

The Process

How to use roadmapping for global platform products

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Creating global platforms for product development can be complex. One way managers deal with this is through Product-Technology Roadmapping. Richard Albright explains this technique: What a global roadmap looks like, how it comes together, and how it can be used in the global decision-making and portfolio management process.

The successful development of a global platform product requires that a product team manage the complexities of producing a series of products at the right costs, with the right features, and using the most appropriate technologies. Product-technology roadmapping leads a team to create a plan that integrates market and customer needs, product evolution, and introduction of new technologies at the beginning of their development journey. The roadmap makes sure that gaps in the plan are identified and can be closed as needed in the future. It also serves as a guide for the team during their journey, allowing them to recognize and act on events that require a change of direction.

In its simplest form, a product-technology roadmap lays out the evolution and timing of platform products to serve multiple, changing market segment needs. Exhibit 1 on this page shows one type of roadmap. For products intended for global deployment, a roadmap also incorporates plans for localization of features to meet regional customer needs or national requirements. And for platforms that combine several products or subsystems to create an offer or solution, roadmaps help

keep the offer's subsystems aligned and on track to meet customer needs with the most appropriate technology.

Roadmaps are about the future

A roadmap describes a future environment, objectives to be achieved within that environment, and plans for how those objectives will be achieved over time. Roadmaps with these basic characteristics are used for planning and forecasting in several applications. Science and technology roadmaps plot the future development of a scientific or technical field, and industry/government-sponsored roadmaps aim to describe the future of an industry or sector, along with actions to move the industry or sector forward. For example, the *International Technology Roadmap for Semiconductors* [1] sets aggressive goals for the industry and its suppliers, defining the framework within which all participants contribute and compete. Finally, corporations use roadmaps for product, platform, and technology planning, as well as for functional planning in areas such as manufacturing or information technology. An overview and classification of roadmapping applications can be found in Kostoff and Schaller [2].



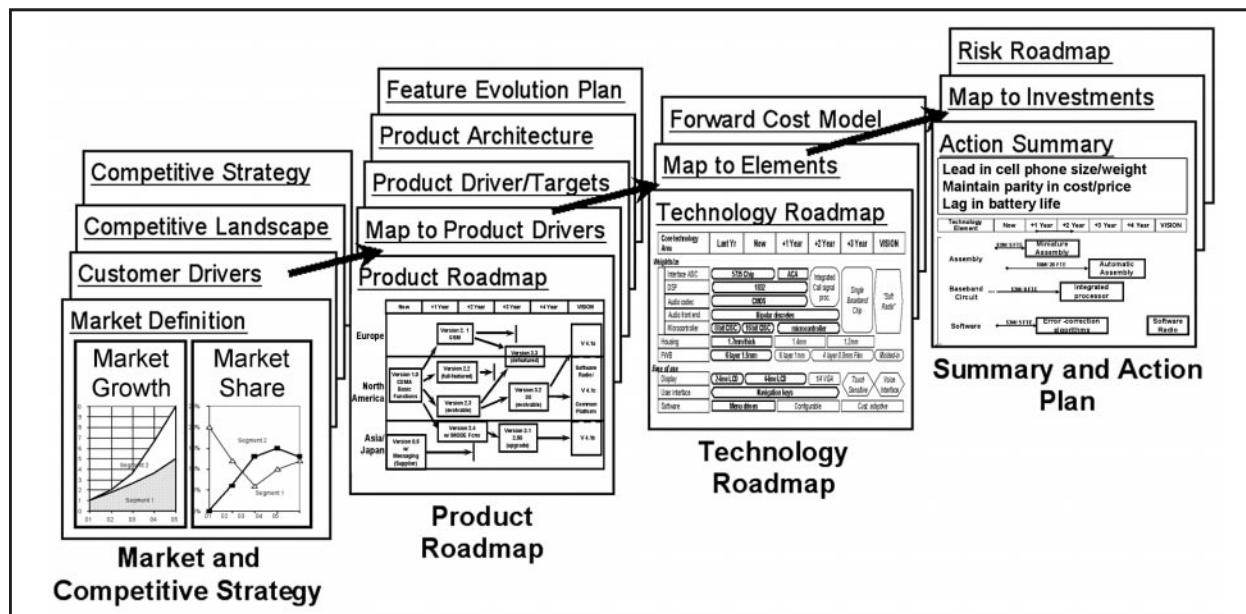
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New applications

As corporations find their markets increasingly globalizing, roadmaps are finding new applications in planning development of global platform products that have common architecture and technology underpinnings, but at the same time are differentiated to satisfy regional, cultural, and regulatory market drivers. Roadmaps help manage the complexities of coordinating features and technologies while maintaining the benefits of designing platform-based products.

The most important application of roadmapping within a corporation integrates product and technology planning to create a Product-Technology Roadmap. The roadmapping process calls for a cross-functional team that includes the many functions that contribute to the success of a product line

Exhibit 1: The four sections of a Product-Technology Roadmap



or business: central and regional marketing, product management, research and development, manufacturing, services, etc. The roadmapping team lays out a possible future (or multiple futures), sets objectives, and defines a plan that will achieve the objectives, making sure the needed capabilities and technologies will be ready at the right times. Objectives are usually set in terms of market share and profitability goals, and plans include the evolution of products to meet customer needs and technologies that enable the product features and cost targets. Roadmaps may be developed from a market-pull perspective, driven by customer needs, or from a technology-push perspective, driven by new capabilities in performance. Roadmaps take on a wide range of formats. Motorola's early roadmapping process is documented by Williard and

drivers, the prioritized customer needs, and anticipated characteristics of the platform.

Exhibit 1 shows typical contents for the four sections of a platform roadmap. A common, useful format presents a roadmap as linked pages or slides. A template is helpful as a guide and helps maintain a common look and feel throughout an organization. The core displays of a roadmap enable reviewers and decision makers to quickly find and use critical pieces of information during the decision-making process. In practice, a standard template is often augmented with unique information that explains and deepens reviewers' understanding of the particular situation, objectives, or plans.

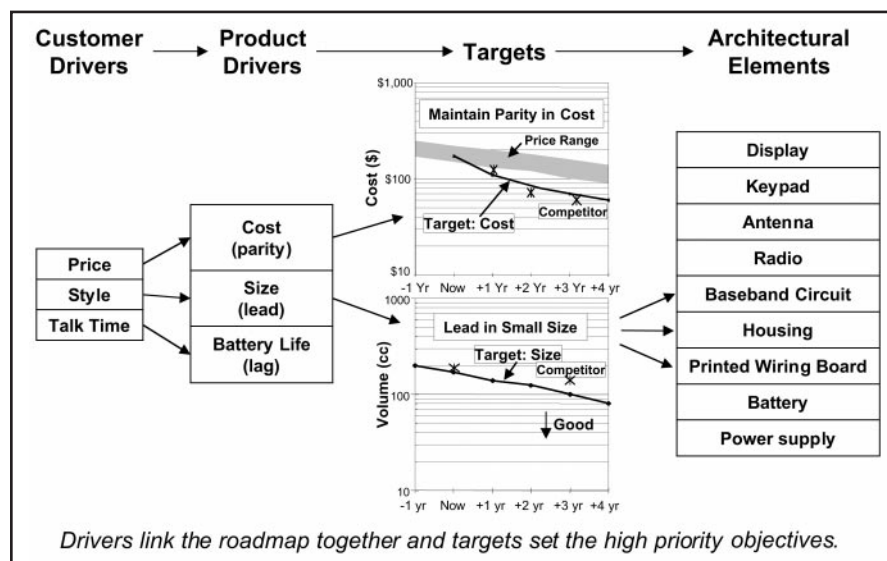
Market definition

The Market and Competitive Strategy section of a roadmap lays out market definition

egy by describing the strengths and weaknesses of competitors, their market share positions and forecasts, core competencies, value propositions, and alliances. Finally, the market and competitive section outlines the competitive strategy and objectives chosen by the roadmapping team, identifying targeted segments, key competitive advantages and weaknesses, and strategies for competing based on feature differentiation, low cost positioning, or other factors. The discipline of the roadmapping process leads the team to make explicit choices among alternatives. In the hypothetical cell phone example, the team may choose to compete as a price/cost leader, or to lead in features such as style or longest talk time.

Key outputs of the market and competitive section of the roadmap are a prioritized list of customer drivers and choices for strategic positioning in the market. Exhibit 2 on this page illustrates the critical role of linkage in a roadmap, showing the mapping of customer drivers to product drivers, quantitative targets over time for the key product drivers, and the mapping of product drivers to the architectural elements of the product. Making the specific mapping helps a team identify why each feature is included in the product, the relative importance of each performance measure, and whether their design is addressing the key customer needs. Key customer drivers – price, style, and talk time for a cell phone – are linked to product drivers, creating a prioritized list of key product characteristics for which the team can choose to lead, lag, or maintain parity with competitors. In the cell phone example, the customer need for low price drives lower product cost, the need for style drives small size and low weight, and the need for longer talk time drives longer battery life. A team might decide to lead competitors with smaller size and lower weight, to maintain parity with competitors on cost and price, and to lag competitors in talk time. Specific, quantitative targets are then set for these characteristics over time, showing how they compare to forecasted positions of competitors. Exhibit 2 shows the targets for cost over the time horizon of the plan, placing the targets in the context of expected price ranges and cost points of competitors' products. Exhibit 2 also shows the team's size targets for the cell phone. The team believes that they can lead the market in size by producing a cell phone of about one hundred cubic centimeters, about thirty percent smaller than the leading competitor. The teams' targeting decisions are interdependent; the additional cost of using smaller components

Exhibit 2: Drivers, Targets, and Architecture



McClees [3], and the Roadmapping Task Force of MATI (Management of Accelerated Technology Innovation) — an industry/university consortium dedicated to the identification, review, refinement, and integration of technology management tools for practical business application — has compared several roadmapping best practices [4].

Product line platform roadmaps

Most product lines are based on an underlying platform, and address multiple market segments with models, versions, or releases targeted to the needs of those segments as they evolve over time. As shown in Exhibit 1, a platform Product-Technology Roadmap covers four topics: a market and competitive strategy, a product roadmap, a technology roadmap, and an action plan. The topic sections of the roadmap are linked by

and segmentation, competitive landscape, and a competitive strategy for the product line or platform. As an illustration, consider an example of a wireless handset or cell phone. (This example is hypothetical, not based on any manufacturer's actual product). The market for cell phones may include user segments such as: "Trendsetters," who value style, price, and talk time; "Mobile Professionals," who value talk time and price; and "Mobile consumers," who value price and talk time. These needs define each key set of customer and market drivers, with priorities determined by market size and growth of the segments. The priorities may vary by region; a global platform roadmap captures the differences and coordinates adaptations to the needs in each segment.

Documenting the competitive landscape leads a team to define a differentiating strat-

and advanced packaging methods to achieve leadership in size and weight means that the best the team can achieve is cost parity with competitors. Also, smaller size means a smaller battery, reducing its storage capacity to the point where the cell phone will lag competitors' talk time. The roadmapping process steers the team to make explicit trade-offs and choices among the drivers in determining how the team will meet their objectives.

Considering product architecture

Product architecture plays a key role in roadmapping. Most platform product markets have a dominant architecture that frames competition in features and cost. The architectural elements become the framework for the technology roadmap and determine where the team should focus development efforts or technology acquisition to achieve the targets. Exhibit 2 lists the basic architectural elements of a cell phone: display, keypad, antenna, radio circuitry, baseband circuitry, housing, printed wiring boards, battery, and power supply. The Exhibit traces the customer driver for style through the product driver for size to the technology elements that have the greatest impact on size: the baseband circuit, housing, and printed wiring board. By reducing the number of separate components, the team sees a way to reduce size. Likewise reducing the thickness of the printed wiring board and the housing will also contribute to reducing size and weight.

A new architecture sometimes appears with the potential to disrupt the market by radically lowering costs or enabling a new, desirable feature. Technology trends, experience curves, and marketing studies provide forecasts of the relative performance of competing architectures, helping the team decide which technology or architecture will win or dominate the market. In the cell phone market, for example, new architectures that integrate the features of personal digital assistants and cell phones could reduce the total cost of ownership for the user. On the other hand, the combination could make the device so complicated that users would reject it. The product team would weigh the product costs, the complications or simplifications of the user interface, and costs to the user of switching to a new architecture to decide if a new architecture would be likely to win in the marketplace.

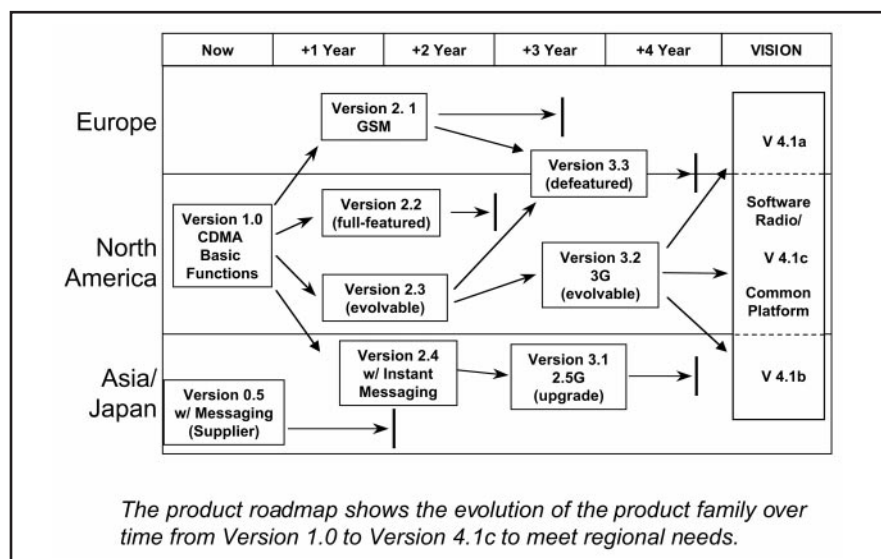
Evolution over time

The bottom line of the product roadmap is a platform or product line evolution, indicating the timing and evolution of the platform in several versions over time, with mod-

els or releases targeted to specific market segments or incorporating major new capabilities. An example of a global product line/platform roadmap is shown in Exhibit 3 on this page. In this example, the platform roadmap begins with a single model (Version 1.0) designed for the North American market, while the needs of the Asian market are met with a model sourced from a supplier. The plan indicates that Version 2.0 of the platform will support four models that meet differing regional standards (e.g., European vs. North American) and customer needs (e.g., for instant messaging, popular in Japan). Versions of the platform evolve over time, and the product roadmap shows the genealogy of product releases. For setting long-term direction, a helpful addition to a roadmap is a vision describing the ultimate destination of the roadmap. The ex-

oped in-house, sourced from a supplier, etc.) and indicates whether the technology development is staffed, planned, or unplanned (indicating a potential gap). The elements of the roadmap are grouped by the product drivers that they most strongly impact. For example the baseband circuit, printed wiring board, and housing are grouped as the key contributors to reducing size and weight. The baseband circuit is further broken down to its sub-elements, and the roadmap shows the increasing integration of components over time. The roadmap also shows the evolution to thinner printed wiring boards and housing as a way to reduce size and weight. To keep long-term goals in mind, it is often helpful to include a technology vision in the roadmap. The vision for the hypothetical cell phone in Exhibit 4 includes a single integrated

Exhibit 3: Global Product and Regionalization Roadmap



ample envisions a single platform that can be programmed to adapt to varying operating standards and feature needs.

The Technology Roadmap shows the technology evolution of each architectural element of the product over time. A portion of the technology roadmap for our hypothetical cell phone example is shown in Exhibit 4 on page 22. New technologies are introduced to achieve the targets set by the team. Each element (or sub-element) is represented by a horizontal line in the roadmap, and technologies used in the element are indicated by bars covering the time each is in use. The technology roadmap indicates importance and competitive position over time for each element, helping to set priorities for development. The technology roadmap also captures information about the source of the technology (devel-

circuit processor with a "software defined radio," and a printed wiring board molded into the housing.

Cost reduction model

A forward cost model is often included as a companion to the technology roadmap, since cost reduction over time is almost always a key product driver. The overall industry trajectory and specific competitive position determine a future cost target for the product. An industry experience curve is an especially powerful tool for setting a cost target; it is usually based on average prices versus cumulative industry production over time. The experience curve can be projected forward, on the basis of the expected market volume, to determine a cost/price target. The cost reduction objective is then distributed to the elements of

the product, helping to focus planning on the technology elements that have the greatest impact on achieving the target. In the example, the cost target may be achieved by consolidating functions into fewer integrated circuits over time, with the ultimate vision of a single-chip cell phone.

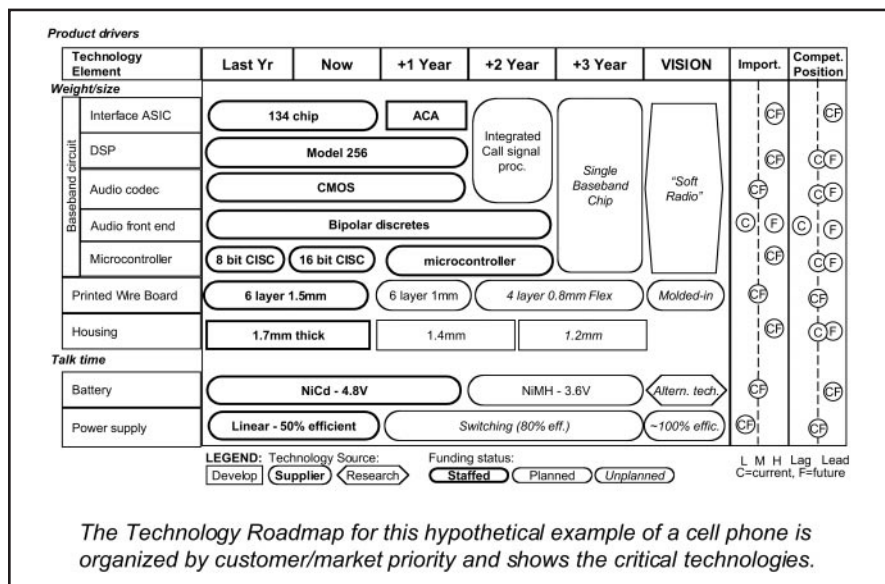
The Summary and Action Plan of a roadmap identifies the highest priority projects to achieve the objectives, and leads the team to schedule, budget, and staff them to accomplish the goals. The action plan helps the team make sure that gaps are closed. In the example given here, programs would be planned and scheduled to integrate functions on fewer integrated circuits as well as for miniature assembly and improved features. Intellectual property strategies (e.g., for securing or licensing patents) and strategies for influenc-

ing national or regional standards are outlined. The user features of a cell phone must also match regional or segment cultural preferences. (For example, a cell phone for the Japanese market would probably include instant messaging features that are in high demand in that market.)

“Offer” platform roadmaps

The most complex platform roadmaps are multi-product solution or “offer” roadmaps in which the platform roadmap becomes a “Roadmap of Roadmaps” — a master plan that coordinates and links roadmaps for multiple components or subsystems. For example, wireless equipment vendors’ offerings to service providers are often complete systems that include radios, controllers, switching systems, and software-based management systems, as well as cell phones that the service provider resells to consumers.

Exhibit 4: Hypothetical Technology Roadmap



ing national or regional standards are outlined. The action plan also includes a risk roadmap, indicating key events for the team to monitor which would signal a need to rethink the strategy and plan. During development, the risk roadmap becomes a guide for monitoring the external environment and technology risks.

Global platform roadmaps

A platform roadmap for a globally deployed product extends the product line platform roadmap to account for regional or local customer needs, for adaptation to cultural differences, or to fit with national regulation. Each part of the roadmap is expanded to plan for local adaptations. A cell phone roadmap, for example, would take into account national or regional operational stan-

The offer may even include services to install and operate the network. Complex offer platforms are common in telecommunications, aircraft, defense, and services industries.

In an offer platform roadmap, a common set of customer drivers may drive the features of many subsystem products or platforms. Each subsystem roadmap includes targets driven by the master roadmap; an architecture that defines the subsystem’s technology elements; and a technology evolution plan. The master roadmap also includes an overall architecture that accounts for customizing the solution/offer for a particular customer, and the master also provides the coordinating structure to make sure the subsystem plans stay in harmony and in sync – to be ready when they will be needed.

Using a roadmap

Roadmapping is best performed as a cross-functional team activity, led by an experienced facilitator. The process aligns the members of the team and creates team ownership of their plan, while the facilitator steers the team toward an aggressive, realistic plan. Important success factors for roadmapping teams are described in Kappel [5]. At its root, roadmapping is just good planning, providing the team with the discipline to examine all parts of their plan thoroughly and to make sure that they are in alignment, that targets are set for the most important objectives, and that there are no gaps in the plan.

By making technology choices specific and visible, the roadmapping process also allows strategic reuse of technology across platforms or product lines. “Cross-roadmap reviews” allow owners of roadmaps to compare their strengths and needs, and to identify areas in which to collaborate or share technology. Roadmaps can also be used to create a “technology database” to enable reuse across the corporation.

Roadmaps enable better decision making during reviews and in portfolio management processes; they enrich the information available to decision makers while presenting information in a form that is quickly understood. Finally, roadmaps are a tool to help the team communicate their objectives and plans to the larger development team, to other corporate functions such as sales and marketing, and to partners, customers, and suppliers. ▲

Endnotes:

- [1] Semiconductor Industry Association, *International Technology Roadmap for Semiconductors*, <http://public.itrs.net/>, 2001.
- [2] Kostoff, R. N., Schaller, R. R., “Science and Technology Roadmaps,” *IEEE Transactions on Engineering Management*, Vol. 48, No. 2, pp. 132 – 143, May 2001.
- [3] Williard, C. H. and McClees, “Motorola’s Technology Roadmap Process,” *Research Management*, Vol. 30, No. 5, pp. 13 – 19, Sept. – Oct. 1987.
- [4] Management of Accelerated Technology Innovation (MATI). *An industry consortium dedicated to the identification, review, refinement, and integration of technology management tools for practical business application*, <http://mati.ncms.org/>.
- [5] Kappel, T. A. “Perspectives on roadmaps: How organizations talk about the future,” *Journal of Product Innovation Management*, Vol. 18, No. 1, pp. 39-50, 2001.

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