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Gartner for Research & Development Leaders

Build R&D Tech Roadmaps That Drive Stakeholder Engagement

Technology roadmaps are often too dense with detail or too technical, making it hard for stakeholders to consume the relevant information. This research offers guidance and sample visuals to enable R&D leaders to create compelling roadmaps and succinctly communicate the technology strategy.

Overview

Key findings

- Sixty-two percent of surveyed R&D leaders use technology roadmaps to manage technologies in the organization's portfolio, but only 27% always reference the technology roadmaps when planning.
- Given the amount of information and analysis available, roadmapping teams struggle to design and present roadmaps in a way that helps stakeholders consume the relevant information for decision making.
- Technology roadmaps are often too dense with detail or too technical, which can make them less usable or relevant for nontechnical audiences or executive decisions.

Recommendations

- Define the technology roadmap's goal, scope and time horizon before building an actual roadmap. This will help identify the altitude of the roadmap, whether you need to build strategic capability investment plans or a detailed development plan.
- Build audience-specific roadmap views by evaluating the information needs of stakeholders and get their buy-in on which type of roadmap will be most useful for them. Align R&D and business terminologies in the roadmap(s) to ensure that business stakeholders can easily consume the information relevant to them.
- Brainstorm the roadmap's visual framework upfront before considering a roadmapping software tool. This helps understand which key inputs or features your organization may need from an off-the-shelf solution, if applicable.
- Update the roadmap regularly, at least once a year, looking out for any internal or external events, such as strategy redirection or market shifts, that can invalidate previous roadmap analysis and trigger off-cycle reviews.

Building Compelling Technology Roadmap Visuals

Gartner's State of the R&D Function Survey[1] indicates that around 62% of R&D leaders use technology roadmaps to manage technologies in the organization's portfolio. However, 41% infrequently reference technology roadmaps when planning. Our research shows that, while teams excel at identifying capability gaps and technology competencies, translating technology strategy into a roadmap is a challenging exercise.

Roadmaps, when appropriately designed, can be invaluable tools for building consensus and stakeholder support for charting technology development goals, capabilities and milestones.

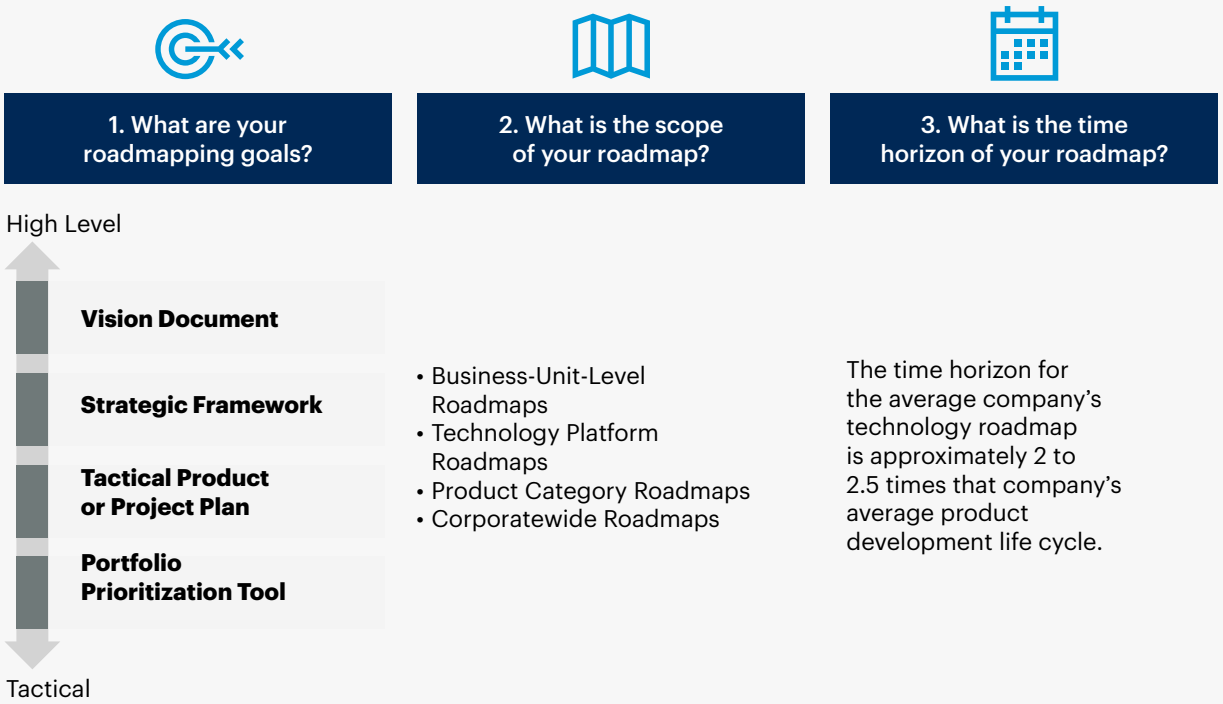
This research will help R&D leaders:

- Define the roadmap's goal, scope and time horizon to identify the roadmap's relevant technology roadmap model.
- Build audience-specific roadmap views by exploring examples of roadmap visuals and sample use cases organized by the three roadmap models (market pull, hybrid and technology push).
- Brainstorm the technology roadmap's visual framework upfront by understanding important components that must be incorporated when building effective tech roadmaps.
- Update roadmaps at a regular cadence.

1. Define the Roadmap's Goal, Scope and Time Horizon

Before you begin the roadmapping exercise, consult with cross-functional stakeholders to prioritize top roadmapping needs (see Figure 4) and select an appropriate roadmap model (market pull, hybrid or technology push). Identifying the roadmap's goal, scope and time horizon will help guide the altitude of the roadmap. For instance, R&D teams can create either a strategic roadmap (presenting a high-level plan for capability investments) or a tactical technology roadmap (showcasing a detailed capability development plan linked to product launches or project portfolios).

Figure 1: Three Foundational Technology Roadmapping Decisions



Source: Gartner

Next, decide which technology roadmapping model will best meet roadmapping objectives. There are three common roadmap models that R&D organizations tend to use (see Table 1). For more details on each model, refer to An R&D Leader's Guide to Technology Roadmap Models.

Table 1: Three Models of Technology Roadmaps

↓	**Market Pull**	**Hybrid**	**Technology Push**
What are your roadmapping goals?	How can technology support business goals?	How can technology support product roadmaps and create new growth opportunities?	How can technology create new market opportunities?
What is the scope of your roadmap?	Product categories, business units (BUs) or regions	Technology platforms and product lines	Technology platforms or areas
What is your roadmap's time horizon?	Three to five years	More than five years	More than five years
Key Inputs:	• Product roadmap, plan and startegy • Business and consumer trends • Prioritized list of customer needs and product attributes	• Product launches • Prioritized set of technologies with a potential to create a long-term competitive advantage	• Technology trends and competencies • Growth opportunities from differentiated technical competencies
Use Cases	• Plan technology investments to support product roadmaps or launch plans • Respond to market shifts • Optimize capability allocation for portfolio management • Support decentralized R&D planning	• Articulate R&D support for nearterm product needs and long-term technology opportunities • Emphasize centralized technolog investments with enterprisewide impact • Encourage longer-term planning and vision setting	• Create a long-term vision for R&D • Identify organizationwide platform or capability development • Prioritize competencies for strategic advantage or future differentiation • Outline a partnership or acquisition strategy for emerging technologie

Source: Gartner

2. Build Audience-Specific Roadmap Views

Given the sheer amount of information available, technology roadmaps often become convoluted and dense with technical details, which can make them less usable or relevant for nontechnical audiences or executive decisions. To solve this:

- Identify your key stakeholders and their information needs, and consider how the roadmap can help facilitate decision making on key discussion topics. For instance, the granularity of information included in the roadmap will depend on whether it's an executive board meeting (where a high-level overview helps validate strategic alignment) or a business planning meeting (where more details help support investment decisions).
- Clarify what elements on the roadmap (such as technology capabilities, product attributes or product features) mean to ensure building a common understanding of roadmap analysis. Wherever possible, align R&D and business terminologies in the roadmap(s) to highlight how key technologies relate to business needs.
- Evaluate if there is a need to build individual roadmaps for each product category, technology platform or BU, and capture elements of the roadmap analysis through multipage or multiple visuals, if needed. When starting the roadmapping exercise, pilot only one product category, technology platform or business segment that you are most comfortable with, and then replicate the visualization format after incorporating stakeholder feedback.

Discuss the initial draft with stakeholders you'll be building the roadmap with/for. Use Table 2 to explore common technology roadmapping elements you can include in your roadmap. Organizations building hybrid roadmaps typically select business-related, product-related and technology-related elements while organizations working on technology-push roadmaps focus on technology-related and implementation-related details. Gartner recommends including at least one element from each category in your roadmap to ensure communicating all relevant information to stakeholders.

Table 2: Common Technology Roadmapping Elements

Category	Common Elem
Business Related	• External trends (societal, technological, economical, environmental or political) • Customer or market needs • Risk category (such as customer risk, competitive risk, digital risk and regulatory risk) • Business or market segments • Scenarios
Product Related	• Product launches • Product categories • Product features
Technology Related	• Technology platforms (such as system, software, devices and networks) • Emerging technology categories (such as AI and cloud) • Technology portfolio segments • Business or technology objectives • Technology capabilities (such as "must have" versus "good to have" capabilities)
Implementation Related	• Time (by year/month/quarter or generation) • Impact (such as transformative, significant or moderate) • Status (such as developing, monitoring, in incubation, long-term strategic vision or proof of concept (POC)/prototype) • Development plan (such as build/buy/ally) • Sponsoring BU • Technical competencies

Source: Gartner

The following section presents examples of roadmap visuals and sample use cases organized by the three roadmap models (market pull, hybrid and technology push). ou can adapt these visual frameworks based on your organization's needs.

The level of detail included in the roadmap depends on whether these are strategic or tactical. Strategic roadmaps depict a high-level plan for capability investments, while tactical roadmaps present a detailed capability development plan linked to product launches or technology projects.

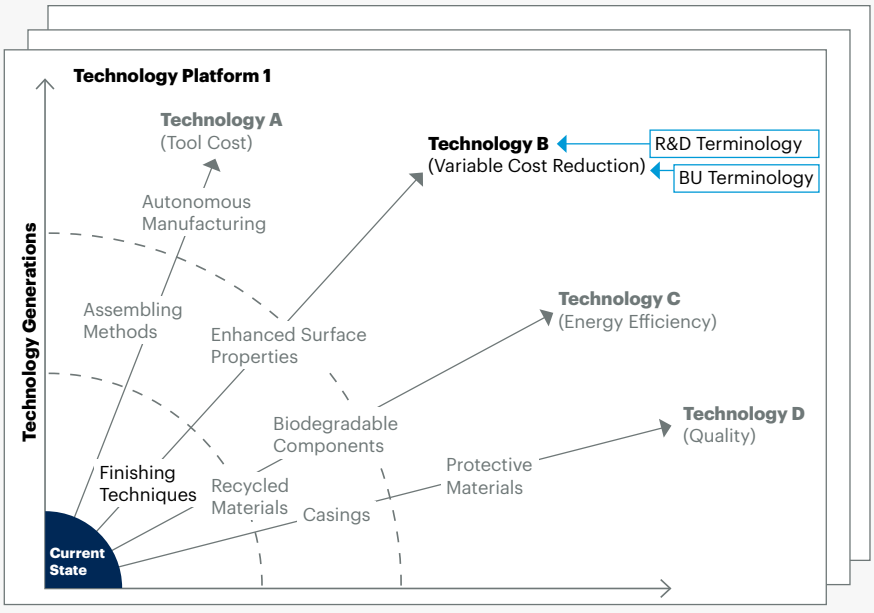
Strategic Market-Pull Roadmap

Sample Use Case

Company Z built a polar chart for each technology platform to show how technologies relate to key business needs. For more information, see Figure 5 and Goal Validation Roadmaps (Company Z). Each vector shows the sequence of technology development within a platform and points to a goal listed in business and technology terms to facilitate ease of communication:

- **Roadmapping Goals:** Vision document
- **Roadmap Audience:** Executive committee, innovation council, board meetings, business teams, product managers
- **Decisions to Support:** Helps validate understanding of business needs and communicate the project's business relevance. Pair it with detailed hybrid roadmaps to support project-level decision making

Figure 2: Strategic Market-Pull Roadmap: Company Z's Polar Chart



Source: Gartner

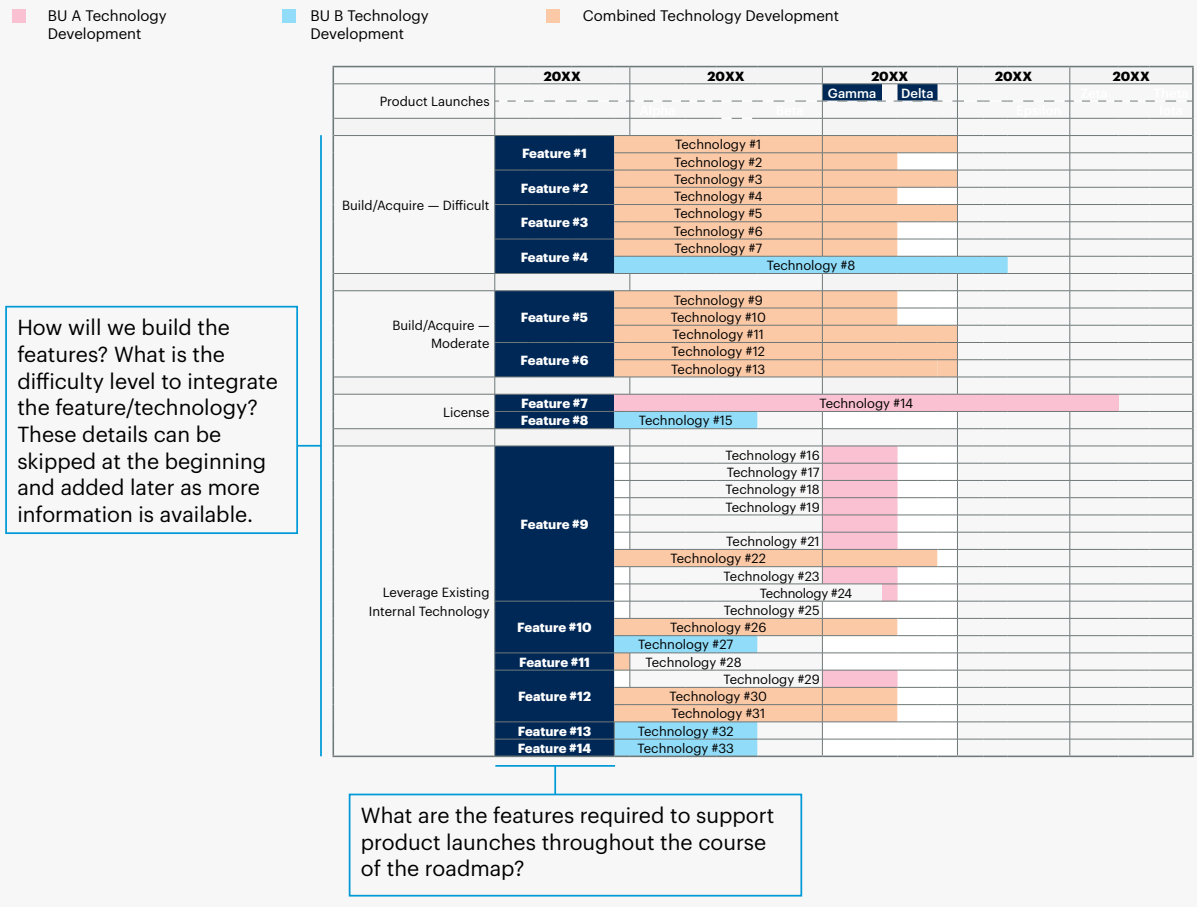
Tactical Market-Pull Roadmap

Sample Use Case

Company B recently refined its product roadmaps and was looking to create a detailed plan communicating the R&D investments needed in the near term. Company B chose to pursue a tactical market-pull roadmapping model organized by product launches (see Figure 3):

- **Roadmapping Goals:** Tactical product plan
- **Roadmap Audience:** Business leadership, project teamss
- **Decisions to Support:** Provides information to support resource allocation and development plan (build/buy/ally) decisions, and helps communicate information about upcoming projects to teams.

Figure 3: Tactical Market-Pull Roadmap: Product Launches



Source: Gartner

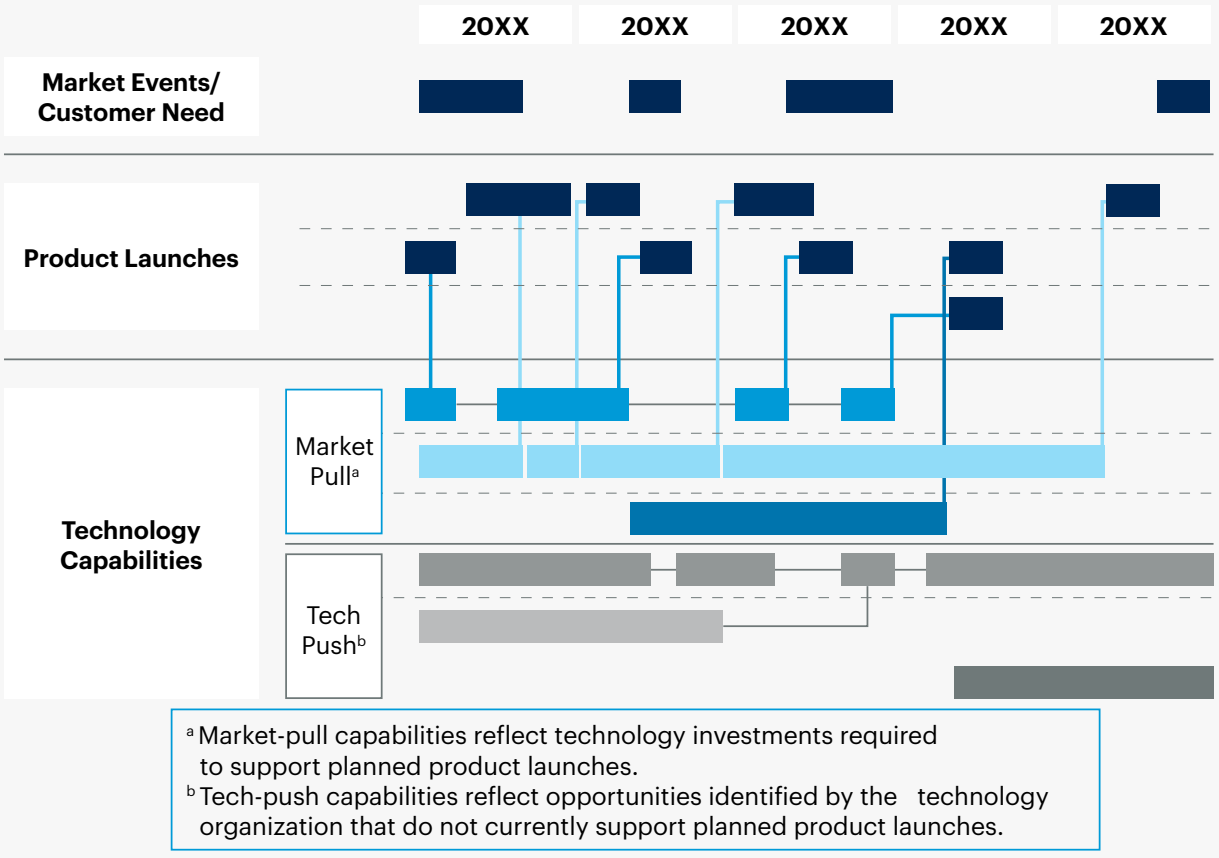
Strategic Hybrid Roadmap

Sample Use Case

Company X wanted to build a roadmap that would help brainstorm the technology developments required to meet emerging market needs. Company X chose to build a strategic hybrid roadmap (see Figure 4) and communicate the various components and related recommendations from the roadmap analysis:

- **Roadmapping Goals:** Strategic framework
- **Roadmap Audience:** Functional leaders, business partners, C-suite executives, project teams
- **Decisions to Support:** Helps inform technology strategy planning and communicate high-level project plans. Customize this template based on the level of detail you want to include in your technology roadmap. To keep the visual succinct and easy to consume, consider limiting the amount of detail included in the roadmap. Instead, add supplemental information to accompany the visual.

Figure 4: Strategic Hybrid Roadmap: Generic Template



Source: Gartner

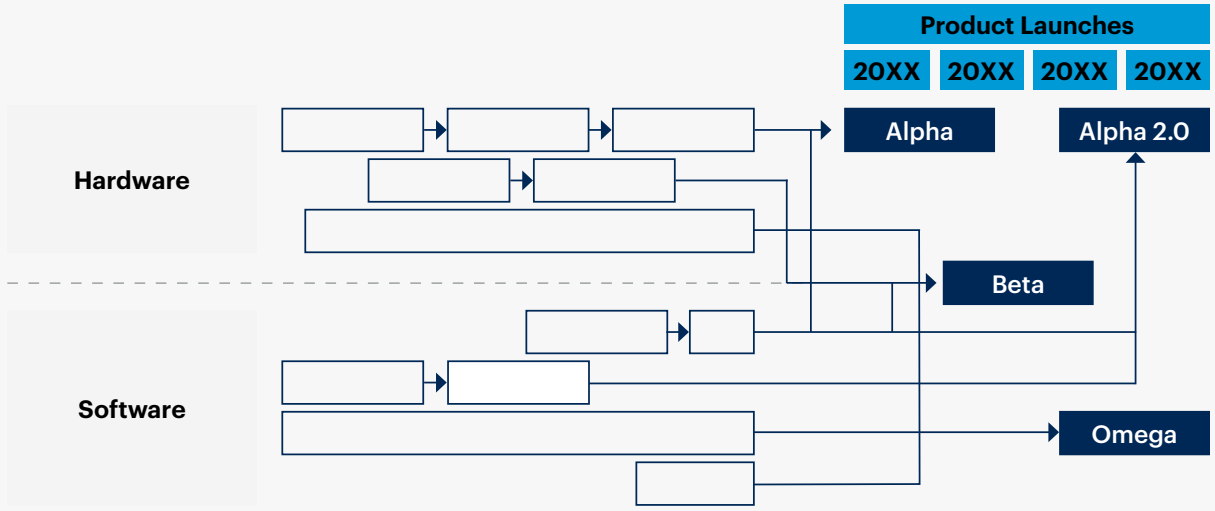
Tactical Hybrid Roadmap

Sample Use Case

Company A needed an integrated strategy for embedding Internet of Things (IoT) functionality across all of its products. Company A chose to pursue a tactical hybrid model that allowed it to link hardware and software technology developments, building toward planned product launches (see Figure 5):

- **Roadmapping Goals:** Tactical product plan
- **Roadmap Audience:** Functional and business leadership, project teams
- **Decisions to Support:** Identify the support needed from other functions for technology development, outline project complexity, and showcase in-depth capability analysis

Figure 5: Tactical Hybrid Roadmap: Hardware and Software Technologies



Source: Gartner

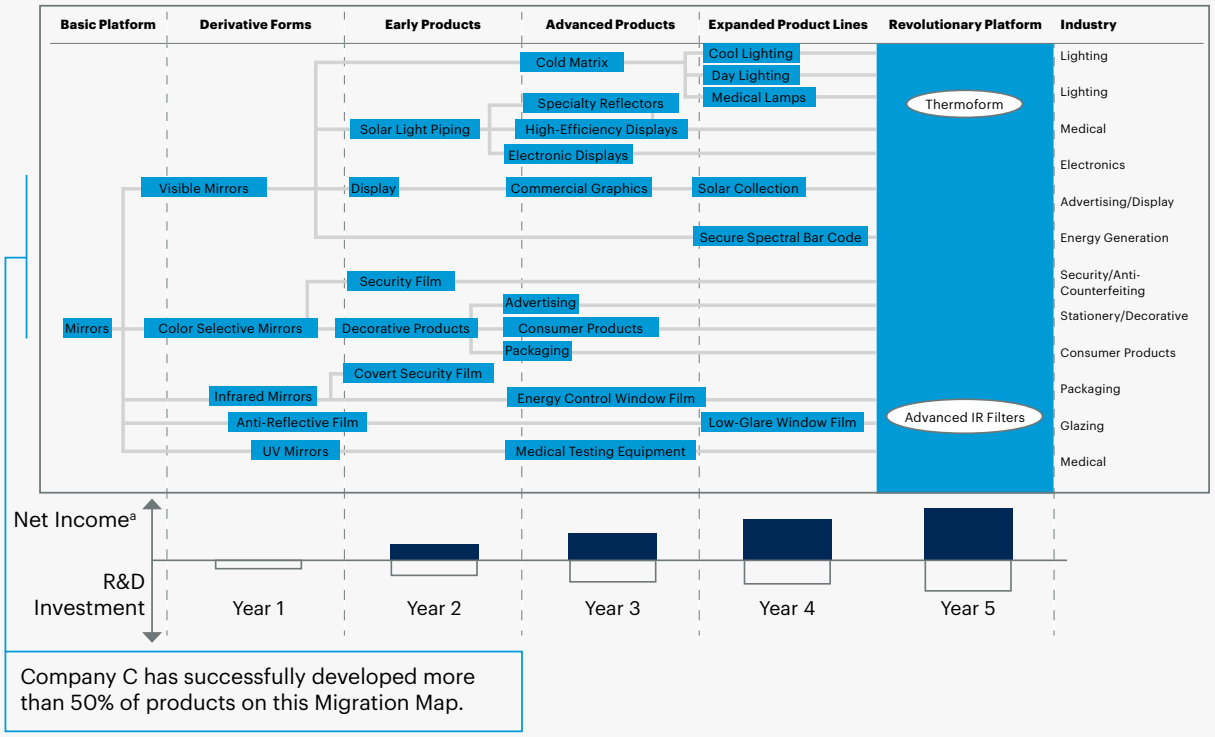
Strategic Technology-Push Roadmap

Sample Use Case

In another scenario, Company C wanted to explore the long-term potential of one emerging, potentially disruptive technology. R&D leaders at Company C used the strategic technology-push roadmapping [2] approach to hypothesize technical advances from the original technology platform (see Figure 6):

- **Roadmapping Goals:** Vision document
- **Roadmap Audience:** Innovation council, business leadership, project teams
- **Decisions to Support:**Helps make investment decisions and brainstorm how existing technologies can lead to new product opportunities

Figure 6: Strategic Technology-Push Roadmap: Company C's Product Migration Maps



[a] Net income without accounting for ongoing R&D investment
Source: Gartner

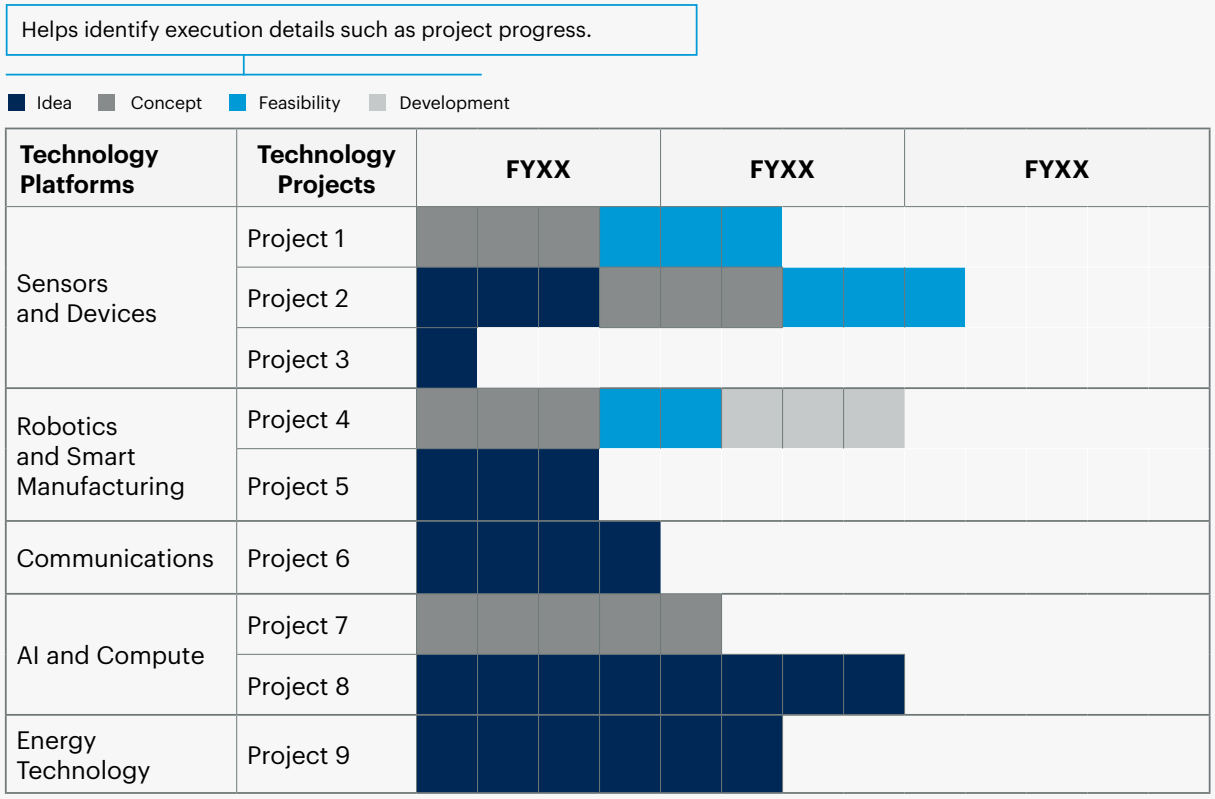
Tactical Technology-Push Roadmap

Sample Use Case

Company Y's R&D function wanted to share information about the projects in the R&D pipeline with leadership. The team chose to build a tactical technology-push roadmap, organized by technology platforms, that presents project progress and estimated timelines (see Figure 7):

- **Roadmapping Goals:** Tactical product plan
- **Roadmap Audience:** CTO, R&D or technical leaders
- **Decisions to Support:** Helps make resource allocation decisions, and communicate planned and in-progress technology projects, as well as project status

Figure 7: Tactical Technology-Push Roadmap: Technology Platforms and Associated Projects



Source: Gartner

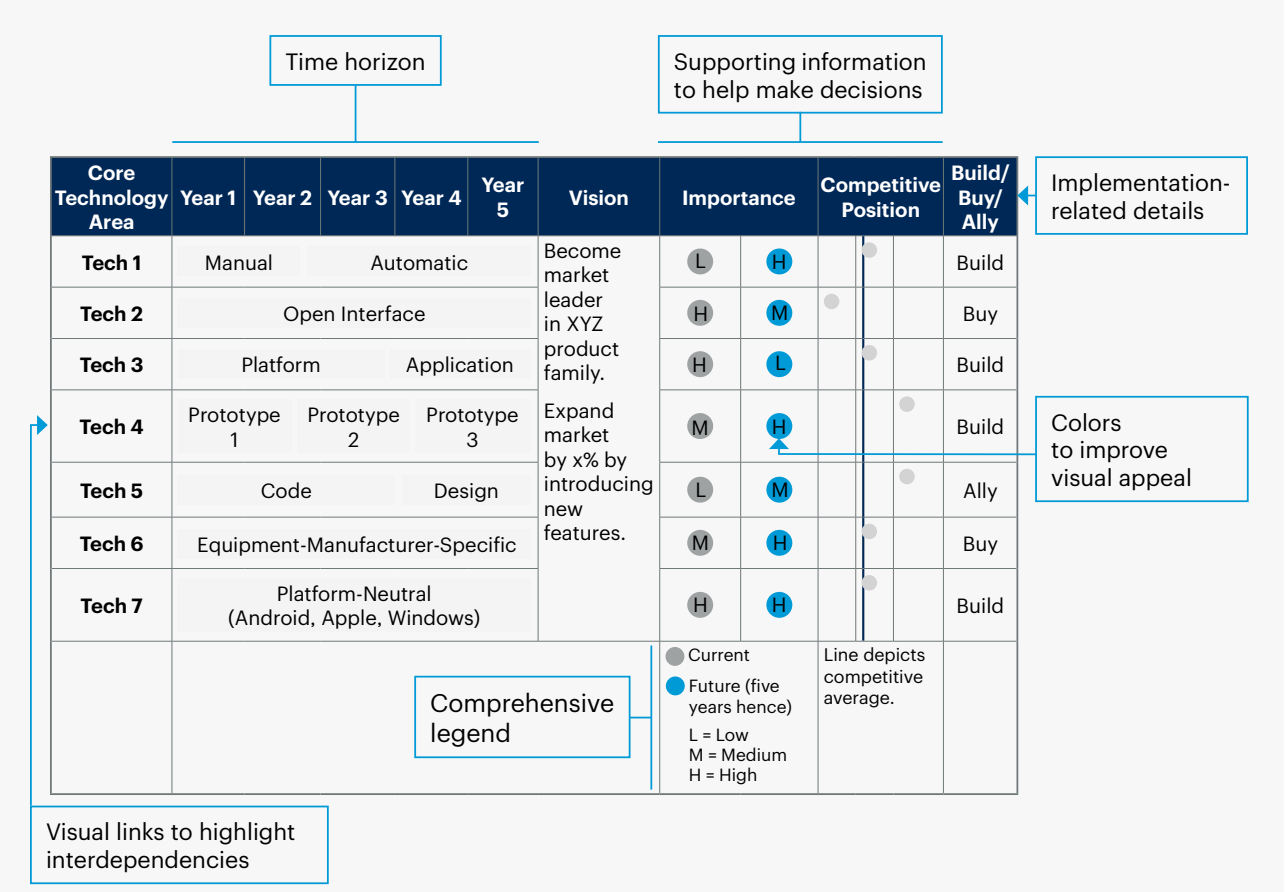
3. Brainstorm the Technology Roadmap's Visual Framework Upfront

Think through the story that you want to convey through your technology roadmap, and roughly design the roadmap's framework before you begin your analysis. Doing so will help you:

- Understand the inputs required to build the roadmap
- Select the relevant technology roadmapping vendor based on the features you need to present and filter roadmap analysis

Use the guidance in Figure 8 to understand important components that must be incorporated when building effective and comprehensive technology roadmap visuals.

Figure 8: Technology Roadmap Visual Guidance



Source: Adapted From T.A. Kappel (Northwestern University), "The Social Context of Industrial Creativity: R&D Planning Using Roadmaps," Kellogg Journal of Organization Behavior, 1998.

4. Update Your Roadmap at a Regular Cadence

Revisit and refresh your roadmap at least once every 12 months. Also look out for possible triggers that can impact the validity or relevance of the organization's technology roadmap and trigger off-cycle or ad hoc roadmap updates. Such triggers can be:

- Internal (such as reorganization of product categories or business segments); or
- External (such as evolving or new opportunities, market shifts or technological advances)

Analysis

Evidence

[1] **Gartner State of the R&D Function Survey.** This study was conducted to provide benchmarking data and analysis to R&D leaders' most pressing questions. The research was conducted online from April through May 2021 among 203 respondents from North America (Canada, the U.S.), Western Europe (France, Germany, the U.K.) and Asia/Pacific (China, India, Australia, New Zealand). Organizations sampled were from the following industries: financial services, information technology, telecommunications, manufacturing (healthcare and nonhealthcare), transportation, utilities, education providers (university, research laboratories), government (national or international, defense or intelligence), and nonprofit (federally funded research and development centers). With the exception of government and nonprofit industries, organizations were required to have annual enterprisewide revenue of $500 million or more in 2020 to qualify for the survey. Respondents were required to hold a manager- or senior-manager-level role or higher in the following departments: research and development, product development, or engineering/product design.

Disclaimer: Results of this study do not represent global findings or the market as a whole, but reflect the sentiment of the respondents and companies surveyed.

[2] Company C's Product Migration Planning

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