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Dualism of
Roadmap Planning and Portfolio Management

DUALISM OF ROADMAP PLANNING AND PORTFOLIO MANAGEMENT

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Roadmapping and portfolio management appear to form two almost completely separate fields in the area of technology development. Few publications or authors cover both subjects in the same presentation. Our understanding is that these approaches are not alternatives, but instead are mutually dependent.

"Portfolio" in a management context refers simply to a set of items or entities typically sorted and described by a certain classification. Portfolio-visualizing tools, in particular, tend to illuminate portfolios as a freeze-frame at a given point in time. However, portfolios are, in reality, living entities that continuously change in line with decisions made in the management process. Traditional portfolio management tools endeavor to cope with this by describing and analyzing the contents of current and future portfolios, and by comparing the differences between the two.

The problem with these tools is the lack of visibility of the different steps, events, routes, and choices on the way from the current portfolio to a certain future portfolio. The strength of roadmapping, for its part, is its ability to dynamically describe changes over time en route to future portfolios. But roadmaps alone do not give real support for comparatively analyzing and selecting the content of portfolios. They are by nature tools for timing and synchronizing between different plans.

One can thus conclude that traditional portfolio management tools and roadmapping tools complement and support each other. Portfolios change and develop dynamically along roadmaps according to common and shared plans.

Kari Hakkarainen & Tapani Talonen

Both roadmaps and portfolios can be seen as hierarchical structures embedded in different levels of a company's strategic planning process. The highest level consists of business portfolios and roadmaps. The second level in the hierarchy consists of product – technology portfolios and roadmaps that focus on managing product families and technology platforms. The most detailed and in-depth cases focus on the evolution of individual technologies. Each level has its own justification, role, and characteristics.

It is easy to see the benefits of roadmapping in communication, in sharing information and in creating mutual agreement, but the full business benefits can be achieved only by really understanding, why, what and how to implement them in practice.

Roadmapping is susceptible to decay once the initial enthusiasm evaporates, which has also been noted in the literature. We will show that there is a logical way to sustain the enthusiasm.

In conclusion, roadmapping is only one portfolio management tool, but a very effective one that supports other traditional tools presented in that field. Thus the roadmapping and portfolio management approaches utilized together can be powerful tools in the management of technology. The benefits can be directly applied in business – once it is known what, why and how to implement them in practice.

This presentation is based on the authors' years of hands-on experience in developing technology management and related practices, both in academic and research organizations, as well as in global business environments. It also builds on numerous presentations, publications, and discussions by the authors.

Separate Fields?

It is interesting to note that the roadmapping approach and portfolio management in the context of R&D and technology development exist as two almost completely distinct fields of research.

No wide fusion can be observed between articles on these subjects. There are no single articles or individual authors that range over both these fields. We claim that roadmapping and traditional portfolio management are not alternative approaches, practices or techniques. On the contrary, to be effective, both of them need each other. In practice, the roadmapping approach represents a new, dynamic and complementary technique to manage diverse portfolios.

A portfolio, as such, is not a tool or technique, nor is it monopolized as a term by a certain management school or approach. Simply put, portfolio in a management context refers to a set of items or entities (e.g. businesses, customers, products, technologies, projects, etc.) typically sorted and described by a certain classification (e.g. by project types).

The approaches of traditional portfolio management tools (e.g. Cooper et al 1999 and Roussel et al 1991) are normally instantly bounded so that they address and analyze (e.g. balance) portfolio situations more or less at specified points of time. Dynamic aspects are added by describing and analyzing the contents of a portfolio now and at a point of time in the future, and by comparing the differences between these two (e.g. Roussel et al 1991).

Traditional tools usually visualize portfolios as freeze-frames, even though portfolios evolve over time. The shortcoming of these tools is that they lack steps from one portfolio to another.

The strength of roadmapping is in defining different alternative routes between portfolios. Roadmaps thus help in planning actions, but they perform poorly in portfolio analysis.

Hierarchical Systems

Both roadmaps and portfolios can be seen as hierarchical systems embedded in a planning process of a company (*figure 1*).
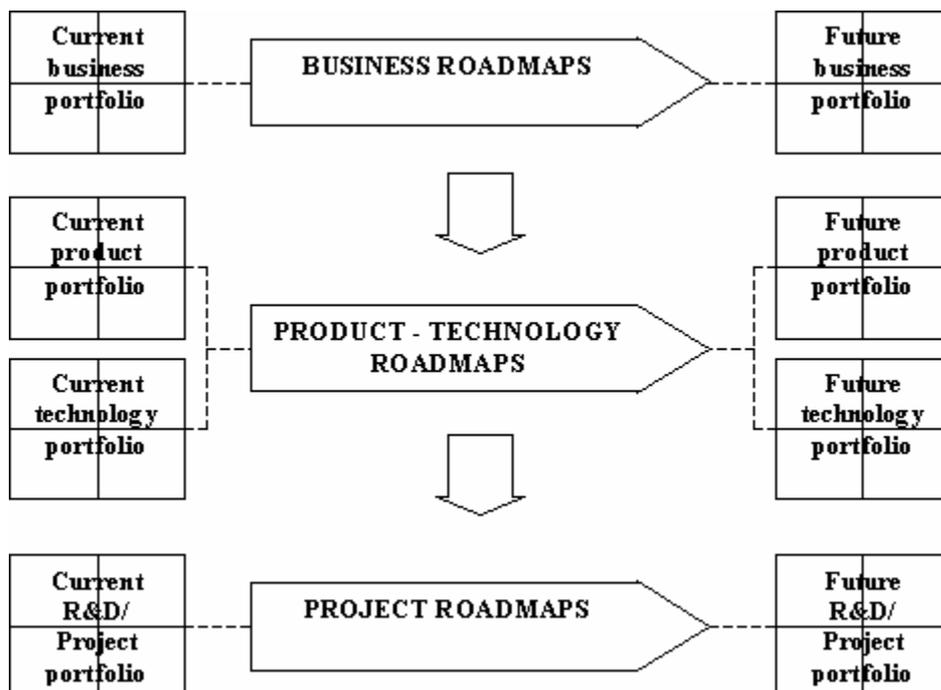

Figure 1. Hierarchy of portfolios and roadmaps.

The highest level consists of business portfolios and roadmaps, which typically consist of two levels. Master business portfolios describe the development of an entire business (at corporation level) in the terms of business units and areas. These types of roadmaps declare the most significant strategic business options in the form of fundamental questions for the future. A typical tool at this level is Boston Consulting Group's strategy-planning matrix (e.g. Hooley et al. 2004). Business roadmaps at a more detailed level focus typically on specific market areas or customer segments, integrating and synchronizing the cross-functional plans of business functions. This kind of scope limitation is necessary for effective action planning, as it identifies critical chains and discontinuities or conflicts in the plans.

The second level in the hierarchy consists of product – technology roadmaps and platforms. Product – technology roadmaps typically focus on a certain product family or technology platform. The essence of a product technology roadmap is integration with a higher-level technology development schedule and product release plan, ensuring timely and sufficient technological readiness. It is just as important to include also the ramp-down of existing products and technologies, not only the ramp-up and leveraging of new products and technologies. On a project portfolio and roadmap, product and technology development needs and steps are broken down into appropriately sized projects. This level is essential to ensure the realism of the portfolio by balancing projects according to available resources. The most detailed and in-depth roadmaps are specific technology roadmaps that concentrate on the evolution of individual technologies (sometimes called "deep technology roadmaps"). These are typically planned and maintained by a group of specialists. An essential tool for these roadmaps is the technology S-curve (e.g. Khalil 2000, Foster 1986 or Dodgson 2000).

It is essential to clearly link also these technology-specific roadmaps to business needs with key technological business parameters. The position of these roadmaps is difficult to place in the hierarchy discussed, because their perspective and basic purpose is a little bit different. The purpose of a technology-specific roadmap is to support understanding about the future evolution of an individual technology, and this understanding is needed at every level of roadmaps and portfolios.

Roadmaps Bridging Portfolios

From the discussion above, it is easy to realize the benefits of roadmapping in linking different portfolios and their evolution. Roadmaps are for communication, in sharing information and in creating mutual agreement about the plans. The full business benefits, however, cannot be achieved if not really understanding, why, what and how to implement them in practice.

The principles and practices are often loosely defined or even missing in the literature. What is the input information, what are the processes, what are the outputs, and most important, how is roadmapping linked to the rest of technology management? In fact, the highly original paper by Willyard & McClees (1987) is still one of the best and conceptually most coherent. As Phaal et al. (2003) rightly state: *"One of the reasons why companies struggle with the application of roadmapping... is that there is little practical support available and companies typically re-invent the process."*

Most strikingly, even an aspect as essential as the purpose of roadmapping is not defined; or worse, is misunderstood. Of course it is for communication and mutual decision-making, but what is its *raison d' être*? What is its fundamental motivation and justification? Even Phaal et al. (2005), in their otherwise creditable article, trip up by stating: "*A key benefit of roadmapping is the sharing of knowledge and the development of a common vision of **where** the company is going.*" (Hakkarainen 2006).

One can quibble that a roadmap shows the destination, but that is not the *purpose* of a roadmap. This is easy to demonstrate with an analogy to orienteering: if a map were about *where* to go, then a picture of the destination, its coordinates, or a map of its close vicinity would be sufficient! It is the business, product, technology, etc., portfolios that declare the future goal.

When orienteering, one can buy a map. A business roadmap one cannot buy, but must prepare oneself. This is done by placing significant developments, milestones, objectives, and other essential events on the corresponding rows. It is important to draft the developments in markets, and competitors' actions as far as they can be anticipated. Critical or otherwise important relationships between items should be marked on the roadmap. The items and their relationships constitute the possible routes on the terrain (Hakkarainen 2006).

It is very important to illustrate alternative developments. How otherwise can one take another route when changes occur, or when one encounters surprises? One must also map the terrain more widely, not just the tentative route. If we draft only the route, how can one fix the position? We need to include internal and external events; they are our points of reference.

When should portfolios and roadmaps be updated?

The current **portfolio** freezes and becomes "past" portfolio, remaining unchanged as soon as one has started to move towards the future. Future portfolios may change if, and only if, the assumptions change – including when a wrong assumption has been made in the first place. That often also has an influence on corresponding roadmaps.

Most commonly it is proposed that **roadmaps** are updated on a periodic basis, at least once a year, often linked to the company's budget or strategy cycles. This has serious shortcomings. The information is inevitably old. New, important information may surface immediately after the update, and in the worst case may have to wait a whole year before being taken into account. The fallacy of prediction is also involved. Mintzberg (1994) states: "… *the world is supposed to hold still while a plan is being developed and then stay on the predicted course while that plan is being implemented.*"

Another school of thought suggests continuous updating. The problem here is that the roadmap changes constantly, it oscillates. It does not freeze. Naturally one has to collect and store new information, but not to change the route unless it is imperative. Replanning needs extra effort, takes time, and adds risks. And moving ahead is suspended in the meantime.

The third possibility for updating, and the most important one, is when reaching an intermediate goal. One verifies the progress and position in the coordinate system, i.e. with relation to time and the key objectives. The aim is to check that the direction is right, and that the progress is as planned. And then to plan the route for the next goal.

With the justification above, we propose revising a roadmap and the path

- when completing an intermediate leg,
- periodically, and
- when imperative.

Phaal et al. (2005) raise a natural question: "*How to keep a roadmap alive?*" As is the case with so many good business processes and practices, roadmaps easily tend to become corrupted or even forgotten over the course of time once the initial enthusiasm fades.

The answer is simple. Once the team has reached the destination, it has two possibilities. To stay there, or to re-trek familiar territory; the routes one has taken and the places one has been before. Neither of these two alternatives makes sense in business.

The third alternative is to define a new goal, create a roadmap with a route on it, and head for the new destination.

Complementing Dualism

Traditional portfolio-visualizing tools (e.g. maps and grids) represent portfolios as freeze-frames in time. However, in reality a portfolio is continuously living and changing. A crucial shortcoming of traditional tools in describing portfolios is their lack of visibility in the different steps, events, routes, and choices (junctions) from the current portfolio to a certain future portfolio.

The strength of roadmapping as a technique, for its part, is to declare dynamically the living routes between portfolios in time. Roadmaps are specifically, and by their nature, visualizing tools. They enable common thinking and discussion, so that every interest group is aware of the current state and the future evolution of a portfolio. Roadmaps help to plan the actions needed to achieve the envisioned future portfolio.

The shortcoming of roadmaps as a tool is that they do not give real support to the making of comparative portfolio content analyses and selections. They are better suited to timing and synchronization between different plans (e.g. between business functions).

As illustrated in *figure 2*, traditional tools for visualizing and analyzing portfolios support analysis and decision-making (e.g. AHP in Suominen & Takala 2006) at critical points and junctions in roadmaps. They define cross-section freeze-frames of the current and targeted future pictures on a roadmap.
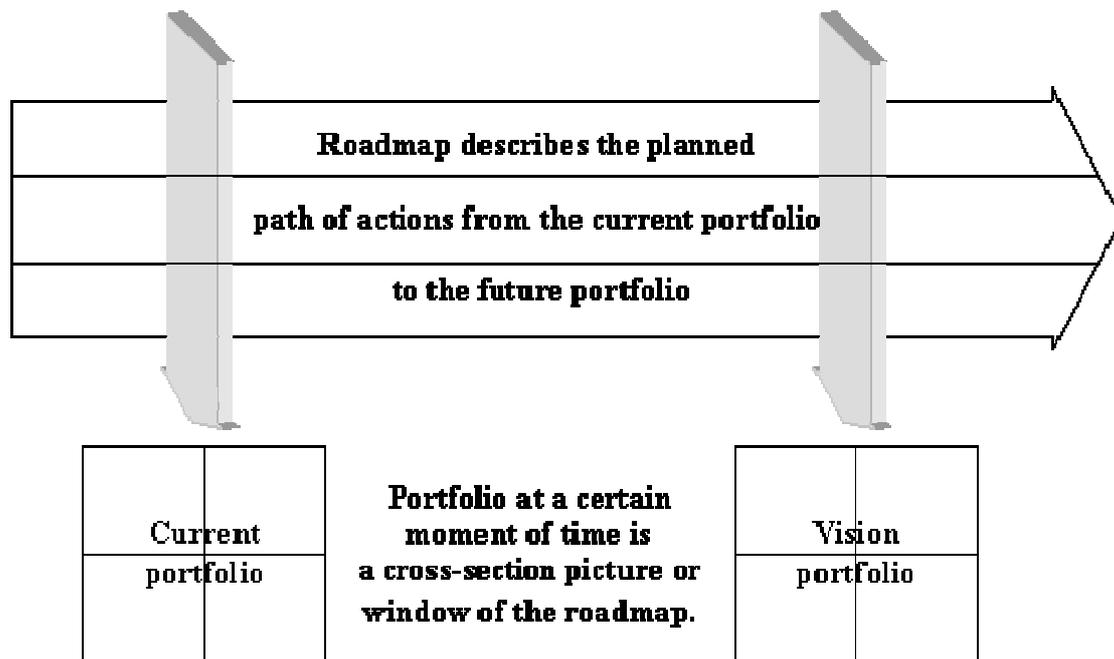
Figure 2. Interrelation between a roadmap and portfolios.

That said, traditional portfolio management tools and roadmapping tools complement and support each other. They are interrelated and an inseparable pair for effective portfolio management. A portfolio changes and develops dynamically along the roadmap according to the common and shared plan.

Conclusions

Roadmapping is only one portfolio management tool, but a very effective one that supports other traditional tools presented in that field. Both of them form hierarchical structures in different levels of a company's strategic planning process.

Business, product, technology, etc., portfolios declare a future goal, and roadmaps define alternative paths for reaching that goal. Roadmaps thus bridge portfolios together.

The strength of portfolios is in defining different portfolios at given points of time, and in making analyses between them. On the other hand, they are not good at highlighting dynamics. Conversely, roadmaps are good at describing dynamics (i.e. at defining different alternative routes between portfolios). Their shortcomings are in analyzing portfolio contents, and in comparing portfolios. Roadmaps thus help in planning actions, but they perform poorly in portfolio analysis.

Traditional portfolio management tools and roadmapping tools thus complement and support each other. Utilizing the two approaches can be a powerful tool in the management of businesses and technologies. The benefits can be directly applied in business – once it is known what, why and how to implement them in practice.

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