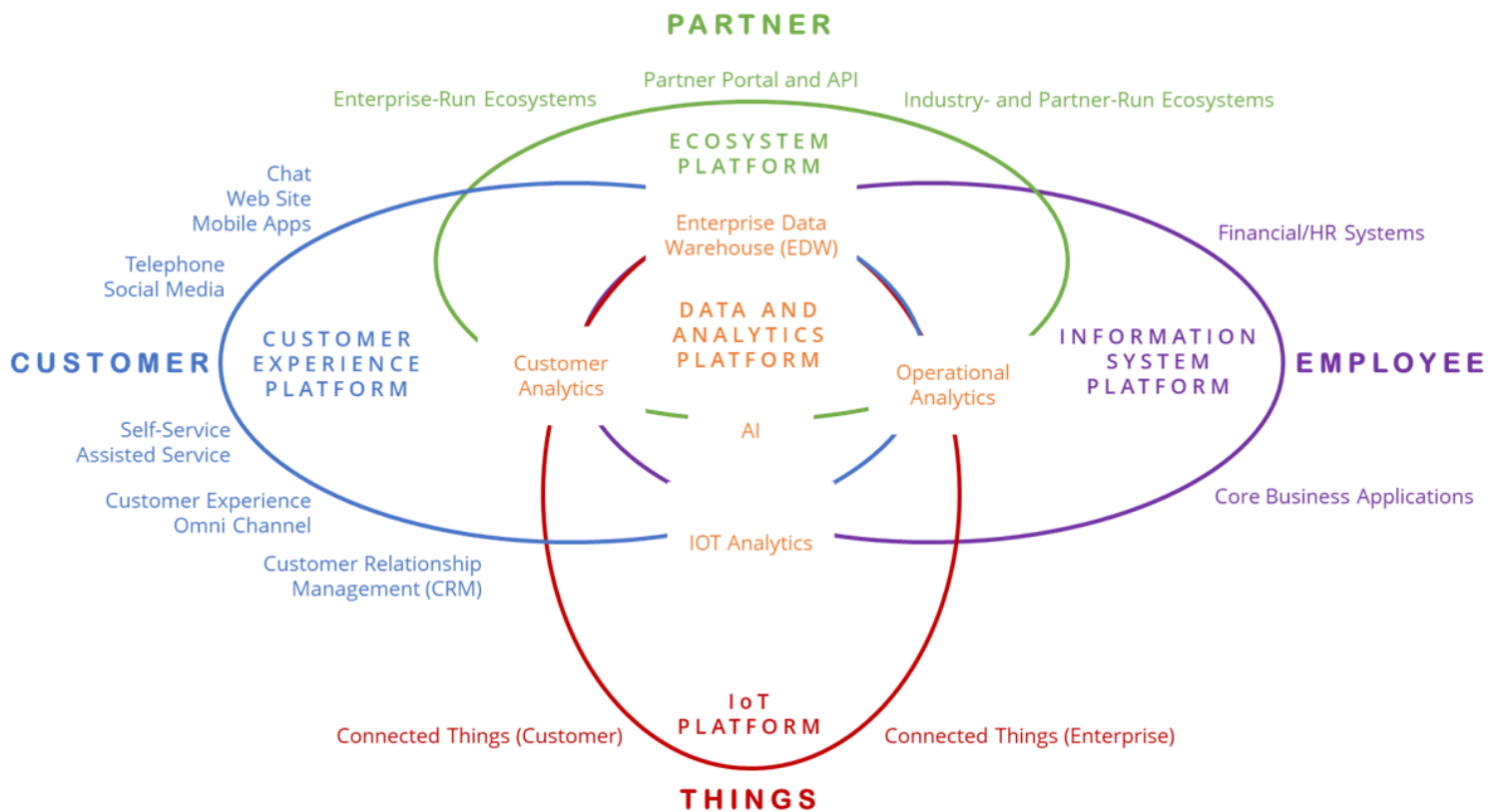


Figure 2. Digital Business Framework

AGING TECHNOLOGY AND PACE OF INNOVATION

Another driver for modernization is the desire to replace older technologies with up-to-date solutions that offer the latest technology, lower cost, greater functionality, and better user experience. This is nothing new, as many organizations have struggled for decades over the inflexibility, unsustainability, and total cost of ownership of their legacy applications. What exacerbates the problem today is the rapid pace of innovation and the complexity and number of interrelated applications, databases, spreadsheets, and manual processes that have accumulated over decades.

Legacy applications are typically like black boxes that perform specific functions but lack the flexibility and agility to keep up with business needs and regulatory changes. This is particularly true of commercial off the shelf (COTS) applications, which are difficult to adapt to unique customer requirements. COTS legacy systems are usually discrete applications and databases on their own platforms with little integration with each other. As baby boomers retire, the scarcity of resources with knowledge of legacy applications and the resulting lack of support is a major concern. Increasing software and hardware maintenance costs of older technology are also drivers of modernization initiatives.

LEGACY SYSTEM PAIN POINTS

COSTS

High hardware and software maintenance costs for legacy applications due to specialty hardware, version compliance, outdated pricing models, and custom development.

SCARCITY OF TALENT

Resources with knowledge and skills in legacy technology and programming languages are leaving the workforce. Younger workers are not satisfied to work on older technologies.

LACK OF FLEXIBILITY

Legacy systems lack the data, functionality, and flexibility that is needed for digital business.

LACK OF SUSTAINABILITY

Legacy systems are often heavily customized and difficult to sustain due to costs, attrition in expertise, and lack of scale to continuously improve and support the applications.

PERCEPTION

Legacy systems have negative internal and external perceptions of being outdated, inefficient, and old-fashioned.

COMPLIANCE

New compliance and regulatory requirements may force costly remediation or replacement of legacy systems. Y2K was an example of this.

GARTNER'S IT MARKET CLOCK

Gartner introduced the IT Market Clock to chart the lifespan of technologies and their commoditization in the marketplace. Many legacy systems fall within the Replacement phase – between 9:00 (the Dusk of Obsolescence) and 12:00. Gartner urges organizations to establish divestment plans before entering this phase and complete all divestment activities before 11:00, but no earlier than 4:00.

On the opposite side of the market clock are new cloud-based technologies, which are being introduced at an increasingly

rapid pace. Hence, businesses experience increased pressure to modernize as such technologies become more prevalent and easily accessible. However, divestment of new technology is not recommended prior to 4:00, since assets have yet to reach their full potential.

Typically, an application portfolio includes components within all phases of the clock due to newer technologies being introduced over time. Therefore, organizations must take operational costs, functionality, and business differentiation into account when deciding whether to invest in or divest technology assets.

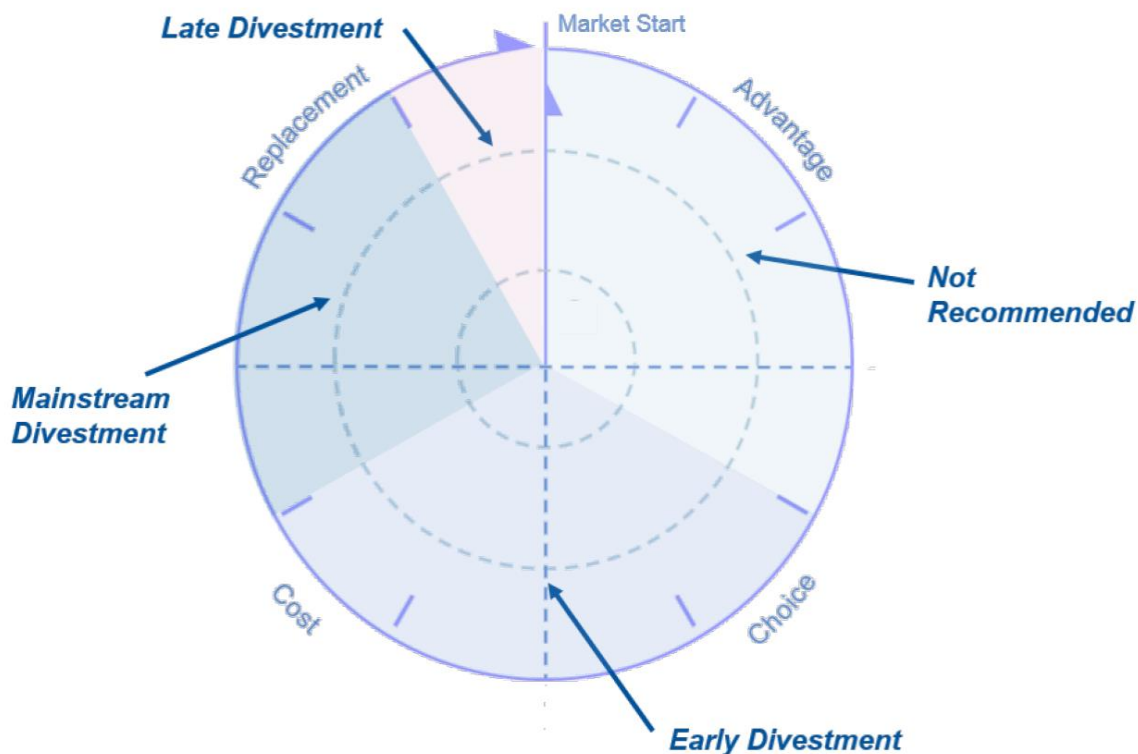


Figure 3. Gartner, *Generic Technology Asset Divestment Guidelines*, September 2015

BUSINESS CASE SUMMARY

Each wave of new technology forces businesses to adapt and incorporate advanced capabilities into their business models. Therefore, it is imperative that organizations develop a digital business strategy to ensure their continued relevance, growth, and success.

- The three main drivers for modernization are: digital business, age of technology, and the pace of innovation.
- A digital business is supported by five technology platforms: information systems, customer experience, data and analytics, Internet of Things, and ecosystems.
- The digital business technology is driven by an overall business strategy and is aligned to the business model of the organization.
- Sustainability of legacy systems is of growing concern, and many legacy systems have entered the Dusk of Obsolescence on the Gartner IT Market Clock.
- Legacy pain points typically include costs, lack of flexibility, scarcity of talent, lack of sustainability, perception, and compliance.

Each new wave of technology forces companies to continuously modernize and adapt to stay relevant, meet customer demands, and remain competitive.

Strategies for Modernization

2

Regardless of the reasons to modernize, organizations must carefully assess the costs, risks, impact, and different approaches. Today, IT systems are essential to running many aspects of a business, which imposes significant risks and impact to the organization if not managed properly. Every organization may differ, and there is no one right way to modernize. Instead, organizations must assess the costs, risks, internal and external factors, and organizational impact for each approach.

“Legacy application portfolios are often viewed as a problem and subjected to large-scale rip-and-replace efforts. Application leaders should instead manage their portfolio as an asset, removing impediments and executing continuous business-driven modernization to provide optimum value.”

Gartner Group, January 2018

PLANNING CONSIDERATIONS

Over the past decades, the prevailing approach to modernization was to simply remove and replace outdated legacy systems with packaged COTS software. Some of these attempts succeeded, but many failed to fully live up to expectations due to the inability to adapt COTS solutions to the customer's unique needs. These unique needs may include specific business or program requirements, integration with existing systems, data

and processes, change management, and data migration.

Therefore, in the interest of completing a modernization project, the solution is often rescoped or downsized, leaving "last mile" gaps to be filled later with ancillary point solutions or manual workarounds.

Today, the traditional replacement approach is significantly more challenging due to the following factors:



RISKS AND COSTS

Large-scale rip-and-replace efforts are costly and carry a high degree of risk. Organizations must carefully weigh the risks and costs of modernization approaches against the benefits.



FUNDING

Sources and availability of funding are factors in considering modernization approaches. A replacement system requires significant upfront investments in time and costs.



AGILITY AND RAPID PACE OF CHANGE

The pace of change and level of uncertainty in many aspects of business requires a high degree of agility and speed. Rip-and-replace projects take years to implement before value is realized, and they are highly disruptive to the business.



ORGANIZATIONAL CHANGE

Resistance to change when implementing a new system has always been a challenge. Today, the challenge is greater with higher user expectations on how technology solutions should behave. Organizational change management issues create friction, which impedes or sometimes stops large-scale modernization efforts.



COMPLEXITY

Decades of business and technology initiatives have resulted in a complex environment with many moving parts (e.g., multiple systems, interfaces, data, spreadsheets, manual processes).

APPROACHES TO CONSIDER

There are different approaches to modernization, and organizations should carefully consider the options and choose the approach that best aligns with and meets organizational goals and objectives.

Replacement

Traditional replacement of legacy applications with a new solution may be the best approach, particularly if the legacy platform is in the Replacement phase of the IT Market Clock. Thorough analysis of the costs, risks, organizational change management, and “last mile” requirements should be carefully considered.

Point Solutions

Implementing individual point solutions to fill gaps will help address immediate problems, but may result in disparate, piecemeal solutions. An overall plan and architecture are needed to ensure solutions are integrated and aligned to an enterprise strategy.

Continuous Modernization

Extending the life of existing IT assets through incremental, continuous modernization has become an increasingly popular approach. The reasons for selecting this approach are to reduce costs, risks, and organizational impact and to achieve quicker delivery time and greater agility. A phased, incremental approach is more adaptable, delivers results sooner, and allows investments to be spread out over time. Organizations will still need to consider the eventual replacement of legacy systems or aging technologies, which they can plan and schedule as part of the phased, incremental approach.

Regardless if a system replacement or point solution path is taken, continuous modernization will eventually become the prevailing approach. The reason is simple: The world is not standing still, and it is not practical to fill gaps by constantly replacing existing systems or adding new point solutions. New business strategies, increasing regulatory compliance, constantly evolving customer demands, industry transformation, the rapid pace of innovation, and the incessant aging of technology necessitates a continuous modernization mindset to thrive in a constantly changing world. For this reason, we focus the rest of this whitepaper on the continuous modernization approach.

CONTINUOUS MODERNIZATION APPROACH

A continuous modernization approach starts with clearly defined business strategies and objectives to set direction and serve as the basis for measuring progress and modernization results. Existing technology solutions, regardless of age, are treated as IT assets, and an assessment of the IT assets' ability to meet stated business needs and objectives is conducted to identify modernization opportunities. In many cases, 80% of the existing IT assets are fulfilling current business needs, but 20% typically present obstacles to digital business optimization and transformation.

For example, a 40-year-old mainframe financial system can maintain accurate and auditable financial records but lacks real-time updates, mobile access, and adequate reporting capabilities. Replacing the legacy financial system with a COTS

solution is an option, but replacement introduces significant time, costs, risks, and impact to the organization. Contrarily, a continuous modernization approach extends the legacy system with modern components in incremental steps. Though the legacy system may be completely replaced eventually, business needs are met on a continuous, timely basis with less risk and impact to the organization.

BUSINESS NEEDS ASSESSMENT

An assessment of how well the existing technology assets are supporting business needs helps to identify modernization initiatives. However, the focus should be on the problems and needs, not on the technology. If all business needs are being met with existing IT assets, there is no need to modernize. However, this is often never the case, since business needs are constantly changing.

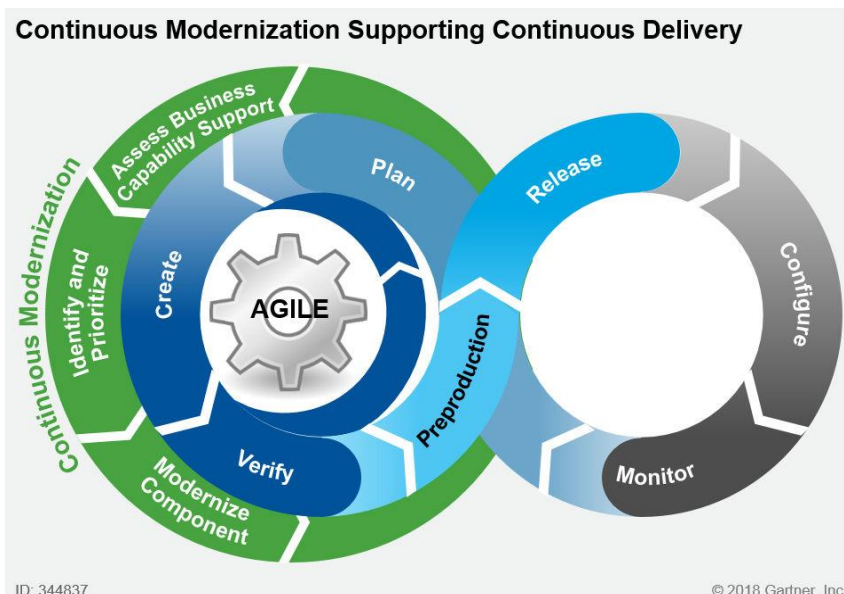


Figure 4. Continuous Delivery Cycle Through Continuous Modernization

The focus should be on the problems and needs, not on the technology.

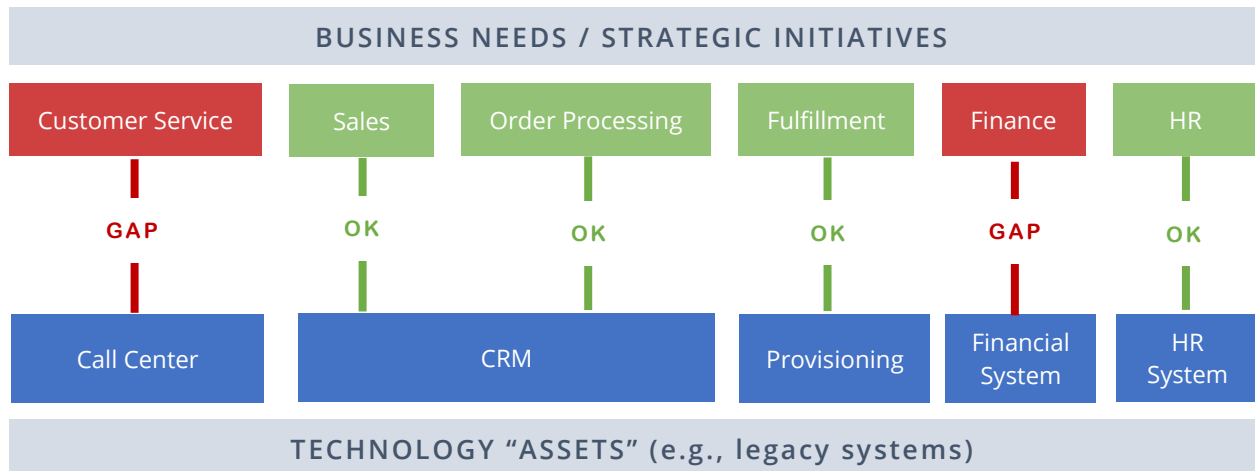


Figure 5. Traditional Model Showing Gaps in Business Needs

INCREMENTAL IMPROVEMENTS

Solutions for addressing friction points are analyzed based on the various approaches discussed. In some cases, total replacement of the solution may be warranted. However, in many cases, business needs could be fulfilled incrementally by adding new capabilities to existing assets. Once implemented, the incremental improvements are added to the portfolio of IT assets.

Incremental improvements can vary in scope. Using a baking metaphor, a cupcake → birthday cake → wedding cake approach allows smaller improvements to be tested and implemented quickly, which accumulates into larger improvements

over time. This approach reduces risks and affords faster turnaround to deliver value, rather than tackling large-scale “wedding cake” improvements up front.

Using an actual project to modernize a 30-year-old insurance claim system as an example, adding a claim inquiry feature to an insurance claimant portal was a cupcake-sized improvement that provided 24x7 access to benefit balances in just a few months. After value of the improvement was proven, it evolved to larger birthday-cake-sized improvements, such as claiming for weekly payments and filing claims. Tackling the larger improvement first would have taken longer to deliver value and incur higher risks and costs.



Figure 6. Incremental Improvements Baking Analogy

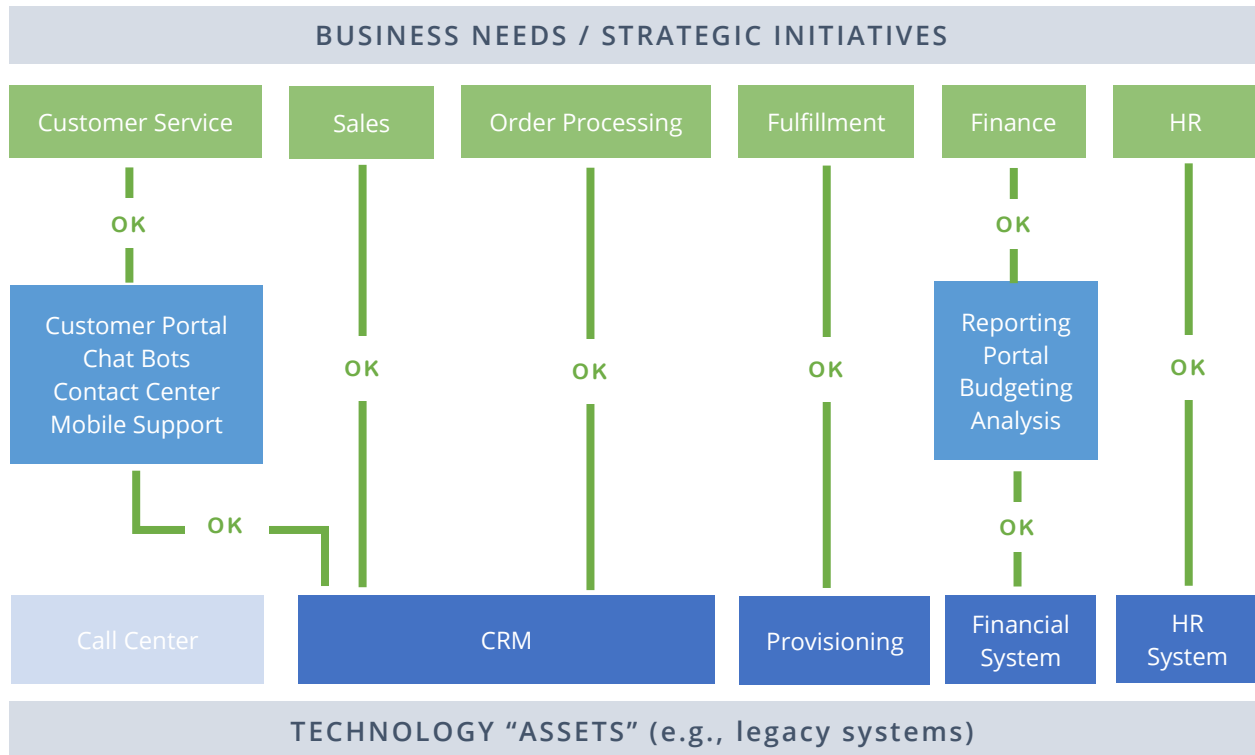


Figure 7. Continuous Modernization Model Showing Incremental Improvements

CENTRALIZED/DECENTRALIZED APPROACH

Many modernization efforts are initiated by business areas to support their program or line of business operations. This decentralized approach supports greater speed and agility and is aligned with funding, ownership, and accountability within the business areas. It also serves as a model for other

business units on how modernization can be done. However, to ensure that a continuous modernization approach is aligned to an overall enterprise strategy, a coordinated, centralized approach should also be considered. A centralized approach would enable the enterprise to align, coordinate, and support modernization efforts across the business units.

CENTRALIZED



Alignment with enterprise strategy



Alignment, coordination, and support across business units

DECENTRALIZED



Speed, agility



Alignment with funding, ownership, and accountability within business units

The following figure explains how both centralized and decentralized approaches support modernization efforts.

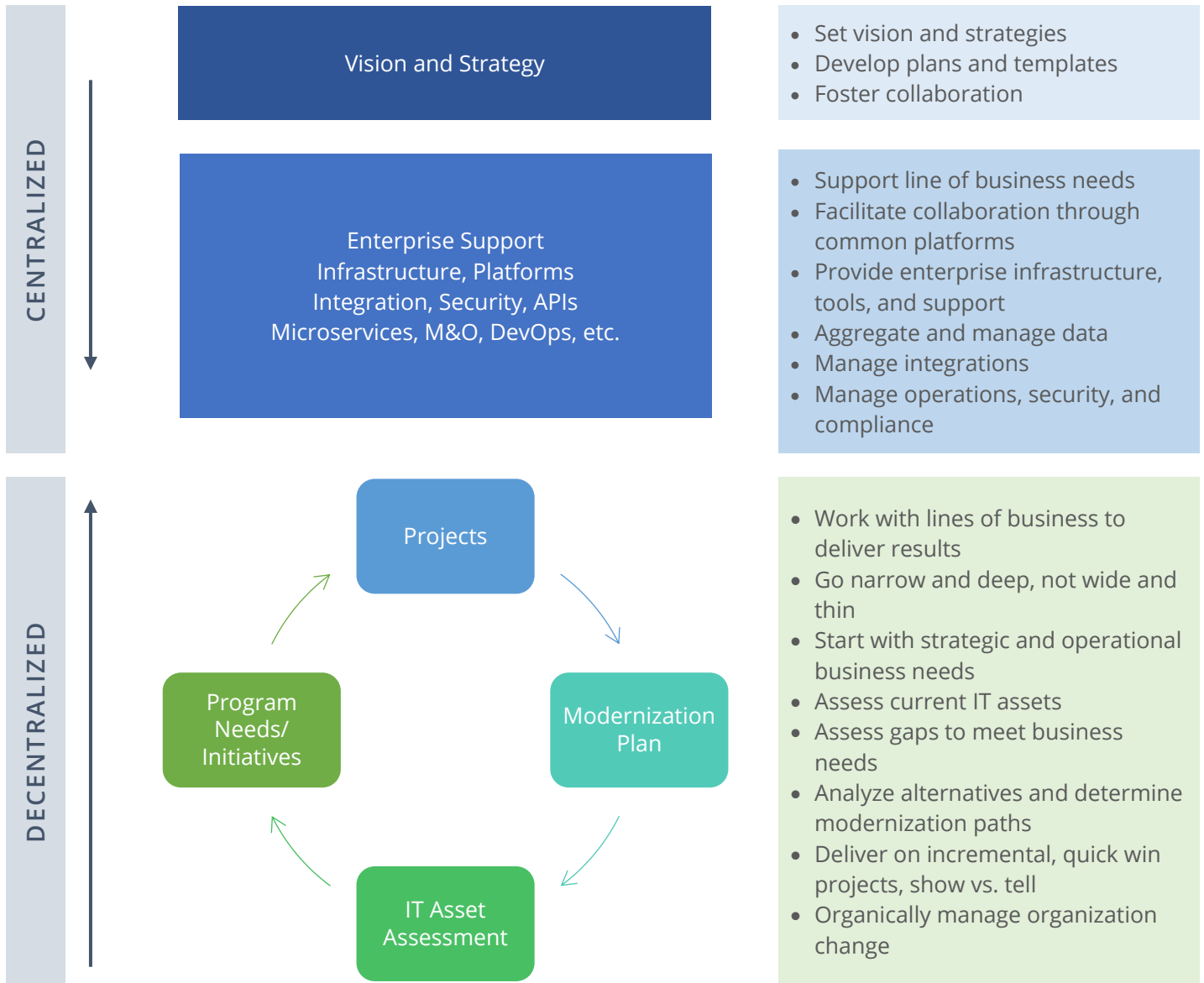


Figure 8. Modernization Approach

MODERNIZATION ARCHITECTURE

Different modernization architectures will apply depending on whether a replacement, point solution, or continuous modernization approach is taken. A replacement approach would dictate an architecture based on the replacement system, whereas a point solution approach would necessitate an architecture that integrates disparate applications and data. Contrarily, a continuous modernization approach is based on an architecture that transforms existing IT assets into a platform onto which modernized components are built.

API INTEGRATION

The preferred architecture for a continuous modernization approach is based on transforming existing IT assets into a platform that abstracts the legacy applications through application programming interfaces (APIs), which facilitate functional integration and data sharing. Representational State Transfer (REST) APIs are widely recognized as the industry standard for interconnecting applications and cloud services. GraphQL is an emerging API design architecture consisting of a query language, tools, and services to connect data sources to front-end frameworks and address some of the challenges inherent in REST. Direct SQL calling to legacy databases is another commonly used method for data access or executing processes through stored procedures. Mainframe applications that lack API or SQL access can be integrated through robotic process automation (RPA) or simple “screen scraping.” Regardless of the methods, the modernization platform

concept is to treat legacy systems as end points that can be connected through APIs. This loosely coupled architecture allows for the separation of concerns for how each application will be integrated into the modernization platform.

The Integration Platform layer provides a point to incorporate enterprise integration tools to manage, govern, and secure system interfaces. The integration platform may be on-premise or provided as a cloud Integration Platform as a Service (iPaas). The benefits of the integration platform are:

- Reduces point-to-point interfaces, which take time to develop and are difficult to manage
- Comes with prebuilt connectors to popular target applications and cloud services such as Salesforce, Google, Dropbox, etc.
- Supports various connection methods, such as REST API, direct database access, etc.
- Handles authentication with target systems
- Useful in testing/simulations during development without affecting target systems
- Monitors and manages the interfaces
- Logs activity for debugging, audit trails

Another component of the modernization platform is an application development environment and infrastructure to develop and run modern applications. Modern application architectures include front-end frameworks, such as AngularJS, Vue.js, or React, a middle tier, such as Node.js or .NET for business logic, and other application components for storage

and security. Modern applications often integrate cloud services rather than develop everything from scratch within the application. Common enterprise platforms provide development tools, libraries, templates, frameworks, and test automation.

The operational component of a modernization platform includes cloud

and/or on-premise infrastructure, containerization, Development Operations (DevOps), security, compliance, and support.

The following figure shows an example of a modernization architecture that integrates legacy assets (“black box”), enterprise platforms, modernized applications, and new applications.

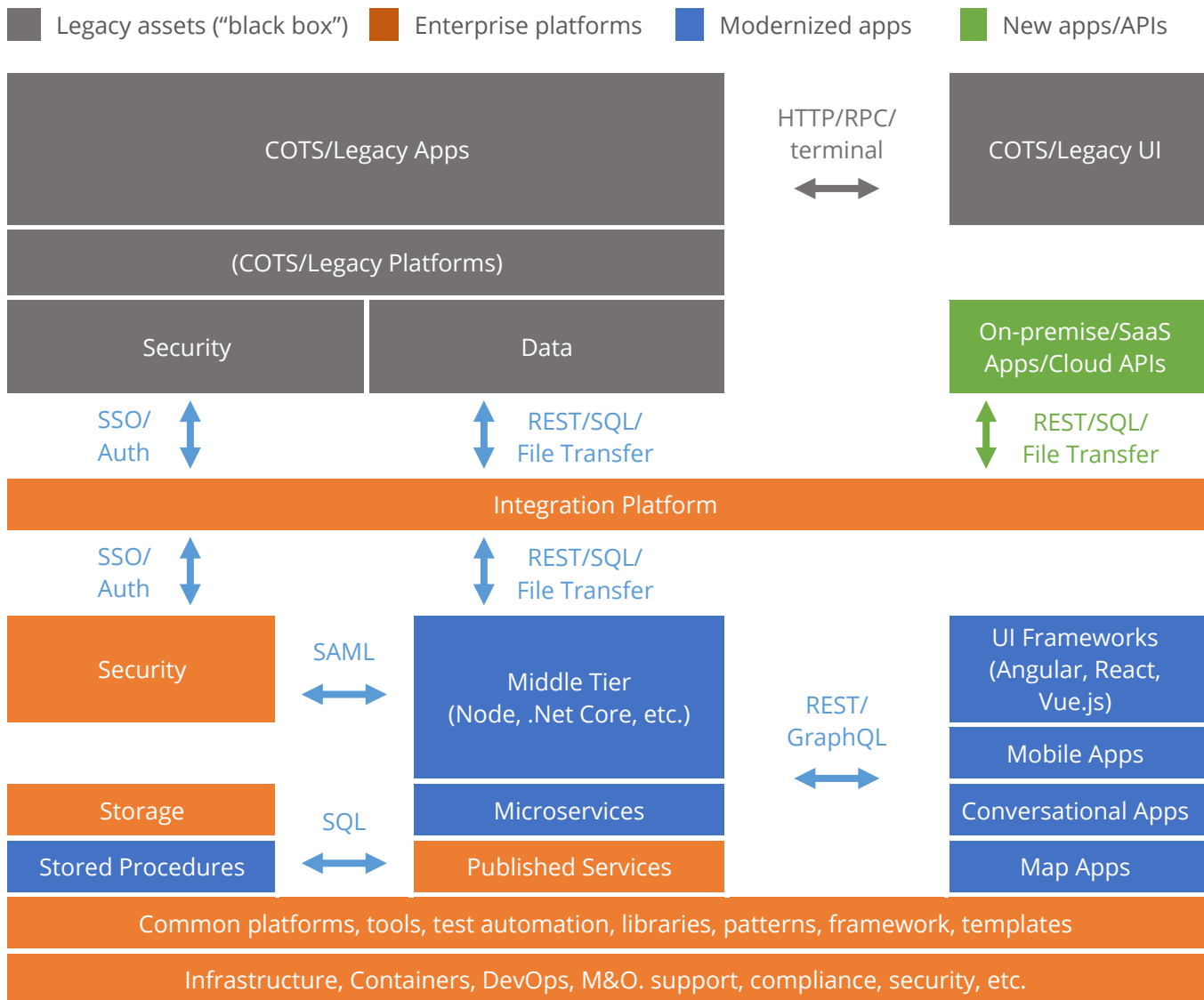


Figure 9. Modernization Architecture

CLOUD MODERNIZATION

Many organizations have already adopted a cloud computing strategy. Cloud computing is especially well-suited for modernization because its vast catalog of cloud services can be leveraged to reduce costs and add new capabilities to existing legacy systems.

The following cloud modernization paths are available for existing IT systems:

CLOUD PATH	DESCRIPTION	EXAMPLES
Infrastructure as a Service (IaaS)	Also referred to as “lift and shift,” this is typically the first step into cloud computing. Existing applications or database workloads are migrated “as is” to an IaaS environment that can provide lower costs, higher reliability, disaster recovery, and greater resource elasticity.	Amazon Elastic Compute Cloud (AWS EC2) Microsoft Azure IaaS Cloud400 Oracle Cloud Services IBM Cloud
Platform as a Service (PaaS)	An application development platform that can be leveraged for developing new applications. New applications can be developed without building everything from scratch due to out of the box functionality and integration that the platform offers. The PaaS is continually updated with new features to help future-proof applications.	Salesforce Platform AWS Lambda Microsoft Azure PaaS Caspio IBM Bluemix Oracle Cloud Service
Software as a Service (SaaS)	This refers to cloud-delivered COTS software that replaces or extend existing applications. Most existing on-premise COTS applications are also available as SaaS.	Salesforce Sales or Service Cloud Workday Microsoft Dynamics CRM IBM Planning Analytics Oracle
Integration Platform as a Service (iPaaS)	Cloud solutions that provide integration services to connect and manage integrations between multiple on-premise and cloud applications.	Informatica Dell Boomi MuleSoft Jitterbit Zapier

Figure 10. Description of Cloud Modernization Pathways

The following illustrates the available pathways for cloud modernization. A common first step is to “lift and shift” existing applications or databases to an IaaS environment. Another common step is to leverage a PaaS to modernize or develop new applications or leverage SaaS solutions to implement new applications. However, other cloud modernization pathways are available depending on the needs of the business and capabilities of the solution.

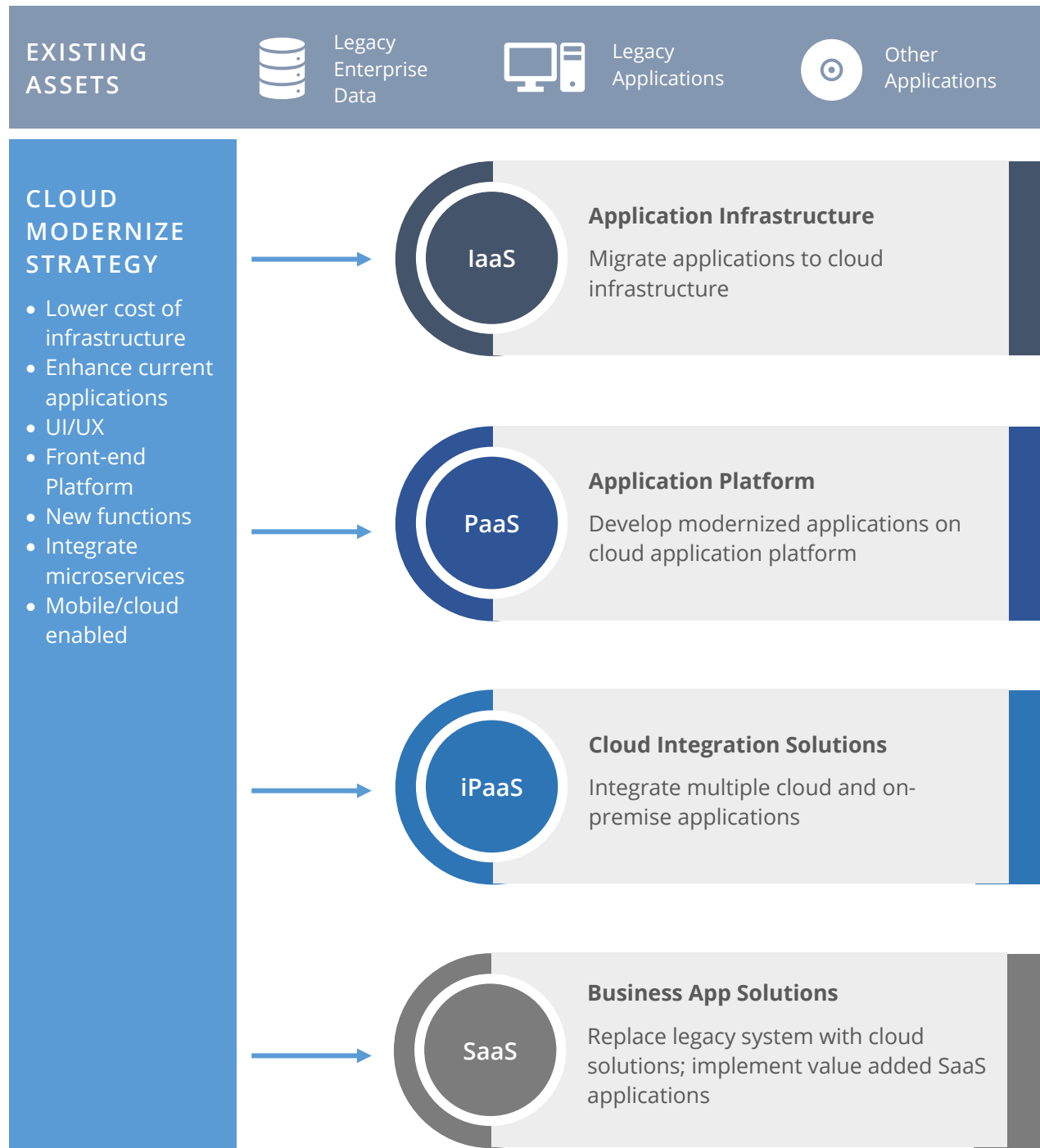


Figure 11. Map of Cloud Modernization Pathways

MODERNIZATION STRATEGY SUMMARY

Replacement, point solutions, and continuous modernization are all valid approaches to modernization. Organizations should carefully consider the options and choose the approach that best aligns with and meets organizational goals and objectives.

New innovations and constantly changing business needs will require a continuous modernization approach to extend the capabilities of existing IT systems while reducing costs and affording new development to occur simultaneously. A continuous modernization mindset is needed to thrive in a constantly changing world.

- Continuous modernization starts with clearly defined business strategies, objectives, and measures.
- Sometimes, total replacement of existing systems is unavoidable. Many times, however, incremental improvements add new capabilities to existing assets over time and reduce risks and costs. Replacement of aging assets may be planned and scheduled
- A combination of centralized and decentralized strategies is necessary to ensure complete business alignment.
- Modernization architectures vary based on the approach, but microservices/APIs are preferred for managing, governing, and securing system interfaces.
- There are different pathways for modernizing cloud computing strategies, including IaaS, PaaS, SaaS, and iPaaS. Businesses should choose an appropriate pathway based on their needs and their current and desired capabilities.

The continuous modernization approach extends legacy systems with modern components in incremental steps so that business needs are met on a continuous, timely basis with less risk and organizational impact.

Modernization Implementation and Operations

3

Just as technologies have evolved, processes and methodologies for implementing them have also changed over the years. Structured, waterfall methodologies that attempt to capture all requirements up front were previously required due to less flexible database and programming environments. Today's modern tooling allows more options, such as agile development and rapid prototyping methodologies, which align well to a continuous modernization approach.

For example, DevOps combines software development and operations to shorten development and release cycles. This methodology fits a continuous modernization approach by allowing new features and fixes to be released more frequently while maintaining production integrity.

Regardless of the approach, organizational change management (OCM) is a significant factor in the success of any modernization effort. This section includes a discussion of OCM case studies and recommended approaches to consider.

"Eighty-five percent of organizations have adopted, or plan to adopt, a product-centric application delivery model."

Gartner Group, February 2019



PRODUCT VS. PROJECT MANAGEMENT

Both project and product management are essential disciplines in continuous modernization efforts, but they have different processes, resource requirements, and end goals. Projects have a start and an end and strive to accomplish objectives within budget and time constraints. Contrarily, product management is the continuous endeavor to add value and adapt existing IT assets, or “products,” to constantly evolving business needs.

Many organizations have mature project management practices and disciplines

but are less familiar with product management.

Product management, in IT terms, is often associated with packaged or COTS software, like Microsoft Office, offered by software vendors and serves as the bridge between product development and sales and marketing. A product manager’s role is to understand customer needs and ensure that the products are designed, developed, and supported to meet such needs.

Additionally, product management is a continuous, proactive approach to ensure products remain relevant and desirable to consumers in a competitive marketplace.

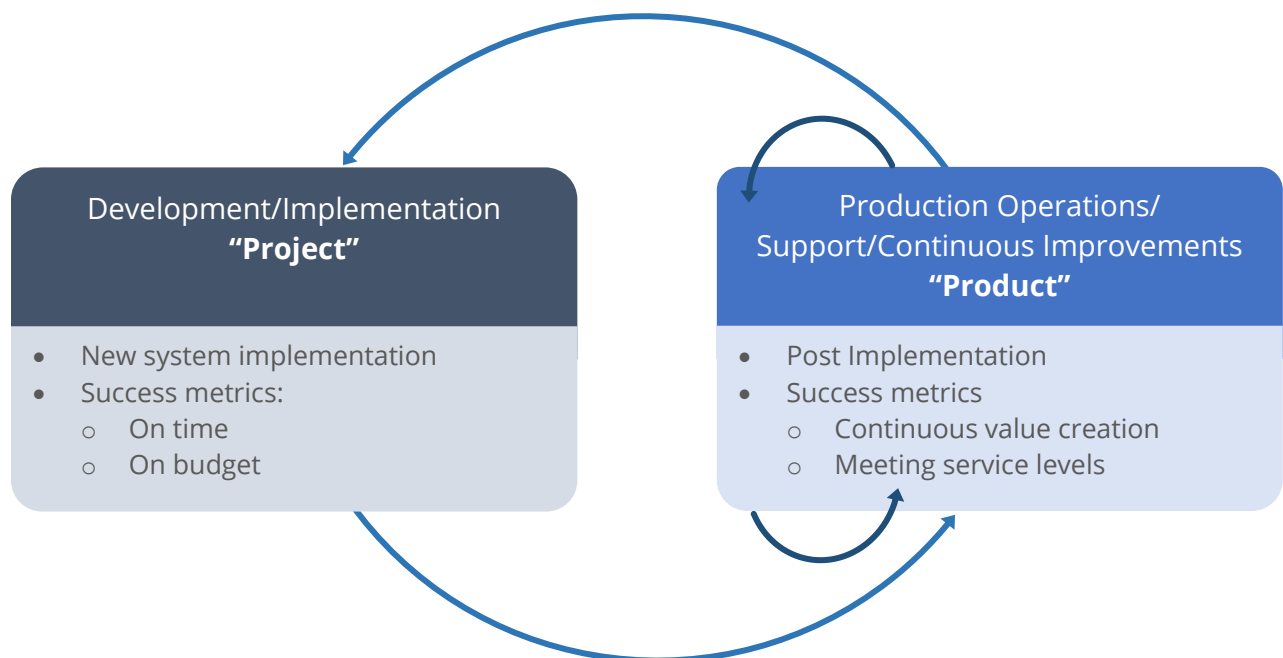


Figure 12. Hybrid Project/Product Management

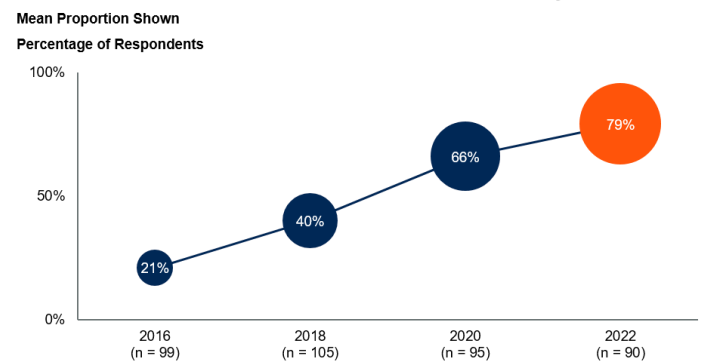
The same principles can be applied when managing IT assets within an organization. Products are the IT assets of the organization that deliver a digital experience to internal and external customers. Product management is the continuous, proactive approach to ensure the products are serving the operational needs and strategic objectives of the organization. This concept elevates IT assets not only as technology enablers but as products that are integral to the business. In the case of digital businesses like Uber, their “products” comprise the platform that the entire business runs on. Gartner Group predicts that by 2020, three-quarters of digital leaders will have pivoted away from project management and toward product portfolio management, compared to the one-third of businesses today.

CONTINUOUS VALUE STREAM

A key principle in product management is the delivery of a continuous value stream rather than waiting for the completion of large, multi-year projects. This approach is even more relevant now than in the past, with the trend away from monolithic applications and toward the rapid growth of readily-available cloud services and new technologies, such as natural language processing (NLP), artificial intelligence (AI), and Internet of Things (IoT).

Today, prebuilt cloud services make it possible to implement new application functionality quickly, which makes it more feasible to deliver continuous incremental improvements to the application. The concept of single-application solutions, such as an accounting or payroll system,

Use of a Product-Centric Model for Software Delivery



Base: Gartner Research Circle Members; Excluding Don't Know answers
Question asked: For each of these four time periods, what proportion of your organization's work was done, or will you expect to be done, using a product-centric model?

ID: 360414

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Figure 13. Gartner, "Use of Product-Centric Model for Software Delivery," 2018

is also becoming less relevant as more organizations integrate cloud applications (SaaS) with packaged applications and develop new applications on the cloud platform (PaaS).

For example, value was added to a PeopleSoft human resource (HR) application by integrating an IBM AI-based chatbot service into the PeopleSoft employee portal. The HR department routinely responds to questions from employees, many of whom are newly hired. Therefore, the chat bot service was trained to answer the top 10 questions received by the HR department, which were then made available through the employee self-service portal. This was done in a few months, leveraging IBM Watson Assistant cloud services instead of waiting for the functionality to become available within the PeopleSoft product. The added value was measured in reduced customer support time and higher customer satisfaction. Rather than individual PeopleSoft or IBM applications, it is the cohesive “product” that delivers the digital experience to end users.

PRODUCT MANAGEMENT PROCESS

The product management process leverages different disciplines and frameworks to ensure alignment with strategic goals of the organization, and that maximum value is derived from the IT assets on a continual basis. The process seeks to proactively realize an organization's strategic goals by identifying new areas for innovation, incorporating best practice techniques (e.g., design thinking and continual user feedback), and considering external factors to continually look for ways to improve products and customer experiences.

In contrast, a typical maintenance and support process tends to primarily focus

on bug fixes and user requests placed through support tickets, which is a more reactive than proactive process. Though other sources of application enhancements may come from business or strategic planning initiatives, they tend to be less intentional and integrated with the overall application maintenance process.

Aside from process changes, product management also creates cultural changes that promote collaboration, ownership, accountability, succession planning, and career development. Product management teams have clear roles and responsibilities to steward a product's value to the organization.

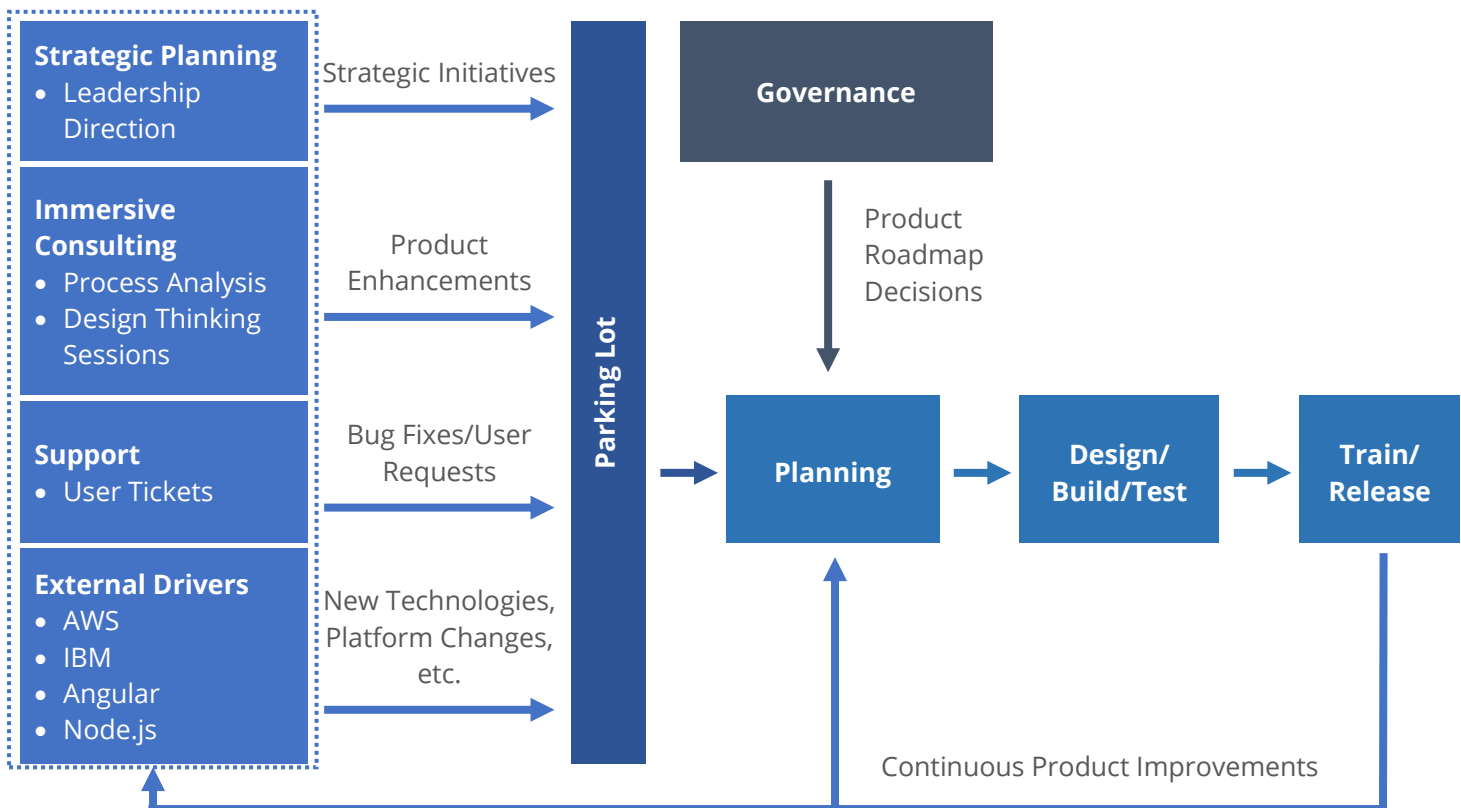


Figure 14. Product Management Process

STRATEGIC PLANNING

Strategic planning is essential to formulate, define, and communicate the strategic vision and business objectives of the organization. IT plans and initiatives should ultimately be aligned to business strategy, which contributes to a product roadmap and supports further discussion around product enhancements.

Many organizations have developed sound business strategies and plans but haven't connected the dots to IT. Fewer have considered IT when formulating business strategies. The strategic planning step in the product management process strives to align product development with the strategic direction of the organization. Also, since products are an integral part of a business model, IT has opportunities to contribute to business strategies.

In keeping with the lean and agile product management principles to deliver a continuous value stream, lean methods can be applied to strategic planning and management as well. Methodologies such as Lean Stack and Six Sigma Lean Practitioner have pioneered the continuous innovation and improvement movement.

Lean Canvas is one method that is well suited to the product management approach. It reduces a business plan to a single page that defines customers, their problems, solutions to problems, a minimum viable product (MVP), and unique value proposition. Canvases can be created quickly to flesh out ideas to optimize existing processes or explore new business opportunities. Vetted MVPs, ideas, and strategies are fed into the product management process.

PROBLEM <i>List your top 1-3 problems.</i>	SOLUTION <i>Outline a possible solution for each problem.</i>	UNIQUE VALUE PROPOSITION <i>Single, clear, compelling message that states why you are different and worth paying attention.</i>	UNFAIR ADVANTAGE <i>Something that cannot easily be bought or copied.</i>	CUSTOMER SEGMENTS <i>List your target customers and users.</i>
	KEY METRICS <i>List the key numbers that tell you how your business is doing.</i>		CHANNELS <i>List your path to customers (inbound or outbound).</i>	
EXISTING ALTERNATIVES <i>List how these problems are solved today.</i>	HIGH-LEVEL CONCEPT <i>List your X for Y analogy (e.g. YouTube = Flickr for videos).</i>		EARLY ADOPTERS <i>List the characteristics of your ideal customers.</i>	
COST STRUCTURE <i>List your fixed and variable costs.</i>		REVENUE STREAMS <i>List your sources of revenue.</i>		

Figure 15. Lean Canvas Example

Lean Canvas is adapted from *The Business Model Canvas* and is licensed under the Creative Commons Attribution-ShareAlike 3.0 Un-ported License.

IMMERSIVE CONSULTING

Another input to the product development process is immersive consulting. During the development and implementation of an application, significant subject matter and institutional knowledge is amassed by the project team. Technical and business users work closely to define requirements, design, build, test, and launch the application. Intimate knowledge of the application, vocabularies, tacit understanding, culture, and personal relationships are all intangible assets created during a project and may be lost after the project is completed. The continuous nature of the product management approach leverages these assets to improve the product on an ongoing basis. The well-seasoned product team can immerse itself and empathize with end user needs and conduct process reviews and analyses that continue to improve the product throughout its lifecycle.

DESIGN THINKING



Design Thinking is particularly well-suited for product management. During Design Thinking sessions, the facilitator leads the team through a human-centric process to empathize, define, ideate, prototype, and test solutions to real problems. The goal is to fail fast and learn

sooner in developing and validating improvement ideas and hypotheses by involving various personas to solve real problems.

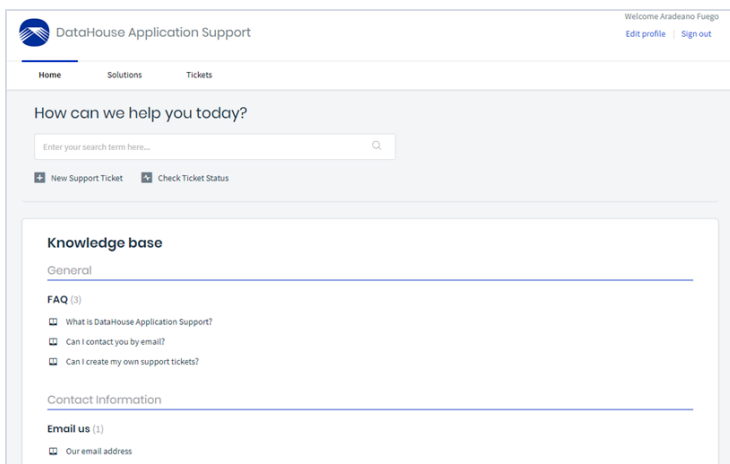
JOURNEY MAPPING



The **Journey Mapping Method** is used to build relationships with product stakeholders while working to understand what they do and how their contribution ties in with the overall Customer Journey. This method brings together all perspectives across organization silos and visually projects how product value is realized and delivered. It examines the value and the experience from multi-user perspectives across all functions and channels to assist in eliciting a full range of product requirements. Workshops are designed to capture observational and organizational knowledge and to identify existing opportunities and breakdowns.

SUPPORT PROCESS

Support is a common source of product improvements ideas. Through the support process, users submit tickets ranging from problems and bugs, questions, and new enhancement requests to a help desk. The tickets are reviewed, triaged, and responded to, either directly by the support team if it is a bug or referred to product development and kept in a parking lot if it is an enhancement.



The support system is a valuable tool in product management. It can track tickets to completion, send notifications, manage service level agreements, and administer customer satisfaction surveys. Dashboards and metrics give insight to the product's performance and support a data-driven decision-making approach.

EXTERNAL FACTORS

External factors affecting product management can range from new innovations and platform updates to market and industry changes. Considering external factors helps avoid the pain of being blindsided by imposed changes that may have nothing to do with

the business, such as end-of-life hardware, unilaterally imposed version upgrades, and security vulnerabilities. Aging technology and eventual replacement of IT assets are also considerable external factors and should be planned and coordinated as part of the product management process.

PLANNING

Parking lot items from user requests, improvements suggested through immersive consulting, strategy-driven enhancements, and general housekeeping tasks are all triaged and reviewed based on the product roadmap. A governance process serves as a framework to help guide all discussions and validate each backlogged item against the product roadmap and overall strategic vision. If there is agreement that the item should be included in the product, the item is moved to the release list and scheduled for a release train.

DESIGN/BUILD/TEST

Product enhancements are prioritized based on the review process and added to the product release schedule accordingly. Once a schedule is determined, an Agile and DevOps software development lifecycle is followed to design, build, test, and deploy new releases.

TRAIN/RELEASE

Orientation, teaching, and evaluation of users on system improvements is conducted. System enhancements are released in production based on the release list and fixed schedule.

In summary, the product management process incorporates leadership direction, process analysis, design thinking, user tickets, new technologies, platform changes, and high-level governance decisions to continuously plan and implement product improvements. The following image shows another visual representation of the process flow.

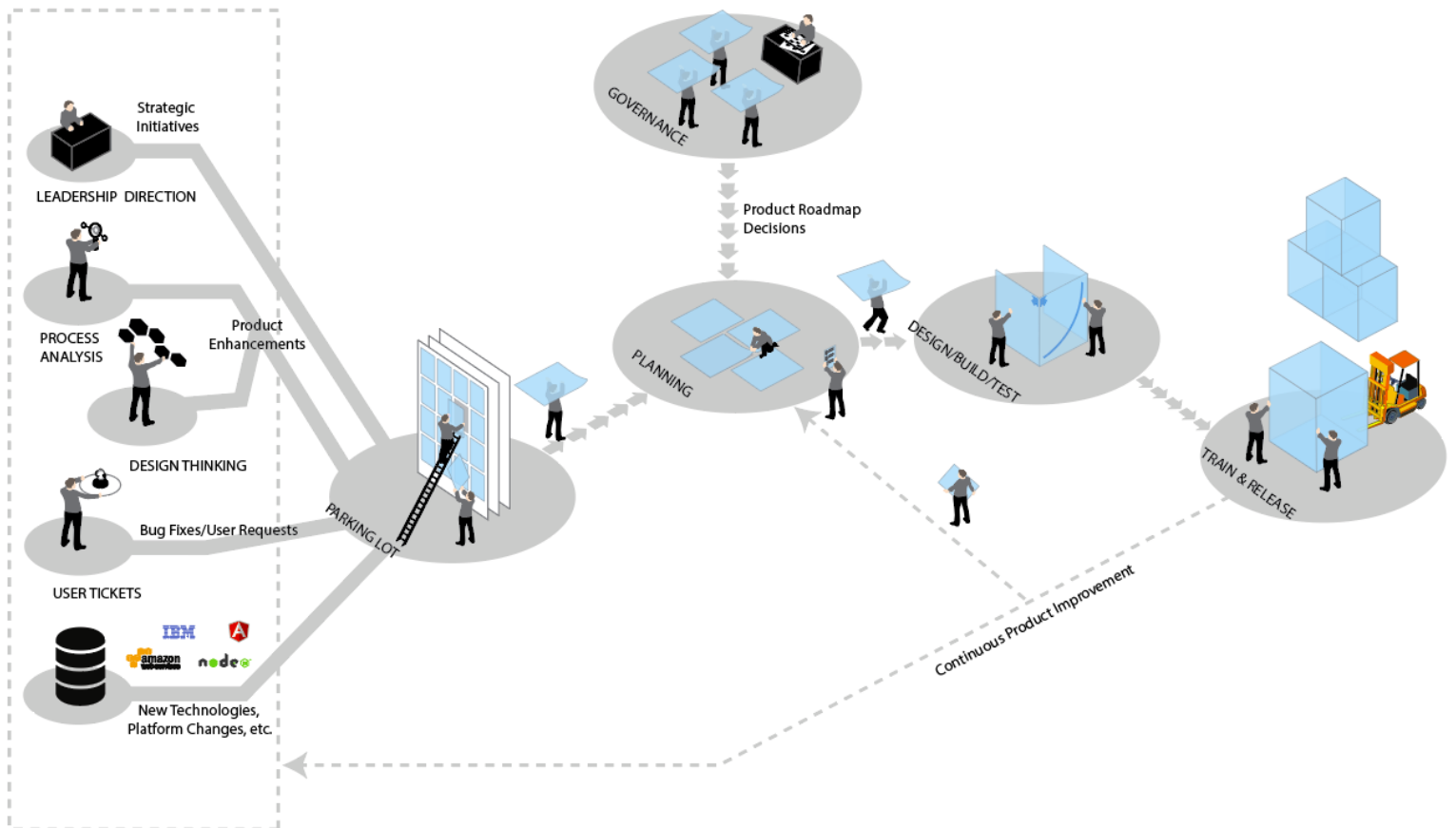


Figure 16. Product Management Process

PRODUCT MANAGEMENT OPERATION MODEL

Certain aspects of the existing IT operating model must change to adopt a product management approach. In fact, the shift to product management is part of the transformation to becoming a digital business. The operating model for a product-centric approach is different than a traditional project-based approach.

ASPECT	PRODUCT-CENTRIC	PROJECT-CENTRIC
Funding	Annual or more predictable block funding	Every project is estimated and budgeted separately
Governance	Product manager reviews product backlog and decides what to include in each release of the roadmap	Every project undergoes planning, review, and approval procedures
Success Metrics	Value delivered by the product	Time and budget, level of effort
Culture	Collaborative, high-trust, low-blame culture. Team is accountable and empowered to make decisions in the best interest of the organization.	Every project culture may vary depending on factors such as management style, project plan, team makeup, etc.
Resources	Cross-functional and highly-versatile team capable of performing multiple roles. Long-term tenure preserves relationships, subject matter, and institutional knowledge.	Team is assembled for each project based on availability
Development Methodology	Agile, DevOps	Agile, Waterfall

Figure 17. Differences Between Product-centric and Project-centric Approaches

PROJECT-CENTRIC APPROACH

A project-centric approach to software development organizes software development activities around discrete projects, each with its own funding, plan, schedule, organization, and governance. The development projects are managed

to time and budget, and once completed, the system is transitioned to an operational team for maintenance, support, and operations. Projects involving the same system can sometimes overlap due to funding availability, which can cause conflicts in resources, coding, scheduling, and dependencies.

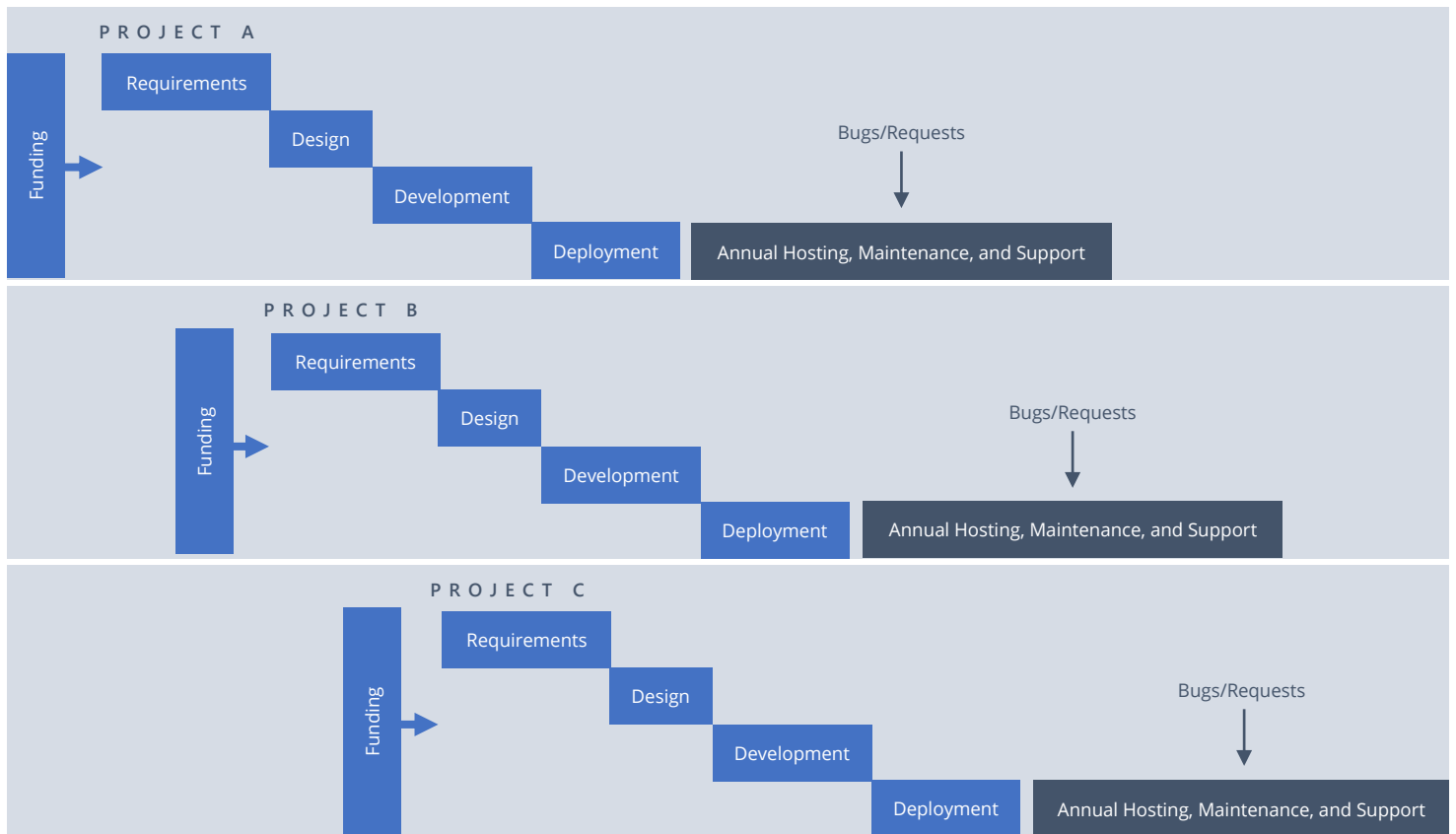


Figure 18. Project-centric Approach

PRODUCT-CENTRIC APPROACH

A product-centric software development process revolves around the Agile “release train” (ART) concept. Release trains are a series of software releases on a regular, fixed-interval schedule. Backlog items are triaged, prioritized, and placed on trains running on regular quarterly releases. Each product line may have different tracks. Within each train, the product team works on product development activities to design, develop,

test, and release new product features. The “width” of the track is determined by funding and resources available to the product team.

Two or three release trains per year is typical. For each train, resource allocation is required for software development, Quality Assurance (QA) and User Acceptance Testing (UAT), user training and documentation, and release management.



Figure 19. Product-centric Approach

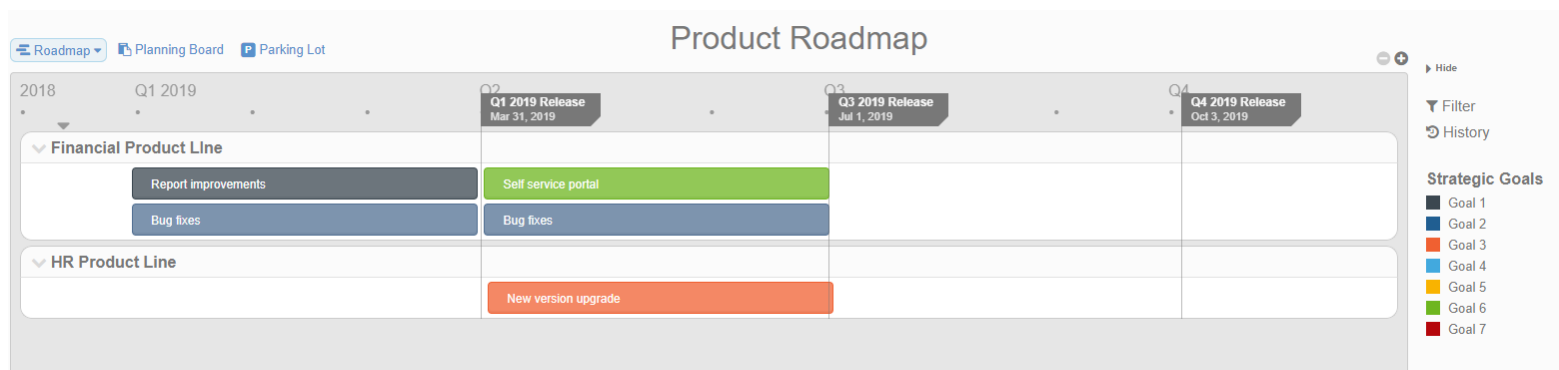


Figure 20. Product Roadmap Example

MAINTENANCE AND OPERATIONS (M&O) MODEL

In a project-centric approach, the completed system is turned over to Maintenance and Operations (M&O) upon completion of the project. The M&O team performs routine help desk support, operations, maintenance, and upgrades to the application. This process tends to be highly reactive to incidents and operational situations.

In contrast, M&O is highly integrated into the product-centric operating model. This approach tends to be more proactive by feeding the loop back to product development. Issues that arise during M&O can directly influence future product enhancements. The M&O teams assist with release management and continually provide system and infrastructure performance management on a 24x7

basis with a feedback loop to the product development team. M&O activities include:

- Support desk for issue and problem management
- Infrastructure and application monitoring
- Backup/disaster recovery
- Change control
- Service level agreement management
- Security and compliance management

RESOURCING MODEL

In a product-centric approach, resources are pre-allocated towards the development and M&O models. The following roles are typically allocated:

PRODUCT-CENTRIC ROLES	
<p>PRODUCT MANAGER</p> <p>Makes final decision about what is included/excluded in the release train</p> <p>Responsible for final definition of features</p> <p>Has product vision; sets long-term resource investment rates (along with customer decision-maker) to support product vision</p>	<p>PRODUCT DEVELOPMENT AND OPERATIONS (DEVOPS)</p> <p>Developer roles towards features and enhancements, management of codebase</p> <p>Infrastructure roles towards managing and improving system platform</p>
<p>PRODUCT SUPPORT TEAM</p> <p>Immersive consulting analyst who understands the business and looks for process/product improvements to add to backlog</p> <p>Conducts design thinking and journey mapping with users</p> <p>Creates project documentation and training</p>	<p>USER EXPERIENCE (UX) DESIGN</p> <p>Drives user-centered development process</p>
	<p>QA TEAM</p> <p>Ongoing system testing</p> <p>UAT</p>

Figure 21. Product-centric Roles

ORGANIZATIONAL CHANGE MANAGEMENT (OCM)

The goal of OCM as it relates to modernization efforts is to have all stakeholders take ownership of their modernized solutions and put them in operation as rapidly as possible. Executive leadership play a key role in ensuring that organizational goals and objectives are clearly understood by all affected parties. Effective communications, training, and useful documentation and resources are essential for user acceptance, and thoughtful consideration to culture and human factors are equally critical to adopting a new system.

OCM has evolved and matured into a niche industry with consulting firms that specialize in OCM practices.

CONVENTIONAL OCM MODEL

Conventional OCM models tend to be top-down driven. Executive leadership defines the organization's mission and direction and initiates projects to deliver on goals and objectives. OCM processes are incorporated into a project plan which typically includes tasks such as team building, stakeholder communications, system training, and user support. OCM processes are delivered to affect, monitor, and reinforce change through various methods, such as blanket communications, peer advocacy, and contingent reinforcement (carrot/stick). The entire OCM process is very project-centric with discrete start and end points and project-specific deliverables.

This top-down approach casts executive leadership as the originator of the ideas,

where the role of the rank and file carries them out. This model mirrors the design of most organizations. However, most organizations are designed for operational repeatability and not designed for change, which creates resistance. The OCM process is intended to overcome the resistance to establish a new normal that can be operationally repeated when fully adopted.

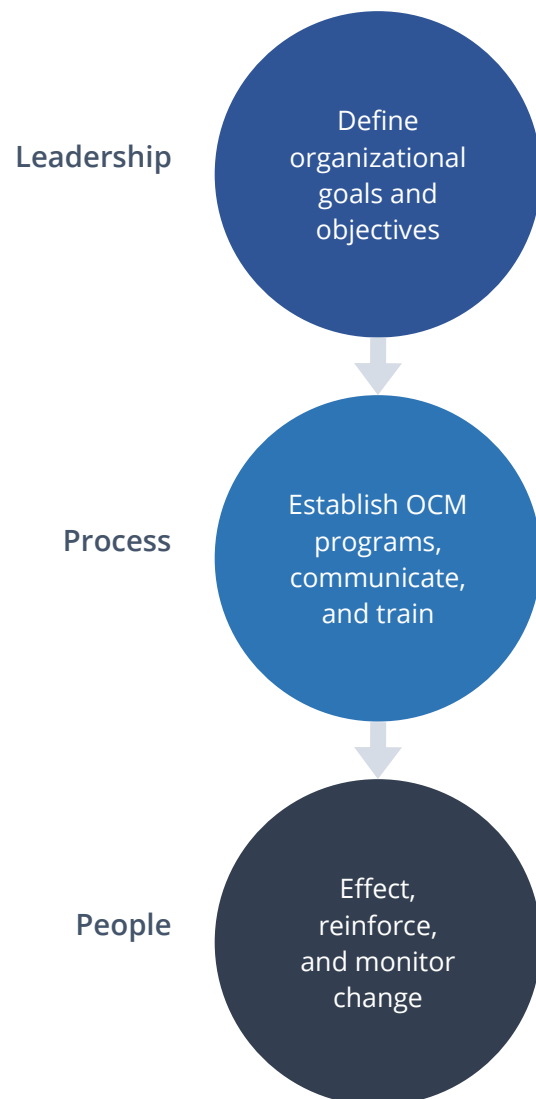


Figure 22. Conventional OCM Model

ORGANIC OCM MODEL

While a conventional, top-down OCM approach may be effective in some organizations, an iterative, organic approach often works better, particularly with continuous modernization and product management approaches that require much greater agility and are less project centric. An organic approach reduces resistance and evolves change from within on a continuous basis. Leadership, process, and people are still the key elements, but they work together in unison to support change in the organization.

From a leadership perspective, an organic approach requires much greater involvement and staff interaction throughout the process. As change is introduced on incremental basis, leadership must be clear on

communicating the strategic destination and continually assess needs, priorities, risks, and staff feedback to make decisions along the journey.

From a people perspective, an organic approach requires a deeper level of empathy, trust, and a collaborative culture that is nurtured within the organization. A continuous modernization approach supports this by involving staff in the development process and allowing them to take ownership.

The process of organic change management is highly iterative and agile. Rapid cloud-based application development allows users to participate in shaping the system, thereby increasing ownership and buy-in. Regular cadence of communications keeps everyone informed and on the same page.



Figure 23. Organic OCM Model

MODERNIZATION IMPLEMENTATION SUMMARY

Product management is the preferred operational approach because it is a continuous endeavor that adds value and adapts existing IT assets to constantly evolving business needs.

- Shifting from project management to product management is part of the digital business transformation process.
- Product management leverages different disciplines and frameworks to align products with organizational goals and constantly achieve maximum value from IT assets.
- Product management also creates cultural changes that promote collaboration, ownership, accountability, succession planning, and career development.
- M&O is highly integrated into the product-centric operating model and feeds a proactive cycle for fixing issues and enhancing future products.
- Continuous modernization and product management lend themselves to organic organizational change that reduces resistance to change and increases staff collaboration.

Products are the IT assets of the organization that deliver a digital experience to internal and external customers. Product management is the continuous, proactive approach to ensure the products are serving the operational needs and strategic objectives of the organization.

Conclusion

Since DataHouse was founded in 1975, we have had a unique, first-hand opportunity to experience the evolution of IT since its inception. We started with large scale mainframe application development in Assembler, PL1, COBOL, CICS, ADABAS/NATURAL, and JCL following structured, waterfall methodologies, such as SDM/70 and Yourdan. With the advent of the PC, graphical user interfaces, and IP-based networks in the 80s, we evolved to developing applications using client/server technologies, such as Microsoft, Java, and C, and started implementing COTS products as an alternative to custom development. In the 90s, web application development was introduced, starting with HTML pages and static content, which quickly evolved to dynamic, transactional applications for e-commerce, content management, and web-enabling back-office, core applications. As such, DataHouse started developing applications in more iterative and agile methodologies. The pace of innovation exponentially accelerated in the 2000s with the growth of the Internet and the introduction of consumer technologies, such as mobile phones and tablets, leading up to the digital transformation we are seeing today driven by cloud, IoT, and AI technologies.

Despite all the advancements, many organizations continue to use applications and technologies from past decades. In an ideal world with unlimited resources, time, and the ability to change human behavior, all IT assets within an organization would be using today's modern technologies. However, the reality is that the pace of innovation and business transformation is ceaselessly accelerating such that what is modern today is legacy tomorrow. Therefore, whether the goal is to optimize or transform, or simply to keep up, the modernization approach presented in this three-part series provides a practical guide for organizations to realize their strategic goals and digital ambition.

The world has gone from flat, to fast, to deep.

Thomas L. Friedman



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