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3 Models of Technology Roadmaps

By the Research and Development Research Team



Introduction

Technology roadmaps help R&D organizations secure stakeholder alignment on key technologies, identify capability gaps and prioritize technology investments. R&D leaders can use this research to understand the main factors that shape and differentiate technology roadmap models.

Overview

Technology roadmaps help R&D leaders assess capability gaps and develop technologies to support growth opportunities. Given the rate of technological change, R&D leaders should use roadmapping to help identify competencies that will fuel competitive differentiation for the organization's future products and services. Translating technology strategy into roadmapping is a challenging exercise; most companies can benefit from reflecting on their roadmapping goals and elevating the maturity and impact of their technology roadmapping activities to maximize their impact.

Key Findings

- The goal of technology roadmapping should be based on use case and applicability, such as a portfolio resource allocation tool, a product development plan or a strategic document to communicate technology investments.
 - The time horizon for the average company's technology roadmap is approximately 2 to 2.5 times that company's average product development life cycle.
 - To decide the scope of roadmaps, teams must consider the trade-off between how the roadmap is organized (i.e., by business unit [BU], product line or platform) and the depth or detail that the roadmap will be able to communicate given that choice.
 - The process and inputs to build technology roadmaps will depend on the degree to which the company's R&D strategy is technology oriented or market oriented. For example, a company planning technology investments to support product launches will likely build a very market-oriented roadmap.
 - In instances of enterprisewide roadmap analyses, companies often create multiple versions of the same roadmap at different altitudes designed for diverse stakeholder groups.
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Technology roadmaps are visual frameworks that depict technology goals and the corresponding competencies required to achieve those goals. At their core, technology roadmaps are powerful tools for ensuring organizational alignment on the key technologies that will enable new products and platforms moving forward. R&D leaders often rely on roadmaps to execute their long-term technology strategy, make tactical portfolio decisions, and conduct capacity and capability planning.

Increasingly, R&D leaders are reporting technology roadmapping as one of their top three priorities.¹ Key factors driving this increased focus on roadmapping are:

- Continued fear of disruption in established industries
- Accelerating pace of new technology introduction
- Perception that data can provide better, more granular insight into where innovation opportunities sit
- Desire to track trends more consistently as new businesses scale rapidly and demand changes quickly

Key Factors to Determine Roadmap Model

Roadmapping Goal

There is no single model that all companies should use to build a roadmap; rather, R&D leaders should spend time upfront considering specific goals they hope to achieve through roadmapping. This reflection will shape the model the companies should select (i.e., technology push, market pull or hybrid), which then determines the process, visual and contributors (or team members) needed to build the roadmap.

Goals should be based on how the organization intends to use the roadmap (see Figure 1). The altitude of information to be captured and the audience will influence the use case. For example, a technology roadmap needs to be strategic and high level if the goal is to communicate technology investments to executive leadership. The roadmap will need to be tactical or granular if it's going to be used as a planning document linked to project plans or portfolio decisions.

Some companies have multiple goals for their roadmap, and hence, they create multiple visuals from the same analyses with different altitudes and level of detail appropriate for various audiences.

Figure 1. Objectives of Creating Technology Roadmaps



Source: Gartner

Scope

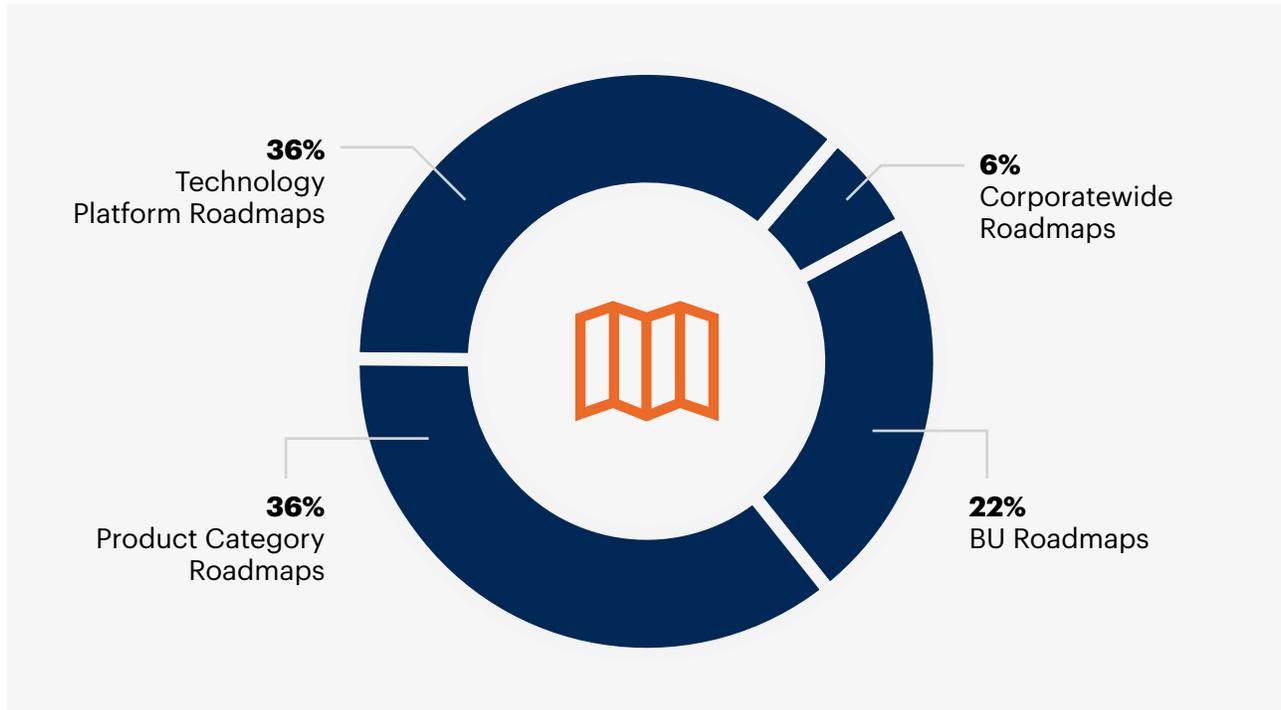
Scope refers to how a roadmap is organized, that is, at corporate level or by BU, product lines or technology platforms. The choice of scope impacts the roadmap model to be built and the level or depth of information covered in it.

Market-oriented roadmaps are typically organized by BUs or product lines, whereas technology-oriented roadmaps are organized by platforms. Roadmaps that cut across the organization should be scoped more narrowly (e.g., a single capability, business process or technology) to make them more feasible to create and less complex to depict. Whereas a roadmap designed to plan all technology investments related to a certain product can include a detailed analysis of technology projects, customer needs, product features and so forth.

The trade-off between depth and breadth should be considered while finalizing the scope to ensure it doesn't impact the ability to represent data meaningfully.

Our benchmarks show that most companies choose to scope their roadmaps around technology platforms or product categories (see Figure 2). Companies rarely create detailed enterprisewide roadmaps as the sheer volume of information makes it difficult to visualize and organize.

Figure 2. Scope of Technology Roadmaps



n = 58
Source: Gartner

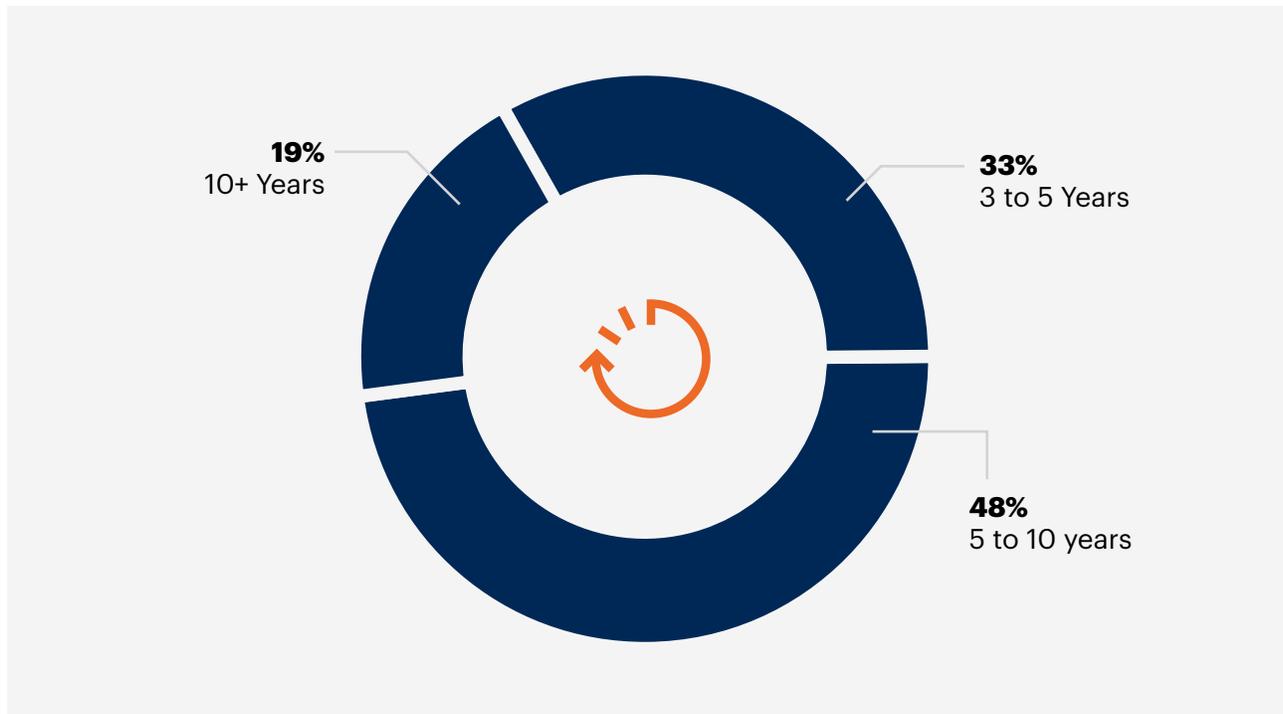
Time Horizon:

Companies most commonly build roadmaps that look out five to 10 years (see Figure 3), but a good rule of thumb to determine an appropriate time horizon is to multiply the average new product development cycle time by 2 to 2.5x.

When selecting the appropriate time horizon, it's important to note that this choice will impact the granularity of analysis included. Roadmaps that look out more than three to five years will comprise detailed near-term analysis with a higher-level strategy outlined in the roadmap's later years. For example, a market-oriented roadmap looking out seven years will likely have thorough market analyses for Years 1 to 5 but a less detailed view of product strategy beyond that.

Tracking the rate of adoption or impact of trends in an industry can help determine appropriate timelines for the technology roadmap. One caution: While many companies want to build roadmaps longer than 10 years, that analysis is often useful only for a very high-level technology-push strategy as there will be little to no product roadmap that far into the future.

Figure 3. Time Horizon of Technology Roadmaps



n = 25
Source: Gartner

Models of Technology Roadmaps

There are three common models of technology roadmapping that R&D organizations tend to use, namely market pull, technology push and hybrid. Table 1 outlines when these models are best applied.

Table 1. Comparative Analysis of Technology Roadmap Models

| | Market Pull | Technology Push | Hybrid |
|-------------------------------|--|--|--|
| Objective | How can technology support business goals? | How can technology create new market opportunities? | How can technology support product roadmaps and create new growth opportunities? |
| Select If You Need To: | <ul style="list-style-type: none"> Plan technology investments required to support product roadmaps or launch plans. Respond to market shifts Optimize capability allocation for portfolio management. Support decentralized R&D planning. | <ul style="list-style-type: none"> Create a long-term vision for R&D. Identify organization-wide platform or capability development. Prioritize competencies for strategic advantage or future differentiation. Outline a partnership or acquisition strategy for emerging technologies. | <ul style="list-style-type: none"> Articulate R&D support for nearterm product needs and long-term technology opportunities. Emphasize centralized technology investments with enterprisewide impact. Encourage longer-term planning and vision setting. |
| Key Input(s) | <ul style="list-style-type: none"> Product roadmap, plan or strategy Business and consumer trends Prioritized list of customer needs and product attributes | <ul style="list-style-type: none"> Technology trends and competencies Growth opportunities from differentiated technical competencies | <ul style="list-style-type: none"> Same as market pull and technology push |
| Features | <ul style="list-style-type: none"> Aligns technology to business needs or product strategy Assists in resourcing decisions | <ul style="list-style-type: none"> Encourages longer-term thinking Assists in transformational ideation Enables strategic workforce planning Identifies centralized technology investment opportunities | <ul style="list-style-type: none"> Assists in resource planning and strategic innovation Useful communication tool to highlight technology-push opportunities or needs with business partners Highlights critical technology investments for growth |
| Drawbacks | <ul style="list-style-type: none"> Difficult to diagnose longer-term capability gaps as product plans tend to only be detailed in the short term Can miss blind spots in the product strategy Difficult to plan cross-product technology investments | <ul style="list-style-type: none"> Time intensive Difficult to get buy-in on technology ideas not explicitly linked to product plans Challenging to identify longer-term product applications or technology-based growth opportunities | <ul style="list-style-type: none"> Tendency to overemphasize the product support components can result in a market-pull roadmap Requires extensive collaboration between multiple stakeholders Requires extensive, and often enterprisewide, data collection and analysis Challenging to organize data in one visual |
| Time Horizon | 3 to 5 years | 5+ years | 5+ years |
| Scope | Product categories, BUs or regions | Technology platforms or areas | Technology platforms and product lines |
| Owners | Technology and marketing, product managers or general managers | Technology | Technology and marketing, product managers or general managers |

Overview of Roadmap Models

Market-Pull Roadmaps

A market-pull roadmap depicts technology competencies required to support product roadmaps or launch plans. These roadmaps are most effective for communicating how technologies support business objectives and, consequently, help teams in prioritizing technology project goals based on business partner needs.

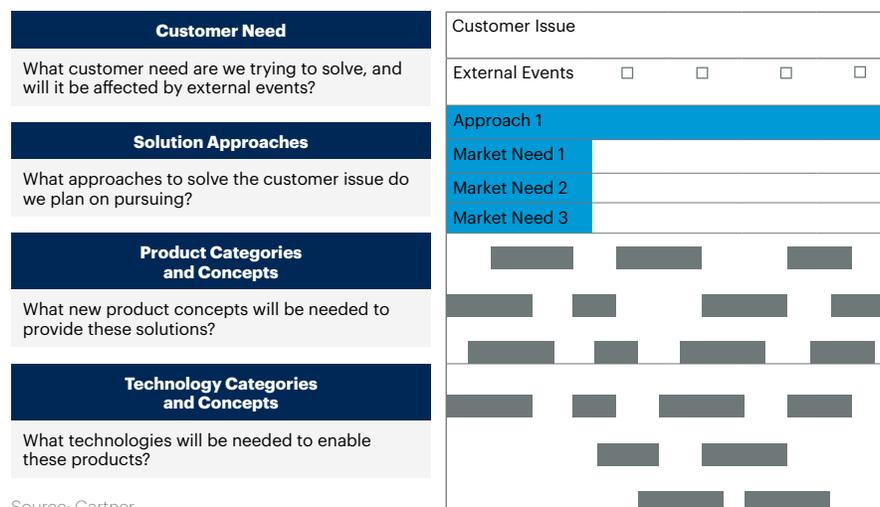
Companies typically use product needs (i.e., features, attributes and specifications) outlined in product roadmaps as a starting point to diagnose capability gaps and emerging technology needs. In the absence of a detailed product strategy, R&D should work with business partners to understand their assumptions about future customer needs and help them articulate the critical product attributes required to fulfill these needs. Roadmapping teams can also identify future customer needs by analyzing market and industry trends impacting the business in the roadmap time horizon.

Market-pull roadmaps tend to have shorter time horizons, three to five years on average, and are most often scoped to support a specific business or product category. Given their product orientation, market-pull roadmaps require R&D teams to closely collaborate with their marketing and business stakeholders during the scoping and analysis phases.

While market-pull roadmaps are effective for clarifying specific technologies needed to support product plans, they do have a few drawbacks. For example, they often become quite tactical and struggle to push the organization to think beyond near-term, well-defined product needs. If the company needs to generate a fresh new vision for the technology organization, market-pull roadmaps may not be the appropriate model to select. In addition, it is difficult to identify cross-BU or cross-product opportunities since the analysis tends to be reflected in separate siloed roadmaps.



Figure 4. Market-Pull Technology Roadmaps



Source: Gartner

Technology-Push Roadmaps

Technology-push roadmaps depict product and market growth opportunities driven by differentiated technologies. These tend to be longer term, often including analysis that recommends investments over the next five to 10 years.

There are two styles of technology-push analysis — these are not mutually exclusive, and many companies reflect both types of analyses in the same roadmap:

1. Differentiating internal capabilities:

This approach involves prioritizing the most valuable, most differentiated existing internal technologies and brainstorming a future-technology-led development pathway. Roadmapping teams can use the following guiding questions to identify technology focus areas:

- What technical discoveries have we made that provide substantial differentiation versus competitors?
- What privileged insight do we have into customer needs and behavior that is unavailable to our competitors?
- What unique applications of technologies to problems have we identified that competitors have yet to recognize?

2. Integrating emerging technology opportunities:

This approach involves tracking new technologies or those used in adjacent spaces and brainstorming how they can improve existing offerings or deliver new product/features. New technologies can be sourced directly from technology scans or the organization's recent technology scouting.

In both approaches, roadmapping teams should prioritize technology competencies to be developed based on their ability to create competitive advantage and future differentiation.

Technology-push roadmaps are most useful for pushing organizations to think beyond their near-term product strategy and to help identify capability gaps that need to be filled via acquisition, partnerships, recruiting or talent development. However, true technology-push roadmaps are often disconnected from core product strategy, which can make it difficult to get business stakeholder buy-in to pursue riskier or new types of technology investments. As a result, the recommended investments in these roadmaps tend to have a lower commercialization rate than market-pull roadmaps.



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Hybrid Roadmaps

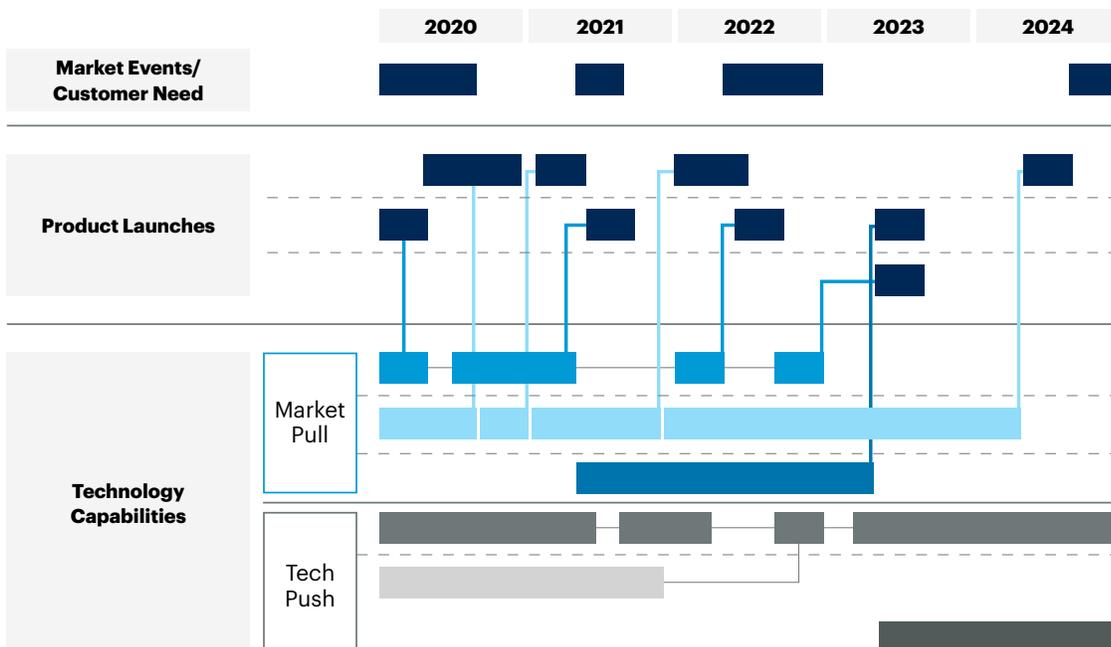
Hybrid roadmaps are a bridge between the market-pull and technology-push models. These depict technology competencies required for product launches and a prioritized set of technologies with a potential to create a long-term competitive advantage.

In practice, most companies first conduct the near-term market analysis that identifies the technologies needed to support product strategy. They then identify additional growth opportunities from either differentiated internal technology platforms or emerging technologies. These growth opportunities often span multiple BUs or product lines. This allows R&D leaders to create a roadmap that encourages long-term planning and enterprisewide capability development (see Figure 5).

Hybrid roadmaps are particularly well-suited for planning the organization’s reaction to emerging market and technology developments or charting R&D’s support for a business transformation. Given the volume of analysis that could be included in these roadmaps, some organizations struggle to build elegant one-page visuals. In those cases, a hybrid roadmap might take the form of a multipage story that walks stakeholders through the various components of analysis and related recommendations.

At the start of a roadmapping exercise, most companies report that they plan to build a hybrid roadmap. However, in practice, many companies deprioritize the technology-push analysis to accelerate completion of the roadmap or, due to a lack of interest from business stakeholders, end up building a market-pull roadmap. To avoid this pitfall, R&D leaders should build a realistic project plan for the roadmapping team with specific time allocated for conducting technology-push analysis and/or front-load this work to avoid the speed trade-off toward the end of roadmapping.

Figure 5. Hybrid Technology Roadmap



Source: Gartner

Conclusion

Technology roadmaps help R&D leaders communicate how technology projects support business strategy, make resourcing decisions and identify enterprisewide investment opportunities. However, many companies try to visualize all the information in a single document, hindering their ability to communicate roadmap applicability and depth of analysis. Instead, companies should leverage the roadmapping exercise to target multiple use cases and create multiple visuals of different altitudes for various audiences. In addition, to get buy-in from business partners, R&D leaders should outline the link between technology priorities and business goals and summarize key findings in business-relevant language.

Recommended by the Authors

[3 Foundational Technology Roadmapping Decisions](#)

This report outlines the three critical decisions R&D leaders must make before technology roadmapping to produce higher-value analysis.

This research is available to Gartner clients only.

Endnotes

¹ [Technology Roadmapping Benchmarks, Gartner, 2017](#)

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