A Unifying Architecture for Roadmaps Frames a Value Scorecard

Richard E. Albright

Principal, Albright Strategy Group, LLC
Morristown, New Jersey, USA
realbright@albrightstrategy.com

Abstract

The term "Roadmap" is used in many ways, most often describing a plan for the future, but with widely varying objectives and styles. A unifying architecture is presented for roadmaps in technology management and business domains. This architecture is in turn used as a framework to define a forward looking scorecard for "Roadmapping," the team activity of learning and communication that underpins a successful plan.

Keywords

Roadmap, Roadmapping, Metrics.

INTRODUCTION

A roadmap is a document that describes a future environment, objectives to be achieved within that environment, and plans for how those objectives will be achieved over time [1, 2, 6]. In this paper, roadmaps are defined in terms of four key topic areas linked by key drivers. Using this framework the team activity of creating a roadmap can be managed, measured, and tracked for coverage and completeness using a progressive roadmapping scorecard. The scorecard highlights gaps in knowledge, understanding, and actions as the roadmap unfolds, helping the team assure that their roadmap closes current gaps and incorporates plans to close future gaps.

Roadmaps may have widely varying objectives [4], but should answer a common set of "why-what-how-when" questions to provide an action plan for reaching the objective – all within a common, four part architecture. Within this architecture, structural details are presented for several types of roadmaps, showing how the common format can accommodate a wide range of objectives.

The best roadmaps are created as a team activity, receiving the views and knowledge of the group of people who will carry out the roadmap's plan. The roadmapping process helps the team build consensus and gets buy-in of its members to carry out the plan [3].

Key questions for roadmapping are: "What value is the roadmap, and what value is the roadmapping process?" The best measure of a roadmap is the value created for the organization, such as shareholder value of a corporation, or the success of an organization's long term objectives. These measures are long-term and rearward looking, likely to be available only after a long period of time has elapsed – often months, years or decades. They tell us many months or years after the fact whether a roadmap

was successful. To be useful to a roadmapping team, a measure should be forward looking and immediate. This paper presents a roadmapping "scorecard" that helps a team recognize its progress and identify the gaps and barriers to progress. The scorecard is built by the team itself as it develops a roadmap and may be updated when the team periodically revisits the plan as development progresses.

A COMMON FRAMEWORK

Roadmaps set a future objective and answer a set of "why-what-how-when" questions to develop an action plan for reaching the objective [2, 5]. Figure 1 shows the four parts of the roadmap architecture that answer the "why-what-how" questions and lay out required actions, the "to-do's."
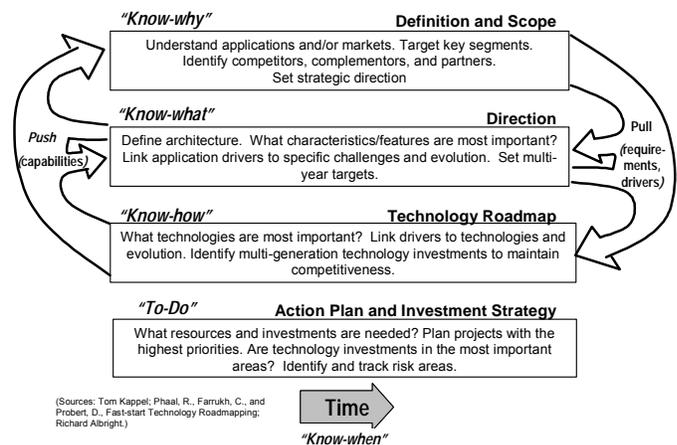
Figure 1. A unifying four-part roadmap framework

The first part defines the domain of the roadmap, the team's objectives, and their strategy for achieving those objectives – the "why" of a roadmap. The roadmap's definition and strategy often include market and competitive assessments as well as planned applications. The second part defines direction, or the team's plans – the "what" of a roadmap. The direction includes challenges, the architecture and evolution of the team's solution, and measurable performance targets to achieve the objective. The third part describes the evolution of technologies that will be used to achieve the objective – the "how" of a roadmap. The "technology roadmap" defines the technologies that will be used to implement each part of the architecture. The fourth part defines the action plan and

	Definition and Strategy "Know-why"	Direction "Know-what"	Technology "Know-how"	Action Plan "To-do"
Science and Technology Roadmaps	• Scope of the Field • Technology Applications	• Technical Challenges • Architecture • Trends, Discontinuities, and Objectives	• Technology Elements and Evolution • Competitive Technologies and Costs	• Action Programs • Technology Investment • IP and Standards • Risk Roadmap
Industry and Government Roadmaps	• Industry Structure and Position • Customer Drivers • Industry Direction	• Technical Challenges • Architecture • Trends and Disruptions • Learning and Targets	• Technology Elements and Evolution • Technology Alternatives • Future Costs	• Action Programs • Technology Investment • IP and Standards • Risk Roadmap
Product – Technology and Platform Roadmaps	• Market Structure and Size • Customer Drivers • Competitive Strategy	• Product Roadmap • Architecture • Product Drivers and Targets • Feature evolution	• Technology Elements and Evolution • Competitive Position • Target Costing	• Action Programs • Technology Investment • IP and Standards • Risk Roadmap

Figure 2. Roadmapping Topics

risks – the "to-do's" of a roadmap. The action plan identifies key development actions, resources required, risks, and technology investment strategy. All parts of the roadmap are laid out over time – the "when" of a roadmap.

A roadmap may be constructed beginning with the key needs of the marketplace and customers – a market-pull perspective. Conversely, a roadmap may start with a key technology and seek to define the market needs that could be served with the new technology – a technology-push perspective.

ROADMAPPING OBJECTIVES AND FORMATS
Within the four part architecture, the contents of roadmaps with the most frequently encountered objectives are outlined in Figure 2. The figure lists the topics covered in each of the four parts of a roadmap for several types of roadmaps. Science and technology roadmaps plot the future development of a scientific or technical field. The scope of the scientific field and current or potential applications of the technology are linked to key technical challenges of the field. The structure, or architecture of the field is defined and trends and potential discontinuities are identified. The challenges are then linked to the evolution of the field in the technology roadmap. Finally, action plans for resource allocation or investment are defined to achieve the most important technological developments. Industry/government-sponsored roadmaps aim to describe the future of an industry or sector along with actions to move the industry or sector forward. Industry structure and key directions are linked to technical challenges and those challenges are linked to technology evolution. Corporations and other organizations use roadmapping for a number of purposes such as product planning, platform planning, or organizational capability planning. Product-technology or platform roadmaps lay out the evolution of a product or platform over time. Capability roadmaps define the capabilities needed for success of a services business or for functional organization such as manufacturing or information technology.

Figure 3 shows a typical layout of templates for a roadmap, in this case a Product-Technology Roadmap. The template in Figure 3 includes four parts as defined above. The first part, the definition and scope, covers market and competitive strategy. The second part defines the product direction, the product roadmap. The third part defines the technology evolution, the technology roadmap. Finally the action plan defines the key programs or projects that will be needed to support the direction, a technology investment summary, and a view of the risks to the plan. Each part is elaborated in a series of pages or panels describing an important element of the plan. The four parts are linked by connecting drivers – customer drivers to product drivers to technology elements to technology investments. In this way the rationale for decisions on directions taken may be tracked

VALUE MEASUREMENTS AND SCORECARDS
The best measure of a roadmap is the value created for society, an industry, or a corporation's shareholders by executing the plan, but the time delay is often very long (sometimes measured in years or decades) and many factors during implementation of the plan can influence the outcome. For example, external events may change the market conditions or internal changes or development problems may affect the development process. A short-term, forward looking measure is provided by a roadmapping "scorecard" of the teams' self-evaluation of progress framed by the four-part architecture. The scorecard captures the teams' perceptions and/or a facilitator's review of the completeness and quality of each part of the roadmap as it is developed. It enables the team to
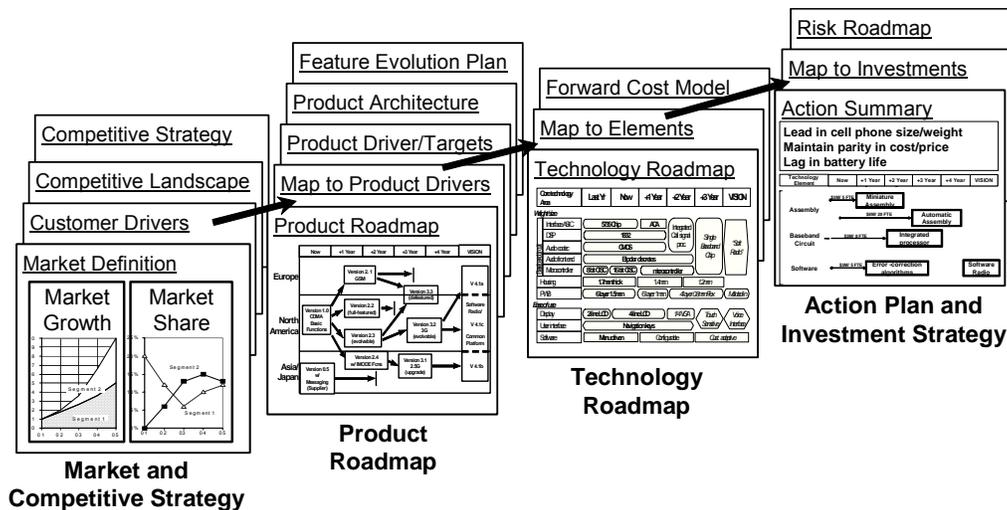
Figure 3. The four parts of a Product-Technology Roadmap

conduct a structured review of gaps and develop plans for closing those gaps.

The scorecard tracks the team's progress and confidence in value created by the roadmap as it develops through several roadmapping sessions. It can then be used to track periodic updates as the team gains confidence in its plan or recognizes the need for redirection.

Roadmapping Value Scorecard

A scorecard may be constructed based on the common framework outlined above. An example scorecard for Roadmapping Group A (based on an actual case) is shown in Table 1. Each major section is weighted by its importance on a relative scale. In the example, three sections are given weights of 1, while the Technology Roadmap is judged to be twice as important to completion of the roadmap and given a weight of 2. Within each section, the individual topics – those defined in the template of Figure 3 – are also assigned weights. In the example, a few topics of the standard template are not used, so are given zero weights. All others are weighted equally, and given weights of one.

Roadmapping Group A created its roadmap over a series of four sessions (one session devoted to a section of the roadmap). At the end of each session, the members of the team rated their confidence in the parts of the roadmap completed to that point on a five point scale. Table 1 shows the team's progress in completing the roadmap. In the first session, the team drafted a Market and Competitive Strategy. At the end of the session, the team was highly confident of its competitive strategy, and moderately confident of the market definition, customer drivers, and competitive landscape. This resulted in a value score of about 16% – good confidence in work completed so far, but with lots more work to do. As the team progressed through roadmapping sessions, the elements of

the market and competitive strategy were reviewed and revisited, and the teams' confidence in the initial sections increased along with increasing overall confidence as additional parts of the roadmap were completed. The team's progress in developing the parts of the roadmap is evident as the sections of the roadmap are scored.

Table 1. Roadmapping Scorecard (Group A)

		Session			
		1	2	3	4
	Section Weight	Score (1-5)	Score (1-5)	Score (1-5)	Score (1-5)
Market and Competitive Strategy	1				
Market definition	1	3	4	4	4
Customer drivers	1	4	5	5	5
Competitive Landscape	1	3	4	4	4
Competitive Strategy	1	5	4	5	5
Product Roadmap	1				
Map to Product Drivers	1	1	3	5	5
Product Drivers/Targets	1		3	4	4
Experience Curves	0				
Product Architecture	1		5	5	5
Feature Evolution Plan	0				
Technology Roadmap	2				
Map to Technology Elements	1		1	4	5
Element Evolution	1		1	3	5
Forward Cost Model	0				
Summary and Action Plan	1				
Action Summary	1				4
Technology Investments	1				5
Risk Roadmap	1				3
Section Total	5				
Value Confidence Score (of 100%)		**16%**	**40%**	**65%**	**93%**

The last row of the table shows the progress toward or 100% confidence. The confidence is computed by weighting the scores for each topic by the section weights. At the end of the first session, the team was 16% of the way to complete confidence in their roadmap.

Figure 4. Value Scorecards for two Roadmapping Groups

By the end of the fourth session, the team scored itself at 93% confidence. To reach confidence nearer 100%, the team will continue to work on the topics with the lowest scores, identifying specific gaps to fill to build their confidence in the quality of their roadmap.

Scorecard Examples

Figure 4 shows a graphical representation of scorecards for two roadmapping groups, based on actual cases. The roadmaps were developed by two groups with similar functions within one organization. Group A (as shown in Table 1) was the first to develop its roadmap – over four sessions (one day for each roadmap section). Group B planned to develop its roadmap in two sessions of one day each using Group A's roadmap as a starting point.

Group A received strong management support, prepared each of the team members with background on the process, the type of input information that would be needed, and a view of what the roadmap would look like when done. Group B was ordered by executive management to complete the roadmap and did not have local management support for its work. Team members were not prepared in advance for the type of activity that was planned.

Figure 4 shows the differing results of the two roadmapping activities. The bars in the figure show the increasing score for each roadmapping team with each roadmapping session. The bars are further broken down by the sub-parts of the roadmap, as indicated in the legend between the two charts. The final bar on each of the team's charts shows the breakdown of the ultimate 100% confidence objective to the sub-parts of the roadmap, corresponding to the panels in Figure 3. While Group A's confidence approaches 100%, Group B's confidence is less than 60% after the completion of its two sessions. Group A will be able to use its roadmap as a guide for development, revisiting and revising as their development progresses and the environment changes. Group B's low confidence indicates that they have more work to do before they can be sufficiently confident in their plan and. Group B's largest

gaps are related to technology element evolution, the action summary, and technology investment mapping.

USING ROADMAPPING METRICS

The scorecard initially tracks a roadmapping team's progress as they first create a roadmap. Roadmaps are intended to be living documents, reviewed and updated over time. So also will a scorecard evolve as a roadmap is revisited and revised, guiding the closure of critical gaps and indicating the teams' progression toward confidence in the value that will be created by the roadmap.

REFERENCES

[1] Albright, Richard E., et al, *Technology Roadmapping*, Research •Technology Management, Vol. 46 No. 2, 26 – 59, 2003.

[2] Albright, Richard E., *Roadmapping for Global Platform Products,* Product Development and Management Association Visions Magazine, Vol. 26 No. 4, 19 – 22, 2002.

[3] Kappel, Thomas A., *Perspectives on roadmaps: How organizations talk about the future*. Journal of Product Innovation Management, Vol. 18 No. 1, 39-50, 2001.

[4] Kostoff, R. N., Schaller, R. R., *Science and Technology Roadmaps*, *IEEE Transactions on Engineering Management*, Vol. 48, No. 2, pp. 132 – 143, May 2001.

[5] R Phaal, R., Farrukh, C.J.P., and Probert, D.R., *Fast Start Technology Roadmapping,* International Association for Management of Technology, http://www.iamot.org/paperarchive/GSTBB.PDF, 2001.

[6] Williard, C. H. and McClees, *Motorola's Technology Roadmap Process*, Research Management, Vol. 30, No. 5, 13 – 19, Sept. – Oct. 1987.