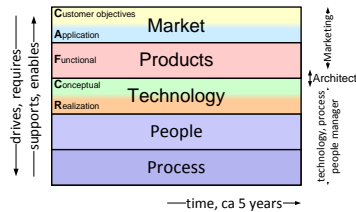


# Roadmapping

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## Abstract

This article describes what a roadmap is, how to create and maintain a roadmap, the involvement of the stakeholders, and criteria for the structure of a roadmap.

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# 1 Introduction

The definition of new products is a difficult activity, which frequently ends in a stalemate: “It must be done” versus “It is impossible to realize in such a short time frame”. The root cause of this frustrating stalemate is most often the fact that we try to solve a problem in a much too limited scope. Roadmapping is a method to prevent these discussions by lifting the discussion to a wider scope: from single product to product portfolio and from a single generation of products to several generations in many years.

The roadmap is the integrating vision shared by the main stakeholders. A shared vision generates focus for the entire organization and enables a higher degree of cooperating concurrent activities.

We discuss what a roadmap is, how to create and maintain a roadmap, the involvement of the stakeholders and gives criteria for the structure of a roadmap.

## 2 What is in a roadmap?

A roadmap is a visualization of the future (for example 5 years) integrating all relevant business aspects. Figure 1 shows the typical contents of a roadmap. At the right hand side the owner of the view is shown, while the left hand side shows the asymmetry of the views: the market is driving, while technology people and process are enabling.

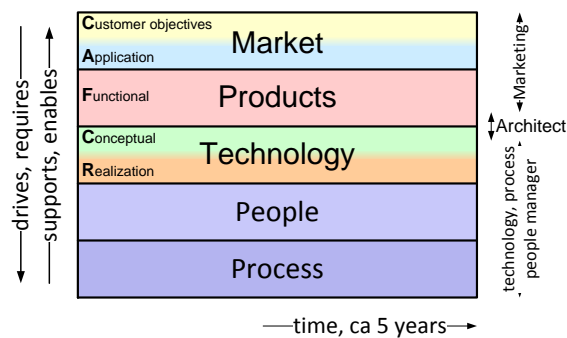


Figure 1: The contents of a typical roadmaps

Key to a good roadmap is the skill of showing the important, relevant issues. The roadmap should provide an immediate insight in the most relevant developments from the 5 mentioned points of view. These issues are primarily related by the time dimension.

The convention used in this article is to show products, technologies, people or process when they are or should be available. In other words the convention is to

be extrovert, be oriented to the outside world. The introvert aspect, when and how to achieve these items, are not directly shown. This information is often implicitly present, since people and process often have to be available before the availability of the technology, and technology often precedes the product.

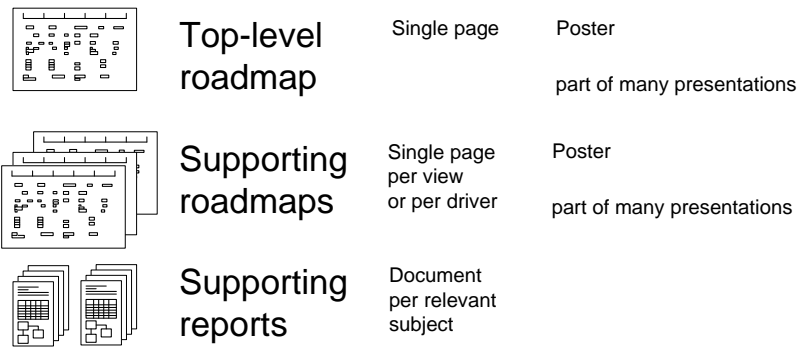


Figure 2: The roadmap is documented at several levels of detail

A good roadmap is documented and presented at top level and at a secondary level with more details. Figure 2 shows the desired granularity of the roadmap documentation, the secondary level is called supporting roadmaps. The top level is important to create and maintain the overview, while the more detailed levels explain the supporting data. The choice of the decomposition into supporting roadmaps depends on the domain. Typically, the supporting roadmaps should maintain an integrated view. Examples of decomposition are:

- One supporting roadmap per key driver.
- One supporting roadmap per application area.

### 3 Why Roadmapping?

The Policy and Planning process as discussed in Chapter ?? relies heavily on roadmapping as tool. The main function of roadmapping is to provide a shared insight and overview of the business in time. This insight and overview enables the management of the 3 other processes:

- the Customer Oriented Process
- the Product Creation Process
- the People, Process, and Technology management Process

Where managing these processes means defining the charter and the constraints for these processes in terms of budgets and results: Where do we spend our money and what do we get back for it?

When no roadmapping is applied then the following problems can occur:

**Frequent changes in product policy** due to lack of anticipation.

**Late start up of long lead activities** , such as people recruitment and process change.

**Diverging activities of teams** due to a lack of shared vision.

**Missed market opportunities** , due to a too late start.

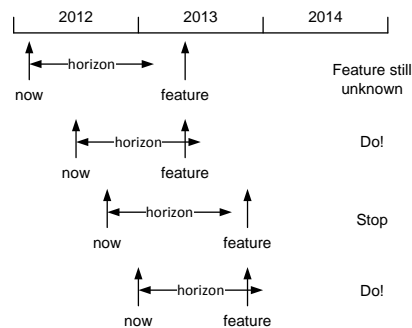


Figure 3: Management based on a limited horizon can result in a binary control of product policy decisions

The frequent changes in the product policy are caused by the lack of time perspective. In extreme cases the planning is done with a limited time horizon of, for instance, 1 year. External events which are uncertain in time can shift into view within the limited horizon when popular and disappear again when some other hype is passing by. This effect is shown in Figure 3

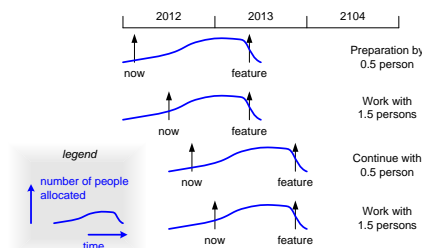


Figure 4: Management with a broader time and business perspective results in more moderate control: work with some more or some less people on the feature

The availability of a roadmap will help the operational management to apply a low pass filter on their decisions. The control becomes more analog rather than discrete, where the amount of people can be increased or decreased dependent on the expected delivery date, as shown in figure 4.

An inherent benefit of roadmapping is the anticipation, which is especially important for all long lead time aspects. Examples are technology, people and process. This is not limited to development activities only; market preparation, manufacturing and customer support also require anticipation. For example, reliable mass production has a significant lead time.

## 4 How to create and update a roadmap

A roadmap is a joint effort of all relevant stakeholders. Typical stakeholders for roadmapping at a typical high-tech company are

**business manager** , overall responsible for the enterprise

**marketing manager(s)**

**people, process, and technology manager(s)** , often called line or discipline managers

**operational manager(s)** , e.g. program managers or project leaders

**architect(s)**

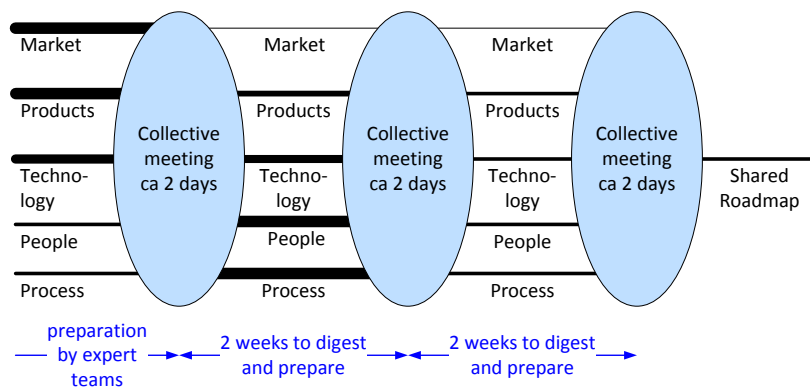


Figure 5: Creation or Update of a roadmap in "Burst-mode"

An efficient way to create or update a roadmap is to work in "burst-mode": concentrate for a few days entirely on this subject. To make these days productive a good preparation is essential. Figure 5 shows the roadmap creation or update as three successive bursts of 2 days.

The input for the first days is prepared by expert teams. The expert teams focus on the *market*, the *products*, and the *technology* layers of the roadmap. The current status of *people* and *process* should be available in presentable format. The target of the first burst is:

- to get a shared vision on the market
- to make an inventory of possible products as an answer to the needs and developments in the market
- to share the technology status, trends and ongoing work, as starting point for technology roadmap
- to explore the current status of people and process and to identify main issues

Between the first and second burst and between the second and third burst some time should be available, at the one hand to digest the presented material and the discussions, at the other hand to prepare the next session. The target of the second burst is:

- to obtaining a shared vision on the desired technology roadmap
- to sharing the people and process needs for the products and technology defined in the first iteration
- to analyze a few scenarios for the layers *products*, *technologies*, *people*, and *process*

The thickness of the lines in figure 5 indicates the amount of preparation work for that specific part of the roadmap. It clearly shows the shift in attention from the market side in the beginning to the people and process side later. This shift in attention corresponds with the asymmetry in figure 1: the market is driving the business, the people and processes are enabling the business.

The function of the collective meetings is to iterate over all these aspects and to make explicit business decisions. The *products* layer of the roadmap should be consistent with the *technology*, *people* and *process* layers of the roadmap. Note that the marketing roadmap may not be fulfilled by the products roadmap, an explicit business decision can be made to leave market segments to the competition.

Figure 6 shows the roadmap activities in time. Vertical the same convention is used as in figure 1: the higher layers drive the lower layers in the roadmap. This figure immediately shows that although “products” are driving the technology, the sequence in making and updating the roadmap is different: the technological opportunities are discussed before detailing the *products* layer of the roadmap.

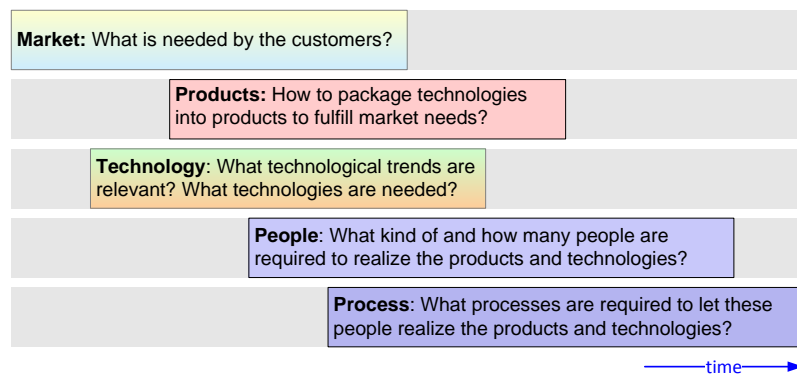


Figure 6: The roadmap activities visualized in time.

## 5 Roadmap deployment

The roadmap is a shared vision of the organization. This vision is implemented in smaller steps, for instance by defining outputs per program and the related resource allocations per program. In Figure 7 it is shown that roadmap updates are performed regularly, in this figure every year. After determining the vision a “budget” is derived that sets the charter for the programs. The budget is revised with an higher update frequency, typically every 3 months. The budget itself sets goals and constraints for the operation. The programs and projects in the operation have to realize the outputs defined in the budget. The operational activity itself uses detailed schedules as means for control. The schedules are updated more frequently than the budget update. Within the operational activity the updates are mostly event driven: changes in the market, technology or resources that render the existing plan obsolete.

From long term vision to short term realization is a 3-tier approach as shown in Figure 8. The roadmap provides the context for the budget, the budget defines the context for the detailed plans. The highest tier, the roadmap, has the longest horizon, the slowest update rate, and the broadest scope. When going down in tiers, the horizon tends to decrease, the update rate increases, and the scope decreases. The roadmap provides a vision, and as such is not committal. A budget is a commitment to all involved parties. Plans are means to realize the programs and projects, and tend to adapt frequently to changed circumstances.

## 6 Roadmap Essentials

We recommend to create a roadmap that fulfills the following requirements:

- Issues are recognizable for all stakeholders.

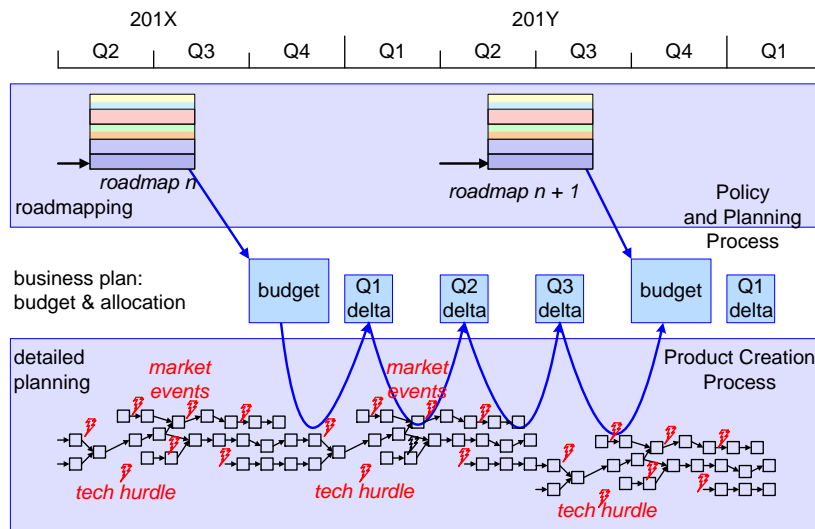


Figure 7: The roadmap is used to create a budget and resource allocation. The operational programs and projects use more detailed plans for control.

	<i>horizon</i>	<i>update</i>	<i>scope</i>	<i>type</i>
roadmap	5 years	1 year	portfolio	vision
budget	1 year	3 months	program	commitment
detailed plan	1 mnth-1yr	1 day-1 mnth	program or activity	control means

Figure 8: Three planning tiers and their characteristics

- All items are clearly positioned in time; uncertainty can be visualized explicitly.
- The main events (enabling or constraining) must be present.
- The amount of information has to be limited to maintain the overview.

## 6.1 Selection of most important or relevant issues

The art of making a roadmap is the selection of the most relevant issues. It is quite easy to generate an extensive roadmap, visualizing all marketing and technological information. However, such superset roadmap is only the first step in making the roadmap. The superset of information will create an overload of information that inhibits the overview we strive for.



## 6.2 Key drivers as a means to structure the roadmap

In [1] key drivers are explained as an effective method to elicit and understand requirements. Key drivers can also be very helpful in the creation and update of the roadmap. At the marketing side the trend in these key drivers must be visible in the roadmap. Showing key driver trends also helps to structure the roadmap.

The supporting roadmaps can clarify how the key driver trends will be supported. For instance, a technology roadmap per key driver is a very explicit way to visualize the relationship between the market in terms of key drivers, the products with the expected performance levels, and enabling technologies.

## 6.3 Nothing is certain, ambiguity is normal

A roadmap is a means to share insight and understanding in a broader time and business perspective. Both dimensions are full of uncertainties and mostly outside the control of the stakeholders. It can not be repeated often enough that a roadmap is **only** a vision (or dream?).

*The only certainty about a roadmap is that reality will differ from the vision presented in the roadmap.*

As a consequence the investment in making the roadmap more accurate and more complete should be limited. Nobody can predict the future, we will have to live with rather ambiguous visions and expectations of the future.

## 6.4 Use facts whenever possible

The disclaimer that *ambiguity is normal* can be used as an excuse to deliver sloppy work. Unfortunately, a sloppy roadmap will backfire to the creators. It is recommended to base a roadmap on facts whenever possible. Examples of sources of facts are:

- Market analysis reports (number of customers, market size, competition, trends)
- Installed base (change requests, problem reports, historical data)
- Manufacturing (statistical process control)
- Suppliers (roadmaps, historical data)
- Internal reports (technology studies, simulations)

Use of multiple data sources enable cross-verification of the sanity of assumptions. For instance, predictions of the market size in units or in money should fit with the amount of potential customers and the amount of money these customers are capable (and willing) to spend.

## 6.5 Do not panic in case of impossibilities

It is quite normal that the roadmap layers appear to be totally inconsistent. For instance, a frequent occurring effect is that the budget estimate in response to the market requirements is 3 times the available budget<sup>1</sup>. Retrospective analysis of past roadmaps shows that the realized amount of work for the given budget is often twice the estimate made for the roadmap. In other words, due to a number of effects the roadmap estimates tend to have a pessimistic bias. The overestimation can be caused by:

- Quantization effects of small activities (the amount of time is rounded to person weeks/months/years).
- Uncertainty is translated into margins at every level (module, subsystem, system).
- Counting activities twice (e.g., in technology development and in product development).
- Quantization effects of persons/roles (full time project leader, architect, product manager, et cetera per product).
- Lack of pragmatism, a more extensive technical realization than required for the market needs.
- Too many bells and whistles without business or customer value.

Initial technical proposals might be more extensive than required for market needs, as mentioned in the lack of pragmatism. Technical ambition is good during the roadmap process, as long as it does not pre-empt a healthy decision. The roadmapping discussions should help to balance the amount of technology anticipation with needs and practical constraints.

## 7 Acknowledgements

The insight that a roadmap should cover all 5 views from market to process came to me via Hans Brouwhuis. Roadmapping as a business tool gained momentum within Philips during the quality actions inspired by Jan Timmer.

The critical and constructive remarks by Jürgen Müller helped to shape this article.

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<sup>1</sup>This factor 3 is an empirical number which of course depends on the company and its culture

## References

- [1] Gerrit Muller. Requirements capturing by the system architect. <http://www.gaudisite.nl/RequirementsPaper.pdf>, 1999.
- [2] Gerrit Muller. The system architecture homepage. <http://www.gaudisite.nl/index.html>, 1999.

## History

**Version: 2.0, date: July 27, 2010 changed by: Gerrit Muller**

- refactored the original roadmapping paper, split of Chnage Management
- removed the theoretical roadmap

**Version: 1.2, date: July 14, 2010 changed by: Gerrit Muller**

- textual changes
- figure improvements

**Version: 1.1, date: June 8, 2010 changed by: Gerrit Muller**

- replaced lists and tables by figures

**Version: 1.0, date: May 31, 2002 changed by: Gerrit Muller**

- abstract added
- readability of some figures improved

**Version: 0.1, date: March 16, 2001 changed by: Gerrit Muller**

- new layout propagated

**Version: 0, date: December 3 1999 changed by: Gerrit Muller**

- Created, no changelog yet