Abstract

Formulating and deploying a strategy requires a combination of vision and analysis. Roadmapping is a tool to explore and articulate future needs and trends for different dimensions, such as the market and customer context, the product portfolio, the technology, competences and supply chain, and processes. Roadmapping helps by relating these different dimensions in time, with a horizon of many years. We will discuss how to create and maintain roadmaps and give practical tips on the format.
Opening Questions

Have you seen roadmaps in your organization?

What do you see in these roadmaps?
1. Brainstorm Roadmapping

2. Business Processes

3. Key Drivers

4. Roadmapping

5. Market Product Life Cycle

6. Strategy

Summary
Simplified process view

- **Strategy** process
- **Customer** oriented (sales, service, production) process
- **Product creation** process
- **People, process and technology** management process
Tension between processes

strategy process

supplying business

customer oriented

product creation

people, process and technology

short term; cashflow!

mid term; cashflow next year!

long term know how (soft) assets

feedback

value

Tutorial Roadmapping for Strategy Support
5 Gerrit Muller

version: 0.1 June 21, 2020

RSPprocessDecompositionAnnotated
Platform strategy adds one layer

- **Strategy**
  - **Customer** oriented
  - **Product creation**
  - **Component or platform creation**
  - **People, process and technology**

- **Value**
  - **Short term; cashflow!**
  - **Mid term; cashflow next year!**
  - **Long term assets**
  - **Long term know how (soft) assets**
Abstract

The notion of "business key drivers" is introduced and a method is described to link these key drivers to the product specification.
Example Motorway Management Analysis

Key-drivers

Safety
- Reduce accident rates
- Enforce law
- Improve emergency response

Effective Flow
- Reduce delay due to accident
- Improve average speed
- Improve total network throughput
- Optimize road surface
- Speed up target groups
- Anticipate on future traffic condition

Smooth Operation
- Ensure traceability
- Ensure proper alarm handling
- Ensure system health and fault indication

Environment
- Reduce emissions

Derived application drivers

- Early hazard detection with warning and signaling
- Maintain safe road condition
- Classify and track dangerous goods vehicles
- Detect and warn noncompliant vehicles
- Enforce speed compliance
- Enforce red light compliance
- Enforce weight compliance

Requirements

- Automatic upstream accident detection
- Weather condition dependent control
- Traffic speed and density measurement
- Cameras
- Deicing
- Traffic condition dependent speed control

Note: the graph is only partially elaborated for application drivers and requirements
## Method to create Key Driver Graph

- **Define the scope specific.** in terms of *stakeholder* or *market segments*
- **Acquire and analyze facts** extract *facts* from the *product specification* and ask *why questions* about the *specification* of existing products.*
- **Build a graph of relations between drivers and requirements** by means of brainstorming and discussions where *requirements* may have *multiple drivers*.
- **Obtain feedback** discuss with *customers*, observe their reactions.
- **Iterate many times** increased understanding often triggers the move of issues from *driver* to *requirement* or vice versa and rephrasing.
Recommendation for the Definition of Key Drivers

- Limit the number of key-drivers
  - minimal 3, maximal 6

- Don’t leave out the obvious key-drivers
  - for instance the well-known main function of the product

- Use short names, recognized by the customer.

- Use market-/customer- specific names, no generic names
  - for instance replace “ease of use” by “minimal number of actions for experienced users”, or “efficiency” by “integral cost per patient”

- Do not worry about the exact boundary between Customer Objective and Application
  - create clear goal means relations
Transformation of Key Drivers into Requirements

Customer What
- Customer objectives

Key Drivers

Customer How
- Application

Derived Application Drivers

Product What
- Functional

Goal

Means
- may be skipped or articulated by several intermediate steps

Functions
- interfaces
- performance figures
What are the key drivers of your customers?

Can you quantify these key drivers?
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.
The Roadmap Integrates Five Views

Customer objectives
Application
Functional
Conceptual
Realization

Market
Products
Technology
People
Process

time, ca 5 years

drives, requires
supports, enables

Marketing
time, ca 5 years

Architect
people manager

Roadmapping
version: 2.0
June 21, 2020

Gerrit Muller
## Granularity of Roadmap Material

<table>
<thead>
<tr>
<th>Top-level roadmap</th>
<th>Single page</th>
<th>Poster</th>
<th>part of many presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting roadmaps</td>
<td>Single page per view or per driver</td>
<td>Poster</td>
<td>part of many presentations</td>
</tr>
<tr>
<td>Supporting reports</td>
<td>Document per relevant subject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Problems that Occur without Roadmapping

- Frequent changes in product policy
- Late start up of long lead activities, such as people recruitment and process change
- Diverging activities of teams
- Missed market opportunities
Management with a Limited Horizon

![Diagram showing management with a limited horizon over the years 2012, 2013, and 2014. Features and horizon are indicated with arrows. Feature still unknown in 2014. Do! in 2012 and 2014, Stop in 2013.]

Roadmapping
17  Gerrit Muller
Management with a Broader Time Perspective

Legend:
- **Number of people allocated**
- **Time**

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Now</td>
<td>Feature</td>
</tr>
<tr>
<td>2013</td>
<td>Now</td>
<td>Feature</td>
</tr>
<tr>
<td>2104</td>
<td>Continue with</td>
<td>0.5 person</td>
</tr>
<tr>
<td></td>
<td>1.5 persons</td>
<td></td>
</tr>
</tbody>
</table>

Preparation by 0.5 person

Work with 1.5 persons

Continue with 0.5 person

Work with 1.5 persons
Creation or Update of Roadmap in Burst Mode

- **Market**
  - **Collective meeting ca 2 days**
  - **2 weeks to digest and prepare**
  - **preparation by expert teams**

- **Products**
  - **Collective meeting ca 2 days**

- **Technology**
  - **Collective meeting ca 2 days**

- **People**
  - **Collective meeting ca 2 days**

- **Process**
  - **Collective meeting ca 2 days**

---

Roadmapping
Gerrit Muller
version: 2.0
June 21, 2020
ROADbursts
### Typical Stakeholders of a Roadmap

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Manager</td>
<td>Overall enterprise responsible</td>
</tr>
<tr>
<td>Marketing Manager(s)</td>
<td>Discipline or line managers</td>
</tr>
<tr>
<td>People, Process, and Technology Manager(s)</td>
<td></td>
</tr>
<tr>
<td>Operational Manager(s)</td>
<td>Project or program managers</td>
</tr>
<tr>
<td>Architect(s)</td>
<td></td>
</tr>
</tbody>
</table>
Target of the First Session

Shared vision on market

First iteration of possible products as an answer to the market

Share technology status, as starting point for technology roadmap

Explore people and technology status, to identify main issues
Target of the Second Session

Obtaining a shared vision on the desired technology roadmap

Sharing the people and process issues required for the products defined in the first iteration

Analyzing a few scenarios for products, technologies, people, and process
The Roadmap Update Visualized in Time

**Market:** What is needed by the customers?

- **Products:** How to package technologies into products to fulfill market needs?

- **Technology:** What technological trends are relevant? What technologies are needed?

- **People:** What kind of and how many people are required to realize the products and technologies?

- **Process:** What processes are required to let these people realize the products and technologies?
From Roadmap to Detailed Plans

Roadmapping
24 Gerrit Muller

version: 2.0
June 21, 2020
ROADbudgetPlan
## 3-Tier Approach

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

Roadmapping
25 Gerrit Muller
Selection of most important or relevant issues
Key drivers as a means to structure the roadmap
Nothing is certain; ambiguity is normal
Use facts whenever possible
Don’t panic in case of impossibilities
Requirements for a Good Roadmap

Recognizable issues for all stakeholders

Clear positioning in time; uncertainty can be visualized

The main events (enabling or constraining) must be present

Limited amount of information to maintain the overview
Sources of Facts

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

Quantization effects of small activities (the amount of time is rounded to manweeks/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 (technical ambition is not too bad during the roadmap process, as long as it does not pre-empt a healthy decision)

Too many bells and whistles without business or customer value
Figure 3: Oil & Gas production profile, 2008 case base

<table>
<thead>
<tr>
<th>Brainstorm Trends Oil and Gas Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brain storm</strong></td>
</tr>
<tr>
<td>Trends in oil and gas production</td>
</tr>
<tr>
<td>social</td>
</tr>
<tr>
<td>demographic</td>
</tr>
<tr>
<td>regulatory</td>
</tr>
<tr>
<td>political</td>
</tr>
<tr>
<td>economical</td>
</tr>
<tr>
<td>geographic</td>
</tr>
<tr>
<td>ecological</td>
</tr>
<tr>
<td>technical</td>
</tr>
<tr>
<td>competing energy sources</td>
</tr>
<tr>
<td>other</td>
</tr>
</tbody>
</table>
Abstract

The lifecycle of a product category in the market determines many aspects of the architecting approach. The lifecycle consists typical of 4 phases: infancy, adolescence, mature and aging.

A discontinuity in market success is seen in the transition from one phase to the next phase. The explanation given is that the phases differ in characteristics and require different approaches. The right approach for one phase is sub optimal for the next phase. A set of characteristics per phase is given and the consequences for architecting are discussed.
Market Product Life Cycle Phases in Practice

- Infancy
- Adolescence
- Maturity
- Aging

- Ideal "bathtub" curve
- Observed curve
- Product unable to make transition

Sales volume vs. time graph illustrating the life cycle phases.
Examples of Product Classes on the Curve

- **Infancy**
  - functional MRI
  - digital TV

- **Adolescence**
  - DVD+RW
  - flat TV

- **Maturity**
  - MRI scanner
  - DVD

- **Aging**
  - X-ray systems
  - VCR
  - TV

**Market Product Life Cycle Consequences for Architecting**

Version: 1.2

June 21, 2020

MPLifecycleGraphExamples
## Attributes per Phase

<table>
<thead>
<tr>
<th></th>
<th>Infancy</th>
<th>Adolescence</th>
<th>Mature</th>
<th>Ageing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Driving factor</strong></td>
<td>Business vision</td>
<td></td>
<td>Stable business model</td>
<td>Harrowing of assets</td>
</tr>
<tr>
<td><strong>Value from</strong></td>
<td>Responsiveness</td>
<td>Features</td>
<td>Refinements / service</td>
<td>Refining existing assets</td>
</tr>
<tr>
<td><strong>Requirements</strong></td>
<td>Discovery</td>
<td>Select strategic</td>
<td>Prioritize</td>
<td>Low effort high value only</td>
</tr>
<tr>
<td><strong>Dominant technical concerns</strong></td>
<td>Feasibility</td>
<td>Scaling</td>
<td>Legacy</td>
<td>Lack of product knowledge Low effort for obsolete technologies</td>
</tr>
<tr>
<td><strong>Type of people</strong></td>
<td>Inventors &amp; pioneers</td>
<td>Few inventors &amp; pioneers &quot;designers&quot;</td>
<td>&quot;Engineers&quot;</td>
<td>&quot;Maintainers&quot;</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Chaotic</td>
<td></td>
<td>Bureaucratic</td>
<td>Budget driven</td>
</tr>
<tr>
<td><strong>Dominant pattern</strong></td>
<td>Overdimensioning</td>
<td>Conservative expansion</td>
<td>Midlife refactoring</td>
<td>UI gadgets</td>
</tr>
</tbody>
</table>
From roadmap to planning

roadmap

sharing understanding exploring positioning

vision/ambition opportunities broader context consequences

plan

allocate prepare commit empower

milestones sales products people/skills
Summary of strategy process

- **Vision**: business specific, but open and generic
- **Mission**: 
- **Empowerment**

---

### Market Product Life Cycle Consequences for Architecting

**Version**: 1.2  
**Date**: June 21, 2020  
**Author**: Gerrit Muller

---

**Table: Gemini**

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales Products</th>
<th>FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Q1</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key Details**
- **Software**: 2 units
- **Electronics**: 5 units
- **Mechanics**: 6 units
- **Optics**: 4 units
- **Total**: 20 units
- **Sales**
  - **Total**: $300,000
  - **Q1**: $100,000
  - **Q2**: $70,000
  - **Q3**: $100,000
  - **Q4**: $105,000

---

**Network Diagram**

- **Context Overview**: reality, facts
- **Feasibility Plan**: input for next roadmap
- **Personnel**: input focus
- **Process**: input
- **Technology**: focus
- **Market**: sharpen

---

**Roadmap**

- **Forecasted Facts**
- **Educated Scenarios**
- **Estimates**
Summary of role in business

- Strategy process
- Roadmap
- Plan
- Empowerment
- Context, overview
- Product creation process
- People, process and technology management process
- Customer oriented (sales, service, production) process