How CTOs Can Create Effective Technology Roadmaps

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Initiatives: Digital Future

CTOs are unable to prioritize technology investments because they lack effective, well-communicated technology roadmaps. CTOs should follow top practices to create technology roadmaps that can inform decisions on technology prioritization.

Additional Perspectives

- Summary Translation: How CTOs Can Create Effective Technology Roadmaps (23 August 2022)

Overview

Key Findings

- Chief technology officers (CTOs) create roadmaps as formal deliverables, but don't always link them to business outcomes. This inhibits them from prioritizing technology investments to further business goals, meaning they miss opportunities to optimally support business and customer needs.
- CTOs are inconsistent in integrating technology into business capability roadmaps. If this is neglected, then technology assets are not leveraged and reused across business capabilities.
- CTOs struggle to socialize roadmaps to inform different types of strategic stakeholders to communicate how and why technology-related decisions are made. Consequently, stakeholders may make their own technology decisions independently, leading to suboptimal technology.

Recommendations

CTOs responsible for technology innovation must:

- Determine the future-state architecture required to support the organization's business model and strategy by performing trendspotting activities, monitoring technologies, assessing capabilities and engaging in discussions with peers before creating a roadmap.
- Determine the future-state technology architecture.
- Develop the right type of roadmap by determining the key decisions that the roadmap needs to inform — and, therefore, the level of information that the roadmap should capture.
- Collaborate with stakeholders when creating technology roadmaps to ensure that the roadmap information is relevant to them. This should encourage these stakeholders to use the roadmaps in their decision making.

Strategic Planning Assumption

By 2025, 80% of CTOs that use business-outcome-focused technology roadmaps will see a 20% increase in employee and customer satisfaction scores due to better alignment of technology with business and customer needs.

Introduction

As a CTO, you're faced with an overwhelming choice of emerging and mainstream technologies to deliver opportunities and tackle challenges within your organization. How do you prioritize what to invest in? Often, CTOs don't effectively prioritize technology investments because they don't link technology roadmaps to business outcomes. As a consequence, CTOs may not invest in the right combination of technologies at the right time to support business and customer needs and navigate disruption.

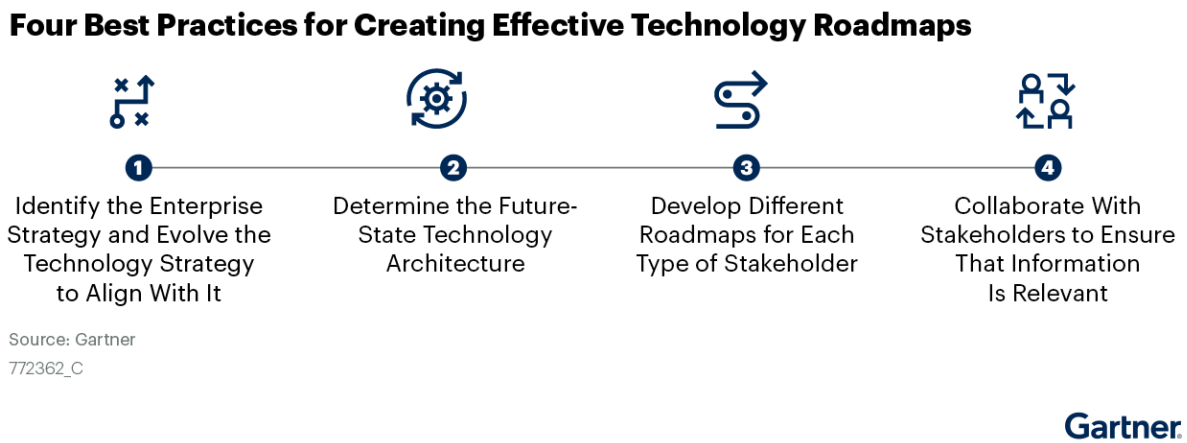
This research will help CTOs create effective and relevant technology roadmaps to guide them in prioritizing competing technology investments. It outlines four best practices that will help them focus on evolving the current state of their technology architecture into the required future state (see Figure 1). Furthermore, this research highlights the ways in which CTOs should consider the needs and expectations of stakeholders, who will also benefit from using roadmaps.

Gartner defines a roadmap as a strategic blueprint that communicates how an enterprise's IT plans will help the organization achieve its business objectives. The visual graphics and supporting documentation serve as a helpful tool in showing progression from a current state to a desired outcome.

Gartner provides additional technology planning deliverables to inform other types of technology-related decisions:

- Understanding the CTO's Role in Technology Strategy explains how to develop a technology strategy and outlines the deliverables required.
- Inventing the Future With Continuous Foresight presents a framework for responding to disruption and understanding how it impacts decision making.
- The Gartner Trendspotting Framework: Driving Operations, Innovation and Strategy provides a framework for analyzing current and future trends to evaluate how they might impact the organization and technology decisions.
- Tool: Emerging Technology Wheel Template provides a visualization for tracking the technologies that an organization is interested in. It outlines the impacts, obstacles, outcomes and opportunities for each technology.
- Assessing Emerging Technology Adoption Readiness provides a comprehensive approach to evaluating the readiness of an emerging technology.

Figure 1: Four Best Practices for Creating Effective Technology Roadmaps



Analysis

Identify the Enterprise Strategy and Evolve the Technology Strategy to Align With It

Technology investments reap their rewards when they enable employees to perform work that delivers meaningful business outcomes. The benefits of technology investment multiply if you consider how technology-related areas like artificial intelligence (AI) and total experience can deliver more effective, high-quality products and services, make your products and services more appealing to customers, and reduce cost and risk. It is essential that CTOs ensure the technology strategy is regularly reviewed so that it continues to support the enterprise business strategy. Our research shows that CTOs are often accountable for defining the technology strategy and creating technology roadmaps, usually with the support of enterprise architecture (EA). [1] In today's disruptive times, business strategies need to continually adapt to the accelerated pace of change. The technology strategy needs to evolve at a similar pace. However, it is hard to align business and technology roadmaps when business strategies, and their objectives, keep changing. [2]

The enterprise business strategy conveys the long-term planning horizon and should guide executives on two aspects: how they play and how they win. However, that is not always clearly defined, documented or communicated. If this is the situation you're in, then you can make assumptions on what strategic business outcomes your organization strives to achieve. Document these assumptions and test them:

- Examine the company's annual report and investor information (if it is publicly traded) to determine what goals, results and metrics are reported.
- Analyze the content of internal management presentations to see what goals and strategic initiatives are discussed.
- Set up discussions with business executives to establish their goals and priorities.

It is also vital to make an explicit link between business and technology outcomes, and to prioritize and measure the value of technology investments, as described in Use Digital-Outcome-Driven Metrics to Quantify the Business Value of Technology Investments. For example, a technology outcome might be time taken to answer a customer query via a digital channel, whereas the business outcome would measure whether the customer was happy with the resolution of their query.

Identifying the strategic business outcomes your organization needs to achieve is the first step in prioritizing technology investments. It sets the scene for the CTO to lead discussions on how various technologies can enable the organization to deliver those outcomes with other executives, as well as any associated risks or limitations of the available technologies. Trendspotting techniques can help CTOs evaluate the impact of technology trends on the organization and industry (see CTO Insights: Building a Process for Trendspotting and Innovation), enabling them to paint a picture of the future. If looking at the longer term, CTOs may also want to perform a scenario planning analysis (see Scenario Planning Playbook). Capture the decisions that result from these discussions in two high-level, two-page business and technology strategic plans. These documents should cover the shorter-term horizon of one to two years.

"Technology strategy" is a broad term that can refer to multiple deliverables, stakeholders and purposes. Clarify to what extent you, as CTO, are accountable for the technology strategy (see Understanding the CTO's Role in Technology Strategy). For example, are you accountable for the enterprise technology strategy or strategies relating to specific technologies like cloud or AI? Depending on the answer, you might be required to craft both an enterprise technology strategic plan and technology strategies for specific technologies. The next level of detail is to develop the technology reference architecture, but first you need to determine the required future-state enterprise architecture.

Determine the Required Future-State Architecture

The future- or target-state architecture outlines the technologies that the organization must modernize or invest in over the next few years to realize the required business outcomes. This approach avoids creating a bottom-up roadmap that fails to show how technologies support business needs. Thus, this exercise should be performed in sync with developing the business architecture. CTOs need to be able to visualize and understand how technologies should evolve in order to support the future business capabilities that the business model requires.

CTOs should work with the EA team to view or create current- and future-state business capability maps to visualize how well the future business model and strategy will be supported. For more information, see Ignition Guide to Creating a Business Capability Model. CTOs must decide whether their future state should represent the short term (one to two years from now) or the longer term (three to five years), or whether to create two future states to provide strategic transition states.

Use this information to perform a gap analysis, identifying either the new capabilities that are required or existing capabilities that require better technology. This will inform you of the technology investments that need to be made. Determine which new technologies will be required to support new or evolving business capabilities. Identify current technologies that need upgrading or that could be retired. This information helps shape the technology roadmap. Conduct these activities in parallel with business stakeholders in a continuous and iterative process, so new business use cases for capabilities can be identified as they emerge. For more information, see Design and Build the New Digital Foundations. The most proactive future-state planners base their roadmaps on capabilities, rather than individual technologies, so that technologies can be swapped in or out of the technology stack as capabilities evolve.

Develop Different Roadmap Versions for Each Stakeholder

Roadmaps can be used to inform different types of decisions relating to planning for, optimizing, retiring and investing in technology.

Choose which type of technology roadmap best suits your stakeholders and the technology-related decisions they need to make. If the CTO is creating a technology roadmap as part of developing or revising the enterprise technology strategy, then it's likely that several different types of roadmaps will be needed. Furthermore, creating several roadmaps is an important best practice because it avoids the need for an enterprise technology roadmap. Because a great deal of information would be required for an enterprise technology roadmap, it is virtually impossible to create one that communicates all the data in a clear and meaningful way. To avoid this approach and creating too much work, use the same object representation and the same template (where appropriate, depending on the type of roadmap in question) so that they are easy to aggregate. An example of this is shown in Case Study: Coordinating Product Lines Through Mutual Self-Interest (The Hanover). The six main types of technology roadmaps are detailed in Table 1.

Table 1: The Six Types of Technology Roadmaps

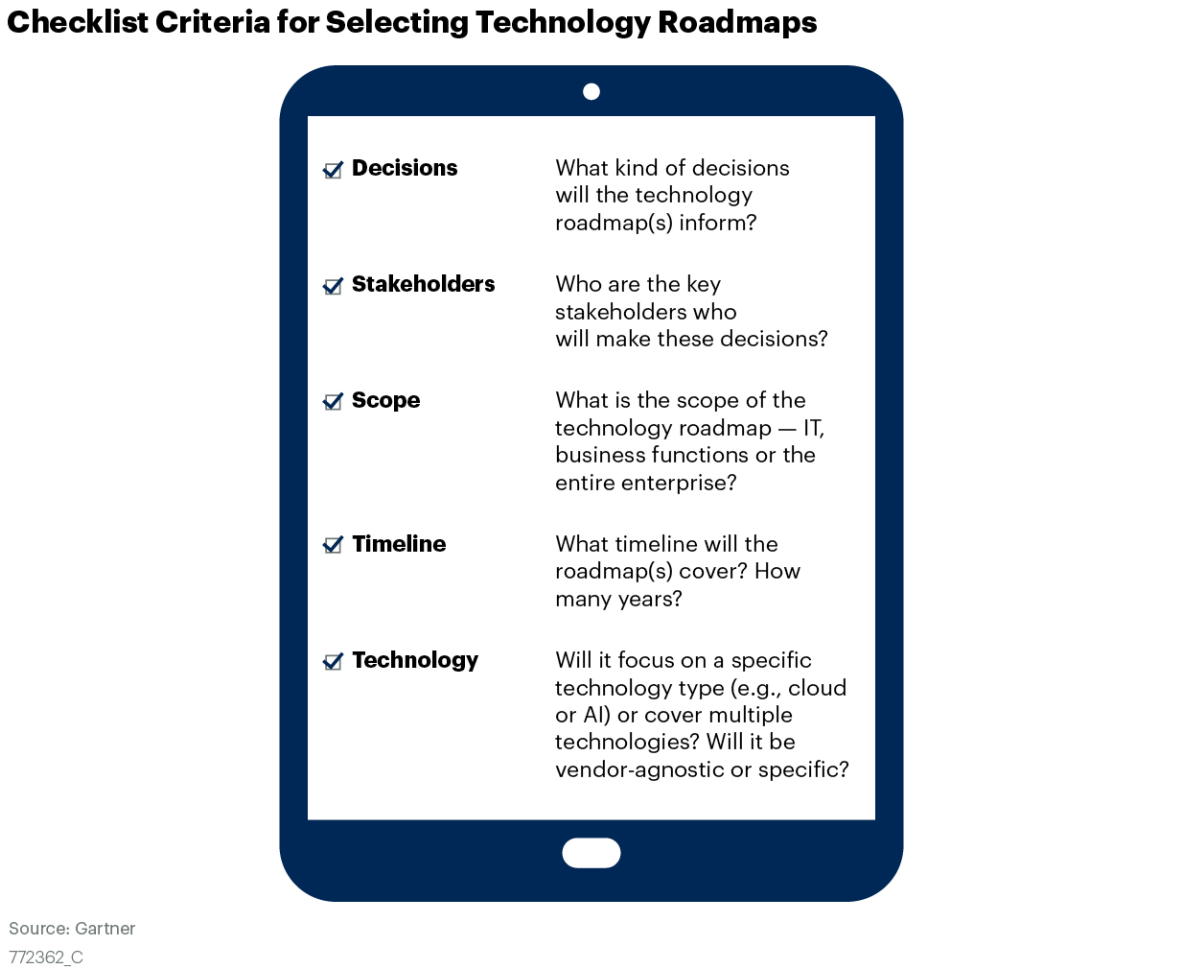
(Enlarged table in Appendix)

Type of Technology Roadmap	Decisions	Scope	Content	Stakeholders
Technology life cycle management roadmap	To optimize and rationalize the technology portfolio	Technology domain	Life cycle status of current and planned changes to applications and infrastructure	Application and infrastructure owners
Technology implementation project roadmap	To plan for implementing new technologies	IT and relevant business functions	Timelines and status of current and planned projects, plus any interdependencies	Project and portfolio managers; product managers and owners; business stakeholders
Emerging technology roadmap	To track the evolution and potential impact of emerging technologies that might be relevant to the organization	IT and relevant business functions	The underlying technologies relating to an emerging technology trend, and how they impact the existing IT landscape	Enterprise architects; infrastructure owners; security and risk management team; data and analytics team; sourcing, procurement and vendor management team
Innovation portfolio balance roadmap	To decide how to allocate resources between different types of innovation	Enterprise	Percentage of resources dedicated to optimize, extend, transform or disrupt; plus more specific innovation targets for time, scope and market impact	
Business capability roadmap	To determine the applications required to support specific, future-state business capabilities	IT and relevant business functions	Technologies required to support future business capabilities (indicating missing technologies)	Business architects; business sponsors
Scenario planning roadmap	To analyze the potential impact of external market and internal business changes on the technology landscape	Enterprise	Description of business scenarios; trends and trigger events, and their impact on current technologies and planned technology investments	Enterprise or business architects; business sponsors

Source: Gartner (July 2022)

To select the relevant types of technology roadmaps, identify your key stakeholders and discuss with them the decisions that need to be made and how a roadmap can help inform those decisions. Sample templates of these types of technology roadmaps are given in Tool: Templates for CTOs to Create Effective Technology Roadmaps. Use the checklist in Figure 2 to determine which types of roadmap you need to develop.

Figure 2: Checklist Criteria for Selecting Technology Roadmaps



Source: Gartner
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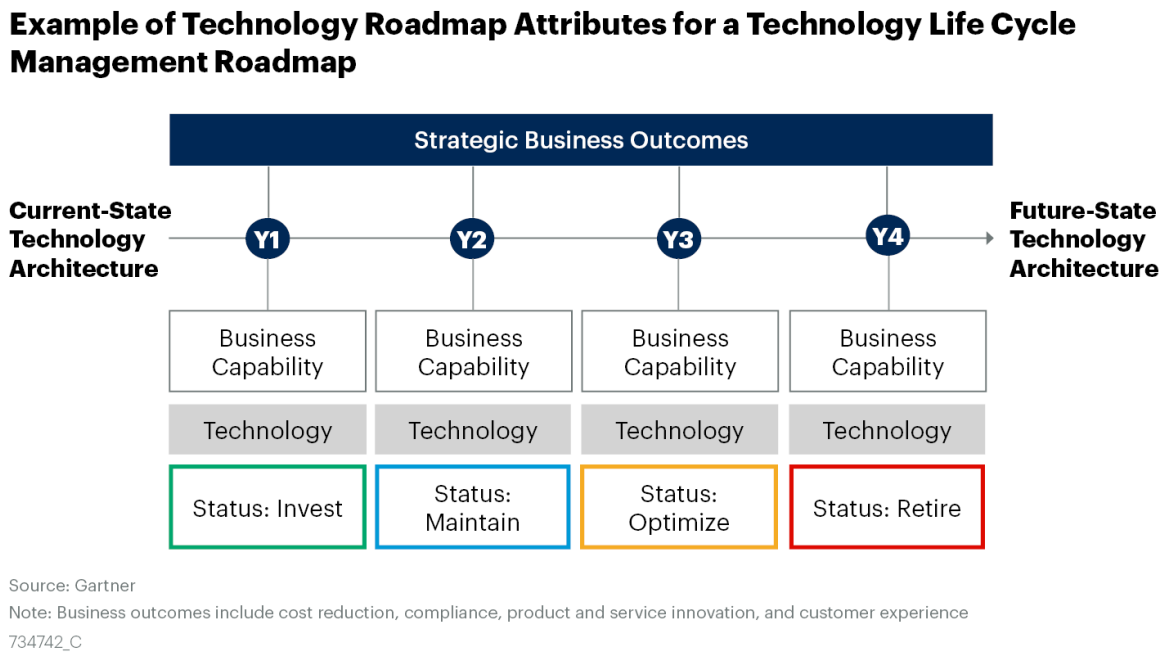
Collaborate With Stakeholders to Ensure That Roadmap Information Is Relevant

It is crucial to incorporate roadmaps into key strategic and innovation planning processes, ensuring they are actually used for decision making. The precise amount of information included in the roadmap, and the attributes it displays, should be limited to the information that the stakeholder will use for decision making (see Figure 3 for an example).

Agree with each stakeholder on the scope of information required for each type of roadmap. Then, create each roadmap in collaboration with the right stakeholders to ensure these roadmaps are perceived as useful. Developing roadmaps should not be a one-off exercise. Ensure that the information is updated regularly to stay relevant, especially if a trigger event has occurred. Revalidate the relevant roadmaps with stakeholders in case priorities, or stakeholders, have changed. Depending on the pace of change that the organization is experiencing, regular updates could be monthly, bimonthly or quarterly. Conversely, an update might be triggered by an unanticipated, disruptive event, triggering the need to reevaluate the business value or risk associated with a technology. We do not recommend annual updates because it is likely that the information will need to be refreshed more frequently to remain accurate.

Figure 3: Example of Technology Roadmap Attributes for a Technology Life Cycle Management Roadmap



Source: Gartner
Note: Business outcomes include cost reduction, compliance, product and service innovation, and customer experience
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To ensure effective stakeholder collaboration, agree on how each stakeholder will be involved in roadmap creation. Obtain both their agreement and their manager's agreement, so that there is a clear understanding of their involvement in the roadmap creation process. Establishing a decision matrix for technology roadmaps is the best way to avoid confusion. The decision matrix should outline how each stakeholder is expected to contribute to roadmap content. This can be done in the form of a "responsible, accountable, consulted and informed" (RACI) matrix. Figure 4 provides an example of a decision matrix for technology innovation roadmaps. Ensure that the final roadmaps are socialized and any further feedback is incorporated into future updates. This will help keep the roadmap information relevant.

Figure 4: Sample RACI Decision Matrix for Technology Innovation Roadmaps

Sample RACI Decision Matrix for Technology Innovation Roadmaps

R Responsible A Accountable C Consulted I Informed

	Decision			
	How does this technology support business and customer needs?	How does this technology support our innovation strategy?	How will this technology impact our security, data, architecture and infrastructure?	How is this technology supported by technology providers?
Business Stakeholders	C	I	I	I
CTO	A	A	A	A
EA	C	C	R	C
TI	R	R	C	C
I&O	I	I	R	C
App Dev	I	I	I	C
PPM	I	I	I	I
D&A	I	I	R	C
SRM	I	I	R	C
Sourcing	I	I	I	R

Source: Gartner

CTO = chief technology officer; D&A = data and analytics; EA = enterprise architecture; PPM = project and portfolio management; SRM = security and risk management; TI = technology innovation

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Evidence

[1] An analysis of 248 CTO profiles and job descriptions showed that developing the technology strategy and roadmap is the top responsibility. This analysis was conducted by Gartner's Secondary Research Services team from April through June 2022.

[2] Gartner's IT Score for CTO maturity assessment indicates that aligning business and technology roadmaps with business objectives is an activity that office of the CTOs (OCTOs) are relatively less mature in (Level 2 maturity).

Methodology

The IT Score for CTO offers the best of Gartner expertise and peer-based research. The IT Score for CTO builds on the previous version of the IT Score, bringing it up to date with the latest research and best practices in CTO functions.

Maturity is measured on a scale ranging from 1 (low) to 5 (high). It measures how advanced an organization's development is in a functional activity relative to Gartner's expert assessment of practices associated with that activity. Each activity comprises several subactivities, and each subactivity is given as a yes or no question. Each question is weighted 1 through 5 depending on how progressive the activity is according to Gartner analysis. Roughly, a 1 is considered a below average or 10th-percentile practice; while a 5 is considered a 90th-percentile practice. Activity maturity is calculated as the average of responses to the subactivity questions.

Importance is measured on a scale of 1 (low) to 5 (high). Importance measures how important each functional activity is to the overall effectiveness of the function in meeting its business objectives.

From August 2021 through March 2022, 62 organizations completed the IT Score for CTO online.

Acronym Key and Glossary Terms

CTO	Chief technology officer
D&A	Data and analytics
EA	Enterprise architecture
PPM	Project and portfolio management
SRM	Security and risk management
TI	Technology innovation

Document Revision History

Recommended by the Author

Some documents may not be available as part of your current Gartner subscription.

The Chief Technology Officer's First 100 Days

Tool: Chief Technology Officer Sample Job Description

How to Demystify the Chief Technology Officer's Many Personas

Understanding the CTO's Role in Technology Strategy

Tool: Templates for CTOs to Create Effective Technology Roadmaps

4 Roadmapping Tactics to Drive Successful Strategy Execution

Case Study: Interconnected Business Capability Mapping (Medtronic)

Gartner Peer Connect Perspectives: How to Develop Effective Technology Roadmaps

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