Roadmapping for Strategy Support

Prof Gerrit Muller
Buskerud University College/Embedded Systems Institute
Laplace Building 0.10
P.O. Box 513
5600 MB Eindhoven
The Netherlands
http://www.gaudisite.nl/
Gerrit.Muller@EmbeddedSystems.nl

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. Unfortunately most companies limit their roadmaps to either products and technology. In this tutorial we will show how to increase the roadmap value by integrating 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.

Biography

Gerrit MULLER, originally from the Netherlands, received his Master’s degree in physics from the University of Amsterdam in 1979. He worked from 1980 until 1997 at Philips Medical Systems as a system architect, followed by two years at ASML as a manager of systems engineering, returning to Philips (Research) in 1999. Since 2003 he has worked as a senior research fellow at the Embedded Systems Institute in Eindhoven, focusing on developing system architecture methods and the education of new system architects, receiving his doctorate in 2004. In January 2008 he became a full professor of systems engineering at Buskerud University College in Kongsberg, Norway.

All information (System Architecture articles, course material, curriculum vitae) can be found at: Gaudi systems architecting http://www.gaudisite.nl/
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?
Simplified process view

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

Customer

Supplying business

Value
Tension between processes

- Strategy
- Process
- Supplying business
- Value
- Feedback
- Product creation
- Customer oriented
- Short term; cashflow!
- Mid term; cashflow next year!
- Long term
- Know how
- (soft) assets
- People, process and technology
Platform strategy adds one layer

- **Strategy**: customer oriented
- **Supplying Business Value**
  - **Short Term**: cashflow!
  - **Mid Term**: cashflow next year!
  - **Long Term**: assets
    - **Know How**: (soft) assets

- **Component or Platform Creation**
- **Product Creation**
- **People, Process and Technology**
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
  - Optimise 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 signalling
- Maintain safe road condition
- Classify and track dangerous goods vehicles
- Detect and warn non compliant vehicles
- Enforce speed compliance
- Enforce red light compliance
- Enforce weight compliance

Requirements
- Automatic upstream accident detection
- Weather condition dependent control
- Automatic counter flow traffic detection
- De-icing
- 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 brainstorms 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”

- **Don’t 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
- **Application** (How)
  - Derived Application Drivers
  - means
  - may be skipped or articulated by several intermediate steps
- **Product** (What)
  - Functional
  - functions
  - interfaces
  - performance figures

Key Drivers: What Customer objectives

Requirements: What Functional
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

- Market
- Products
- Technology
- Process
- People

Drives, requires, supports, enables

Time, ca 5 years

Marketing

Architect

People and technology manager

Roadmapping

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ROADstructure

Gerrit Muller
## Granularity of Roadmap Material

<table>
<thead>
<tr>
<th>Toplevel 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

2000  |  2001  |  2002

Feature still unknown

Do!

Stop

Do!
Management with a Broader Time Perspective

2000
now

2001
feature

2002
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
- Products
- Technology
- People
- Process

Collective meeting ca 2 days

2 weeks to digest and prepare

preparation by expert teams

Shared Roadmap

Collective meeting ca 2 days

2 weeks to digest and prepare

Collective meeting ca 2 days

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ROADbursts
Typical Stakeholders of a Roadmap

- Business manager (overall enterprise responsible)
- Marketing manager
- People and technology manager(s)
- Operational manager(s)
- Architect
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 required by the customers and how?

**Products**: Which packaging of technology into products fulfils the customer needs?

**Technology**: Which technological trends are relevant?

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

**Process**: Which processes are required to realize the products and technologies with these people?

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From Roadmap to Detailed Plans

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Roadmapping

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ROADbudgetPlan

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Policy and Planning Process

Product Creation Process

201X

Q2  Q3  Q4  Q1

roadmap n

budget & allocation

detailed planning

market event

tech hurdle

201Y

Q1  Q2  Q3  Q4

roadmap n+1

budget

Q1 delta  Q2 delta  Q3 delta

budget

Q1 delta
## 3-Tier Approach

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<th>update</th>
<th>scope</th>
<th>type</th>
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<td>5 years</td>
<td>1 year</td>
<td>Portfolio</td>
<td>Vision</td>
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<tr>
<td>Budget</td>
<td>1 year</td>
<td>3 months</td>
<td>Program</td>
<td>Commitment</td>
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<tr>
<td>Detailed plan</td>
<td>1 mnth..1yr</td>
<td>1 day..1 mnth</td>
<td>Project or activity</td>
<td>Control means</td>
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</table>
Roadmap Essentials

- 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)
• Suppliers (roadmaps, historical data)
• Internal reports (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
Example Market Roadmap

- **Smooth viewing**: 25 in 2001, 50 in 2002, 60 in 2003, 100 in 2004
- **Expected breakthrough**: gadget only
- **Integration in other appliances**: Africa
- **Ease of use**: mass production and distribution
- **Higher reliability?**
- **Tremendous impact on the rest of the company**
Example Product Roadmap

Product:
- S1
- S1A
- S2
- S3
- S4
- S5
- H4711Combi
- T1
- S6
- T2
- carrier
derivatives

Years:
- 2000
- 2001
- 2002
- 2003
- 2004
- Xmas
- Xmas
- Xmas
- Xmas

First generation products
Second generation products
Integrated products
Example Technology Roadmap

<table>
<thead>
<tr>
<th>Technology</th>
<th>Platform</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4 Component Extraction</th>
<th>R5</th>
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version: 1.0
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ROADexampleTechnology
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Example Process Roadmap

<table>
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<th>Year</th>
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<th>Product</th>
<th>Platform</th>
<th>Component wise</th>
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<td>2004</td>
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Bootstrapping the Roadmap Process

-1st order roadmap
facts as perceived by the stakeholders

0th order roadmap
serious attempt to obtain a consistent vision

eyeopener for many stakeholders, first overview of business and time context

1st order roadmap
full blown roadmap; supporting reports are still limited

shared understanding of product positioning and required technology investments

2nd order roadmap
explicit forecast of people and process needs

time

2..4 years
Roadmap Bootstrapping Spiral Model

Apply and earn credit

Collect facts

Integrate facts, create vision

Communicate

Apply and earn credit

Collect facts

Integrate facts, create vision

Communicate
Change Management Heuristics

- People don’t want to be changed. They are quite often willing to change.
- Changing the way of working or the culture costs many years.
- Work at multiple tracks at the same time, a.o. managerial, operational, strategic, etc.
- Earn credit by showing usable results.
Figure 3: Oil & Gas production profile, 2008 case base

Brainstorm Trends in Oil and Gas Production

Trends in oil and gas production

- social
- demographic
- regulatory
- political
- economical
- geographic
- ecological
- technical
- competing energy sources
- other
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, adolesence, 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 lifecycle phases

- Infancy
- Adolescence
- Mature
- Aging

Sales volume vs. time graph.
Compared with ideal bathtub curve
Examples of market product lifecycle

- Infancy: MRI, digital TV
- Adolescence: DVD+RW, flat TV
- Mature: MRI scanner, DVD
- Aging: X-ray systems, VCR, TV

Sales volume over time:
- Infancy
- Adolescence
- Mature
- Aging

Market Product lifecycle consequences for architecting

Gerrit Muller

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MPLifecycleGraphExamples
<table>
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<tr>
<th>Attributes per phase</th>
<th>infancy</th>
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<th>mature</th>
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<td>prioritise</td>
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<td>legacy</td>
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<td>conservative expansion</td>
<td>mid-life refactoring</td>
<td>UI gadgets</td>
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</table>
From Market, Product, Technology to People, Process

- **Customer objectives**
  - Market
- **Functional**
  - Products
- **Conceptual**
  - Technology

**feedback**

**homework**

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<tr>
<th>software</th>
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</table>

estimate by program manager

estimate by people manager

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RSPfromMPToPP
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

- Mission:
  - Business specific, but open and generic

- Vision:
  - Empowerment

- Input:
  - Context overview
  - Reality facts

- Focus:
  - Roadmap

- Process:
  - Forecasted facts
  - Educated scenarios

- People:
  - Estimates

- Market:
  - Products lifecycle consequences for architecting

- Technology:
  - Forecasted facts

- Reality facts:
  - Input for next roadmap

Gemini

<table>
<thead>
<tr>
<th>Sales Products</th>
<th>k$ unit</th>
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<th>Q2</th>
<th>Q3</th>
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<td>70</td>
<td>90</td>
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<td>70</td>
<td>90</td>
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</tbody>
</table>

2002 actual sales:
- Software: 100
- Electronics: 80
- Mechanics: 40
- Optics: 20
- Total: 300

2003 sales:
- Software: 150
- Electronics: 100
- Mechanics: 50
- Optics: 30
- Total: 430

Roadmap:
- Reality facts
- Input for next roadmap

Reality facts:
- Input for committal plan
Summary of role in business

- **Customer oriented process** (sales, service, production)
- **Product creation process**
- **People, process and technology management process**
- **Focus, context, overview**
- **Empowerment**
- **Reality facts**
- **Strategy process**
- **Roadmap plan**

**Market Product lifecycle consequences for architecting**

Gerrit Muller