

Understanding the CTO's Role in Technology Strategy

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Initiatives: [Enterprise Architecture and Technology Innovation Leaders](#)

The term “technology strategy” covers many deliverables, stakeholders and purposes. Enterprise architecture and technology innovation leaders who are CTOs should establish which areas of technology strategy they need to own and what strategy deliverables the organization requires.

Overview

Key Findings

- No single format of technology strategy suits all purposes or stakeholders, and not all technology strategies are the responsibility of the CTO.
- In many situations, the CTO has insufficient business input to define strategy, or de facto technology strategy decisions are made without CTO input.
- Technology strategy doesn't start or end with technology adoption; it must extend to managing the entire technology life cycle.

Recommendations

Enterprise architecture and technology innovation (EA&TI) leaders who are CTOs should:

- Identify the role of the CTO and office of the CTO (OCTO) in technology strategy, and determine which forms of technology strategy deliverables satisfy the needs of each stakeholder in the organization.
- Improve business relationships to develop a better technology strategy, and make the case for more structured approaches to technology strategy by highlighting the costs and risks of weak business alignment.
- Establish a process for technology life cycle management that bases retirement decisions on business criteria.

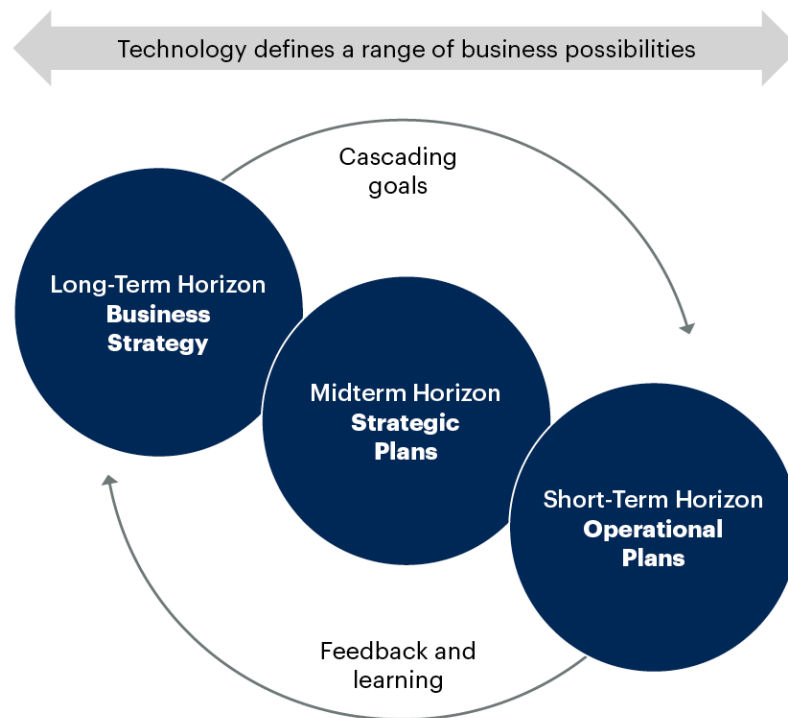
Introduction

What Is a Technology Strategy?

A technology strategy addresses the role and life span of one or more technologies. Ideally, it flows from business strategy, which answers the two fundamental questions: Where do we play? and How do we win? This leads to more detailed questions and decisions related to topics such as the organization's purpose, customers, value proposition, ecosystem partners and success metrics. Technology defines the range of possibilities to implement the business strategy and may constrain or influence it based on the availability and capability of specific technologies. However, not all technology strategies are developed to satisfy explicit business or nonfunctional requirements. CTOs must also manage technology strategy in less-than-perfect situations, such as when there is inadequate business involvement or the strategy is triggered by challenges with existing technologies or vendors.

Analysis

Technology strategy has to inform and support three horizons of business strategy, as illustrated in Figure 1.

Figure 1: Three Horizons of Business Strategy**Three Horizons of Business Strategy**

Source: Gartner
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Different stakeholders and different business planning horizons demand different technology strategy deliverables. Therefore, a CTO must deliver several types of technology strategy documents with different levels of detail depending on their purpose and audience. At one extreme, business executives might need a two-page strategy to gain a high-level understanding of general technology trends and opportunities. At the other, complex projects and initiatives may need a very detailed description of the mapping between business architecture and capabilities, and technologies/vendors. The strategy related to a technology applies to its entire life cycle. It starts when a technology is first identified as potentially useful and ends with that technology being retired or replaced.

What's the Purpose of a Technology Strategy?

Technology strategy as we discuss it in this research comes into play once the organization has decided to adopt or abandon a technology that is significant to its operations. It's concerned with why, how and when a technology is deployed and eventually retired. There are activities that precede technology strategy, such as technology scanning or innovation management, which are concerned with identifying the technologies to adopt. These may be the responsibility of a CTO but are not the concern of this research (see The Wider Context of Technology Strategy section).

There are several variants of technology strategy for different purposes. Technology strategies can be stand-alone deliverables (e.g., a cloud strategy or an artificial intelligence [AI] strategy) or may be embedded in other documents such as reference or enterprise architectures. In general, all technology strategies deal with the six issues listed in Table 1.

Table 1: The Purposes of a Technology Strategy

Goal	Example
Recommended Usage	"Use technology X for purpose Y," "Avoid technology P for purpose Q."
Manage Life Cycle	This extends from adoption to retirement planning. "Technology Y will be mature enough to use by 2025," "Technology Y must be retired by 2023."
Create Capabilities	Identify technologies to enable necessary capabilities such as agility or scalability, or to deliver key business solutions such as hybrid cloud or AI. Identify technologies that will support future requirements, new capabilities or business models.
Optimize Use of Resources	Avoid technology duplication, achieve reuse, optimize licensing costs, leverage skills and retire technologies that are no longer cost-effective.
Manage Risk	Manage, for example, security risk, vendor risk, financial risk, skills risk and obsolescence risk.
Lessons	Understand the opportunities and risks associated with a technology.

Source: Gartner (August 2021)

The types of technology strategies that concern any specific CTO will depend on his or her persona (see [How to Demystify the Chief Technology Officer's Many Personas](#)).

Gartner identifies four key CTO personas:

- **CTO as digital business leader.** This CTO will be responsible for digital business transformation and innovation and less so for day-to-day technology management. However, such a CTO may well be concerned with high-level strategic technologies such as AI or technologies that might enable new business models like blockchain.
- **CTO as digital business enabler.** This CTO will be concerned with a wide range of technologies to support a digital business model and operations. These may include IT and operational technologies around, for example, factory automation, composable business and cybersecurity.
- **CTO as IT innovator.** This CTO will primarily be concerned with technology and process innovation within the IT function, such as, adopting 5G, edge architectures or microservices.
- **CTO as COO of IT.** This CTO is focused on the optimization and operation of the IT organization. This persona is likely significantly involved in procurement decisions and vendor management. Such a CTO may be very involved in technology life cycle management.

In reality, many CTOs span more than one persona so may have technology strategy responsibilities that cross personas.

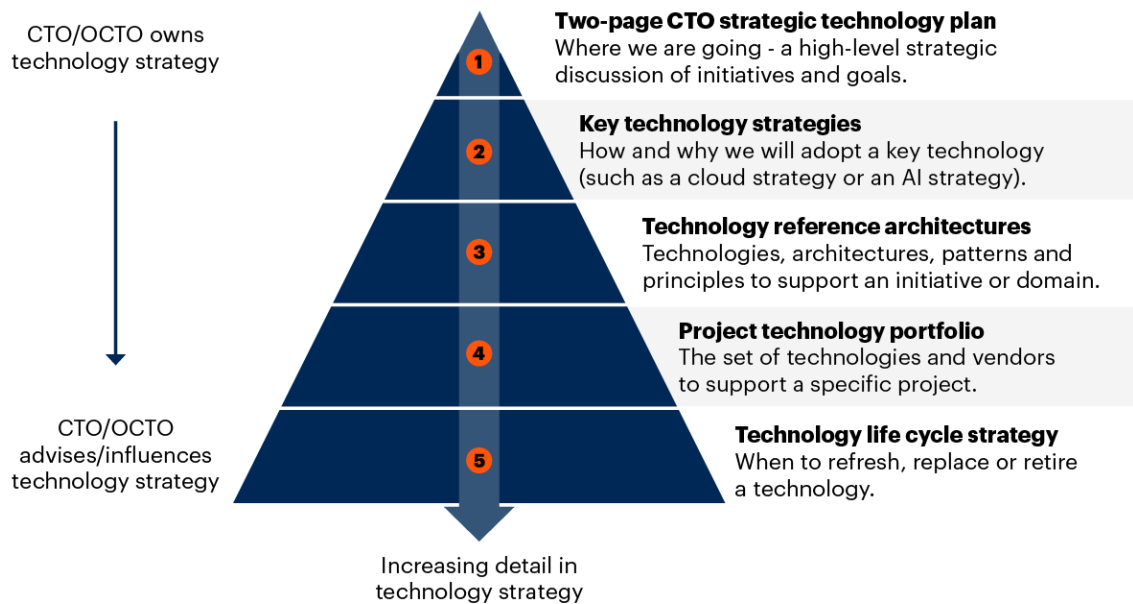
Which Technology Strategies Does a CTO Own?

Depending on his or her persona, a CTO may be involved in several different types of technology strategies, as illustrated in Figure 2. Broadly, technology strategies form a pyramid ranging from very-high-level broad-brush strategies down to very detailed plans cataloging the set of technologies that will support specific systems and initiatives. The involvement of the CTO and OCTO in these strategies will vary among organizations.

Some technology strategies are owned and maintained by the CTO/OCTO; in other cases, the OCTO may influence or review a strategy, but may not be directly responsible for it. In some organizations, technology reference architectures might be developed by external consultants, enterprise architects or technology architects outside the OCTO. In general, the CTO is more likely to own strategies at the top of the pyramid and influence those at the bottom. In federated organizations with highly autonomous business units, the CTO may have little or no influence on technology strategy at the business unit level.

Figure 2: Examples of Different Technology Strategies

Examples of Different Technology Strategies



Source: Gartner
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Figure 2 illustrates five common types of technology strategies:

- **Strategic technology plan.** This is a high-level strategic discussion of a business goal or goals and the set of technologies that will be required to deliver them. For example, a CTO tasked with improving customer experience might identify a need to adopt new user experience technologies, AI and analytics, CRM, and other similar technologies. The goal of this form of strategy is to communicate the general goals and direction in a specific area. Typically, it will cover issues such as where we are now, where we need to go, and what technologies and strategies will get us there. The concise technology strategy format discussed in Figure 4 is well-suited to this type of strategy.
- **Strategy for a key technology.** This type of technology strategy is typically concerned with the exploitation of a key technology that will be applied across a range of business areas. Examples might include cloud or AI strategy. See the key technology strategy discussed in Figure 5 for more information.

- **Technology reference architecture.** A reference architecture defines the portfolio of technologies, architectural patterns, data designs, applications and business principles associated with a specific class of system, such as an Internet of Things reference architecture or a business platform architecture.
- **Project technology portfolio.** This defines the detailed set of technologies and vendors that will be used to implement a specific project or system. Such detailed mappings are typically the responsibility of enterprise or application architects, so we don't discuss them in detail in this research.
- **Technology life cycle strategy.** CTOs are often involved in technology life cycle management. They may determine when a technology should be adopted, upgraded (e.g., to new versions of packages or operating systems), or retired and replaced. This type of strategy is particularly likely to be the concern of those CTO personas concerned with IT technology and organization.

These are not the only types of technology strategies but illustrate five positions on the strategy pyramid that demand different forms of technology strategy deliverables.

As noted, the involvement of the CTO in each of these strategies will depend on the persona of the CTO and the politics and culture of the organization. When assigning responsibility for technology strategies, it may help to use a RACI matrix to clarify who's responsible (does the work), accountable (owns the task and signs off on it), consulted (provides input) and informed (kept in the loop).

Technology Strategy in an Imperfect World

In a perfect world, technology and business strategy will be integrated and interdependent; business innovation may demand new technologies; and new technologies may suggest new business opportunities. In organizations where the CTO persona is "digital business leader" owning digital business strategy, this alignment may be easy to achieve. However, the world is often imperfect, and CTOs may need to operate against a background of several types of misalignment, as illustrated in Figure 3.

Figure 3: Technology Strategy in an Imperfect World

Technology Strategy in an Imperfect World

■ Business Strategy ■ Integrated Technology

Integrated technology and business strategy



The ideal situation

CTO may own digital transformation strategy

Separate technology and business strategies



Collaborate with the business

Position technology strategy as an input to business strategy

Unknown or unclear business strategy



Try to clarify business strategy – but don't wait

Make and document assumptions about business strategy

Devolved technology decisions by BUs



Highlight the costs and risks of a lack of strategy

Don't try to control everything, but focus on the areas of greatest cost/risk first

Source: Gartner
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Business and technology strategy are integrated. This is the ideal situation. It is likely to be easiest to achieve in the case of CTO personas such as “digital business leader,” where the CTO owns both business and technology decisions.

Business and technology strategy are separate but coordinated. In organizations where business and technology strategies are the responsibility of different groups, the CTO must collaborate with the business to ensure the technology strategy is relevant. In such cases, it may be useful to position technology strategy as an input to business strategy; for example: “Technology will enable you to do these things you need to do by providing capabilities, reducing costs and improving agility.” A key risk to avoid is strategies driven by a “technology for technology’s sake” attitude, which inadequately addresses business needs.

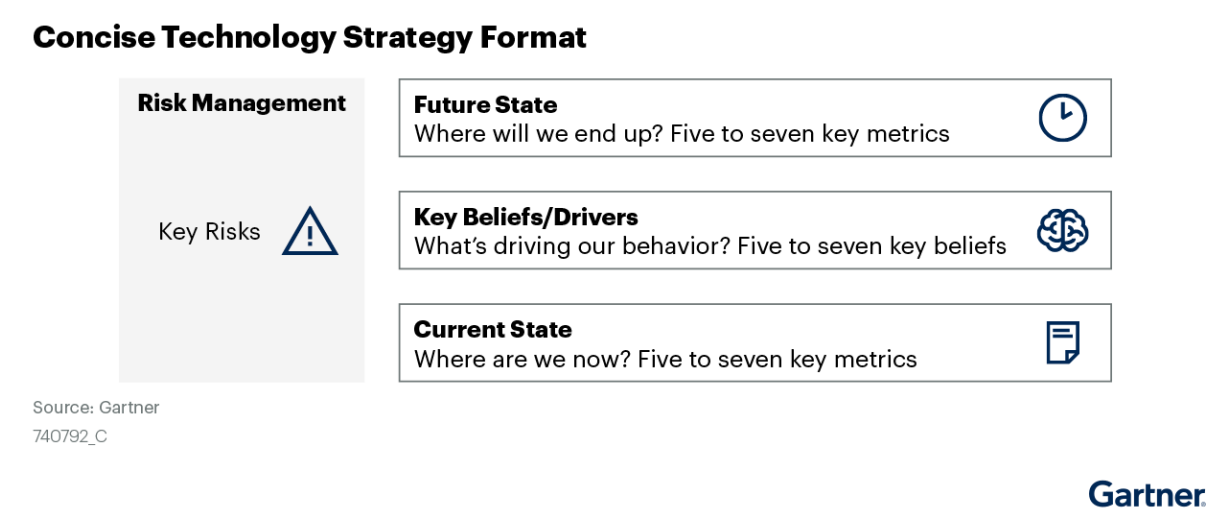
Business strategy is unknown or unclear. Some CTOs operate in situations where the business strategy is unclear, undefined or hasn't been communicated. A CTO should obviously try to clarify business strategy, but it may not be practical to defer all technology decisions until this can be achieved. In such cases, the best approach is to make assumptions about business strategy for the purposes of technology planning, and document them for others to use and review. This situation is more likely to impact the two CTO personas primarily concerned with IT.

Technology strategy is devolved and fragmented. In organizations where business units are powerful and independent, the CTO may have limited input to many technology selection decisions. This is often suboptimal since the organization will typically not be investing efficiently in technology because of redundancy, duplication, skills fragmentation and limited economies of scale. Creating a more centralized strategy may be politically difficult, but there will likely be opportunities for the CTO to highlight some of the costs and risks stemming from the lack of coordinated technology strategy. This may provide opportunities to improve the situation in some areas and provide a foundation for discussion about future plans.

Concise Technology Strategy/Technology Roadmaps

The concise technology strategy is a format that can be used for statements of strategic technology directions or high-level two-page overview strategies, as noted in Figure 2. It can also be used to provide an executive-level discussion of technology end-of-life strategy. It consists of the four components illustrated in Figure 4.

Figure 4: Concise Technology Strategy Format



Current state. The current state involves “where we are now, and what we need to move away from,” typically expressed as a few key bullet point metrics. Examples include:

- “We have 50 applications hosted in-house.”
- “It takes a minimum of 12 weeks to make changes to pricing systems.”
- “Twenty percent of our mobile workers’ footprint has no data connectivity.”
- “Unplanned production line outages occur once a week.”
- “A major cybersecurity event would bankrupt our business, and no one will insure us against it.”

Key beliefs and drivers. These are a few key factors driving decisions and behaviors, typically five to seven bullet points. For example:

- “We expect three times as many customers, but each will only deliver 40% of today’s average customer revenue.”
- “Virtual reality will be essential for field engineers.”
- “We’ll need 98% production line availability by 2024.”
- “Auditors will require us to have cybersecurity insurance.”

Future state. The future state involves “where we want to be in the future” expressed as a discussion supported by five to seven key metrics that are relevant to business outcomes. For example:

- “By 2023, all field engineers will have a minimum of 20 Mbps bandwidth in 95% of the country using 5G and satellite.”
- “By 2023, we’ll have deployed sufficient cybersecurity technology and response processes to make cybersecurity insurance affordable.”
- “By 2023, digital twins of our production line machines combined with predictive AI will reduce unplanned outages to one hour every three months.”

Risk management. All technologies incur risks, some of which are important enough to be surfaced in the strategy. For example:

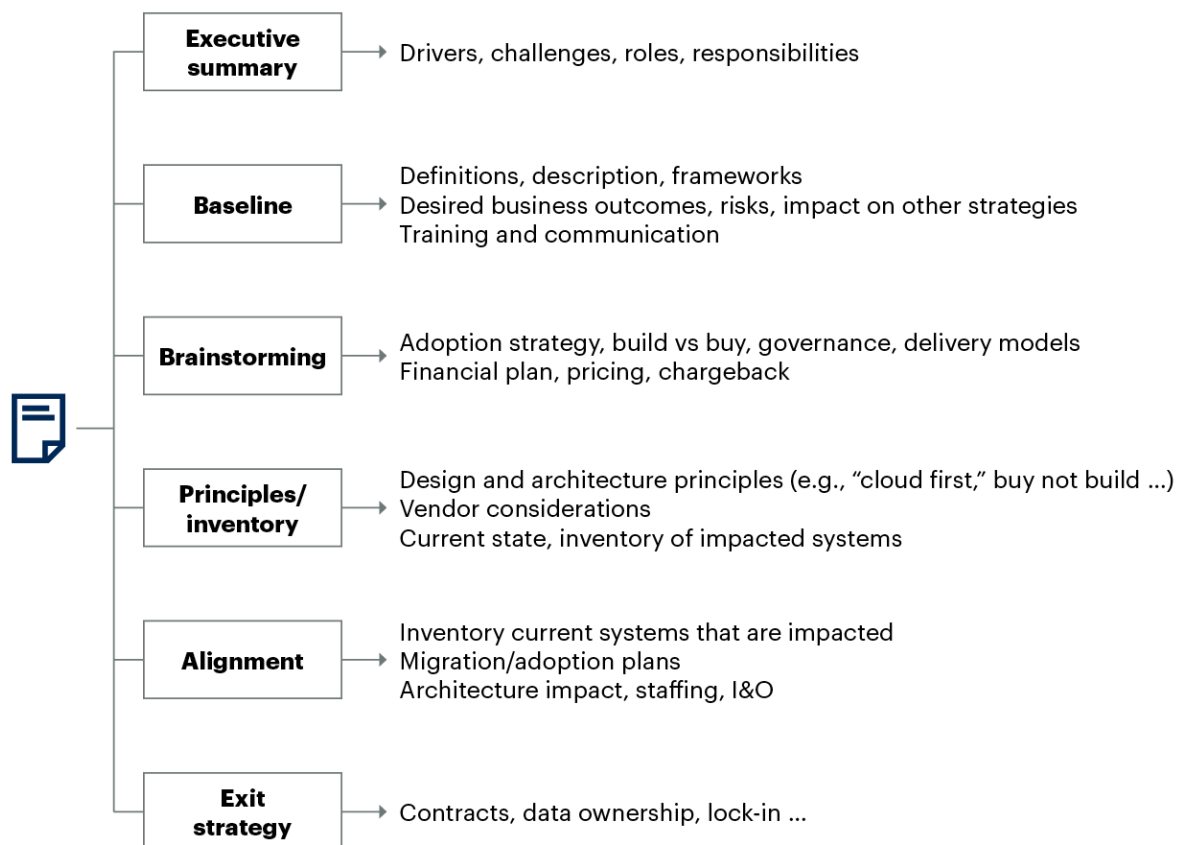
- “Our connectivity strategy is dependent on a satellite vendor being commercially successful and remaining operational through 2025.”
- “We will be able to recruit or train the necessary AI skills by 2023.”

Key Technology Strategies

The purpose of a key technology strategy as noted in Figure 2 is to outline why and how the organization will deploy a technology that is likely to provide a key capability for several business and technology initiatives. Figure 5 shows an outline of a key technology strategy using the framework recommended in [The Cloud Strategy Cookbook, 2021](#).

Figure 5: Key Technology Strategy

Key Technology Strategy



Source: Gartner
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A key technology strategy provides a framework to identify the role of a technology such as cloud or AI that will be used widely across the organization. Creating this strategy may identify additional actions required by the CTO, such as establishing a center of excellence to accelerate technology adoption.

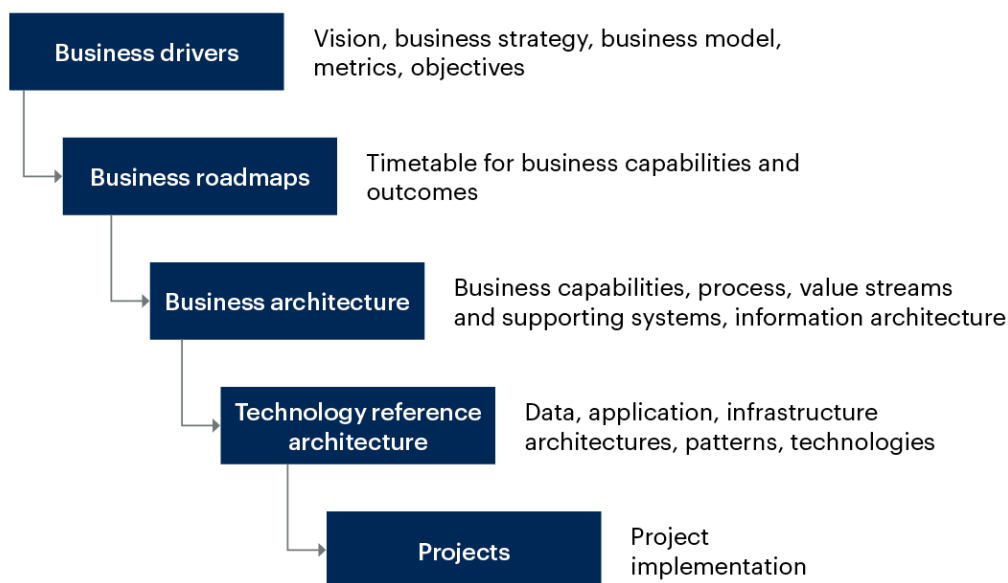
Enterprise and Reference Architectures

Enterprise architectures and technology reference architectures identify the portfolio of technologies required to deliver systems and applications, or provide templates for delivering certain types of systems. A CTO is not always personally responsible for creating detailed enterprise and reference architectures as part of enterprise technology strategy. However, these will sometimes be developed by OCTO staff, such as in organizations where the EA function reports to the CTO.

Detailed discussions of the format are outside the scope of this research; however, in general, they deliver technology reference architectures that are derived from business drivers, roadmaps and business architecture, as illustrated in Figure 6.

Figure 6: Enterprise and Reference Architectures

Enterprise and Reference Architectures



Source: Gartner
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A traditional way to develop such architectures uses somewhat complex approaches such as process-driven EA or The Open Group Architecture Framework (TOGAF). While these approaches can deliver a comprehensive technology architecture tightly linked to business strategy, they may not suit the culture and governance models of some organizations.

Technology Life Cycle Strategy

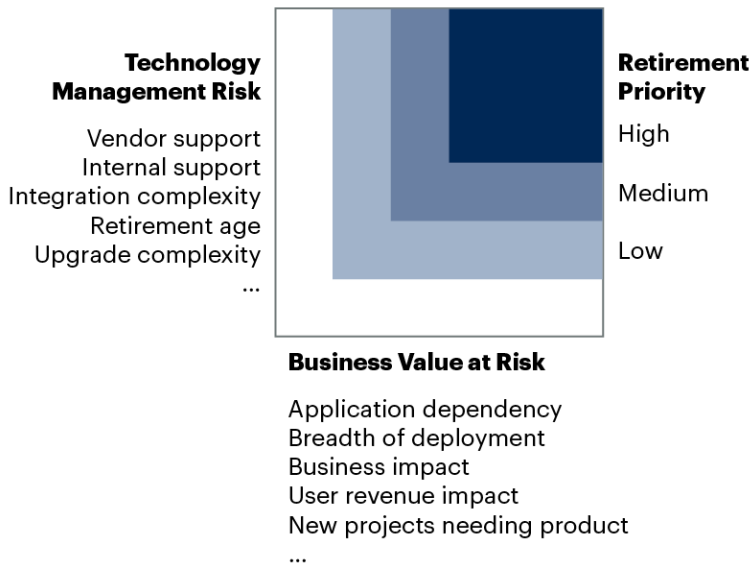
CTOs are involved in the life cycle of technology adoption through retirement. The CTO and his or her staff typically know the state of maturity of technologies and vendors, the evolution of alternatives, and the risks and issues that they involve. The OCTO is therefore well-placed to create or review plans to refresh, replace and retire technologies.

Technology retirement is an unglamorous activity, and it's sometimes difficult to justify the cost of replacing an obsolete technology. The CTO should therefore champion a structured process for technology life cycle management that will drive decisions based on criteria relevant to the business.

One approach, illustrated in Figure 7, calculates a risk assessment based on two axes: technology management risk and business value risk. The risk on each axis is calculated using a weighted score of factors such as revenue risk, vendor support and internal support. The most urgent candidates for retirement are those with both high technology management and business risk. An approach such as this provides a rational, defensible and business-oriented framework for technology life cycle management.

Figure 7: Technology Retirement and Replacement Planning

Technology Retirement and Replacement Planning



Source: Gartner
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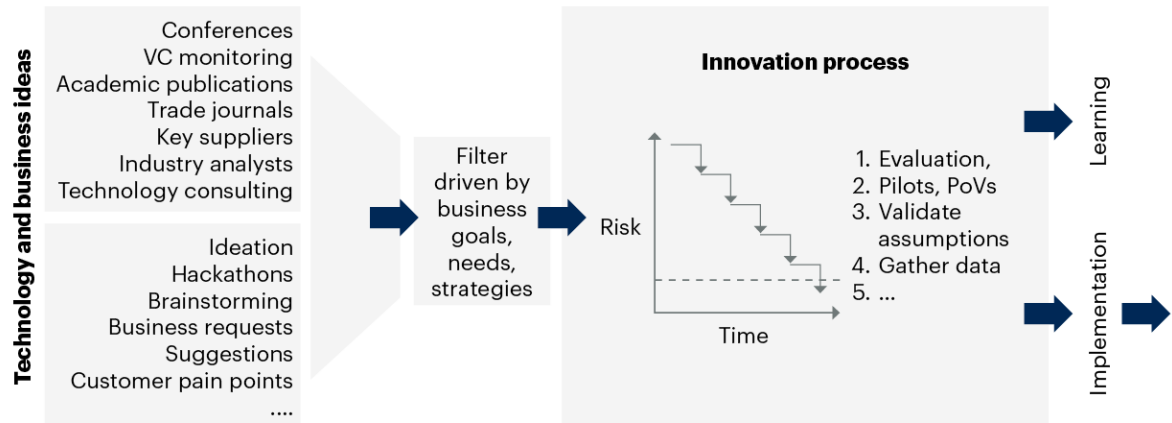
Having the CTO responsible for the entire technology life cycle means that retirement and replacement plans, and issues such as technical debt, can be considered before a technology is adopted.

The Wider Context of Technology Strategy

One common question is about the relationship of technology strategy to other technology-related functions the CTO performs such as technology scanning and innovation management. In general, these activities provide the input to technology strategy, as illustrated in Figure 8. They identify technologies that are candidates for adoption, which are then evaluated by an innovation team or some similar process. Once selected, they're candidates for implementation, so the details of adoption and life cycle management will be addressed in one or more of the technology strategy deliverables discussed earlier.

Figure 8: Technology Strategy and the Innovation Process

Technology Strategy and the Innovation Process



Source: Gartner
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Evidence

Evidence used to create this research includes discussions with colleagues and CTOs, and other Gartner research.

Recommended by the Authors

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

[The Cloud Strategy Cookbook, 2021](#)

[Inventing the Future With Continuous Foresight](#)

[CTO Insights: Identify Your Focus to Succeed as CTO](#)

[The Future Direction and Evolution of Business-Outcome-Driven Enterprise Architecture](#)

[How to Demystify the Chief Technology Officer's Many Personas](#)

[Assessing Emerging Technology Adoption Readiness](#)

[How CTOs Can Create Effective Technology Roadmaps](#)

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