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Software Product Management

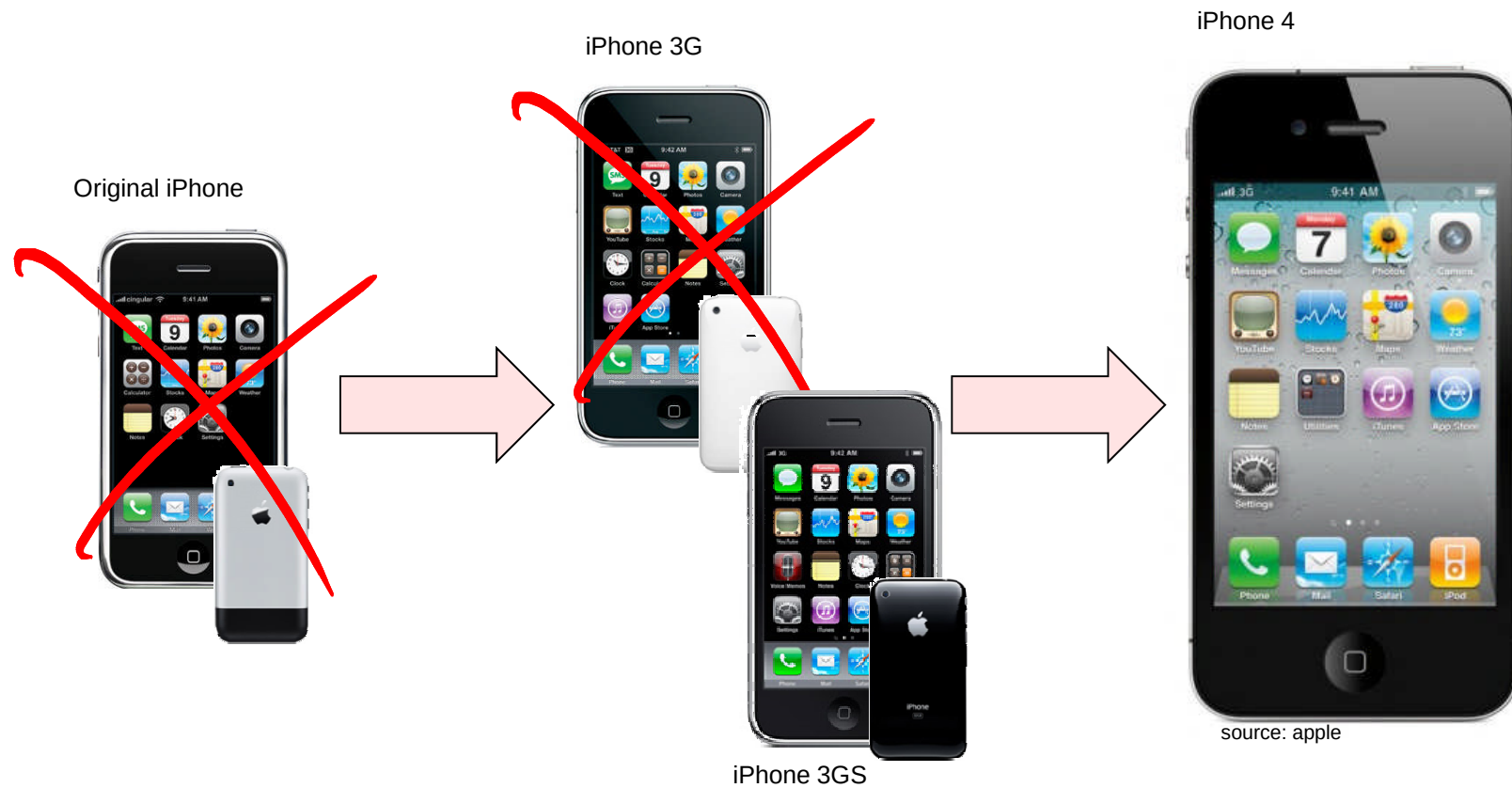
Release Planning

Nov 08, 2010

Samuel Fricker
(fricker@ifi.uzh.ch)



Evolution of Software Products



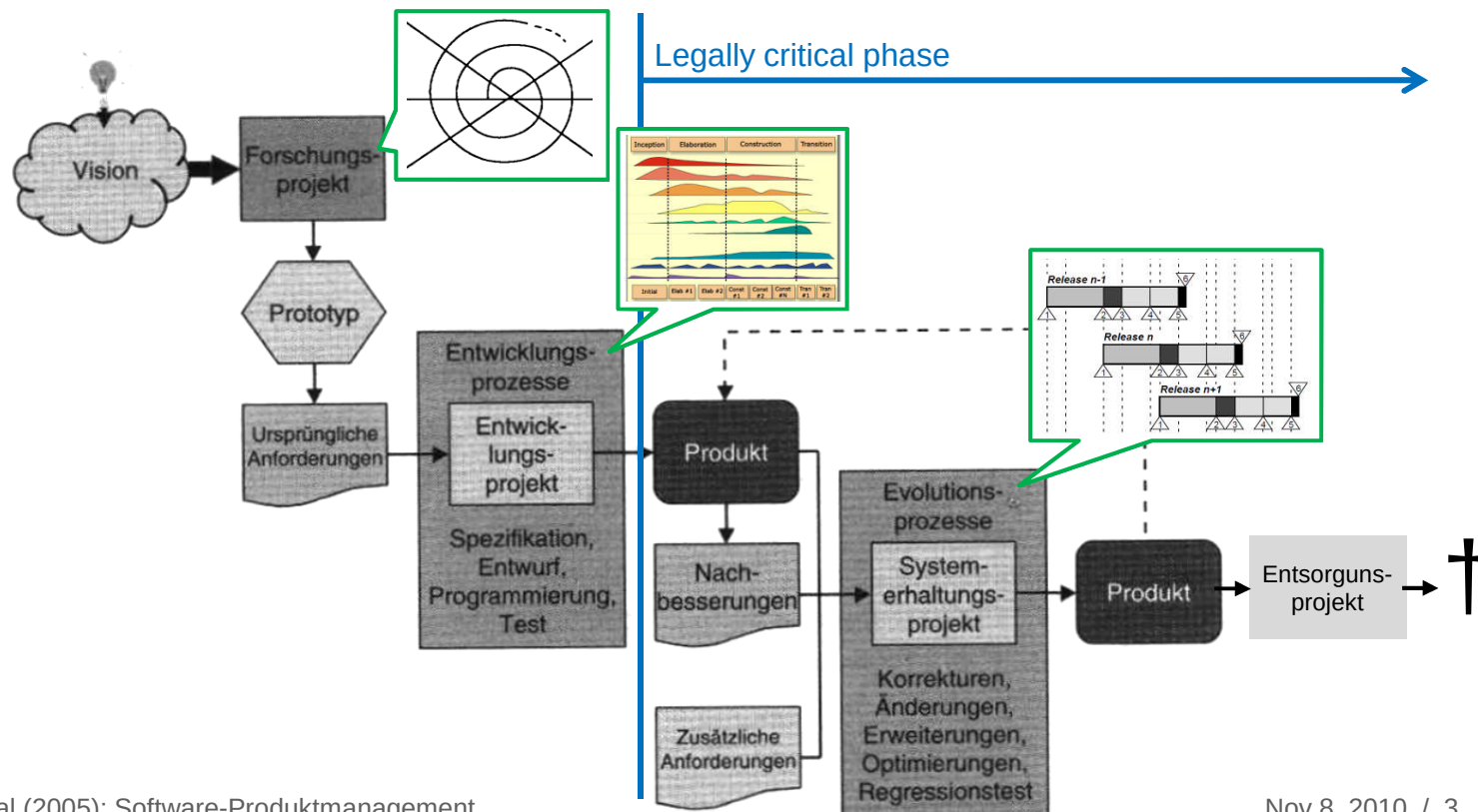
Technical View: SPM = Lifecycle Management



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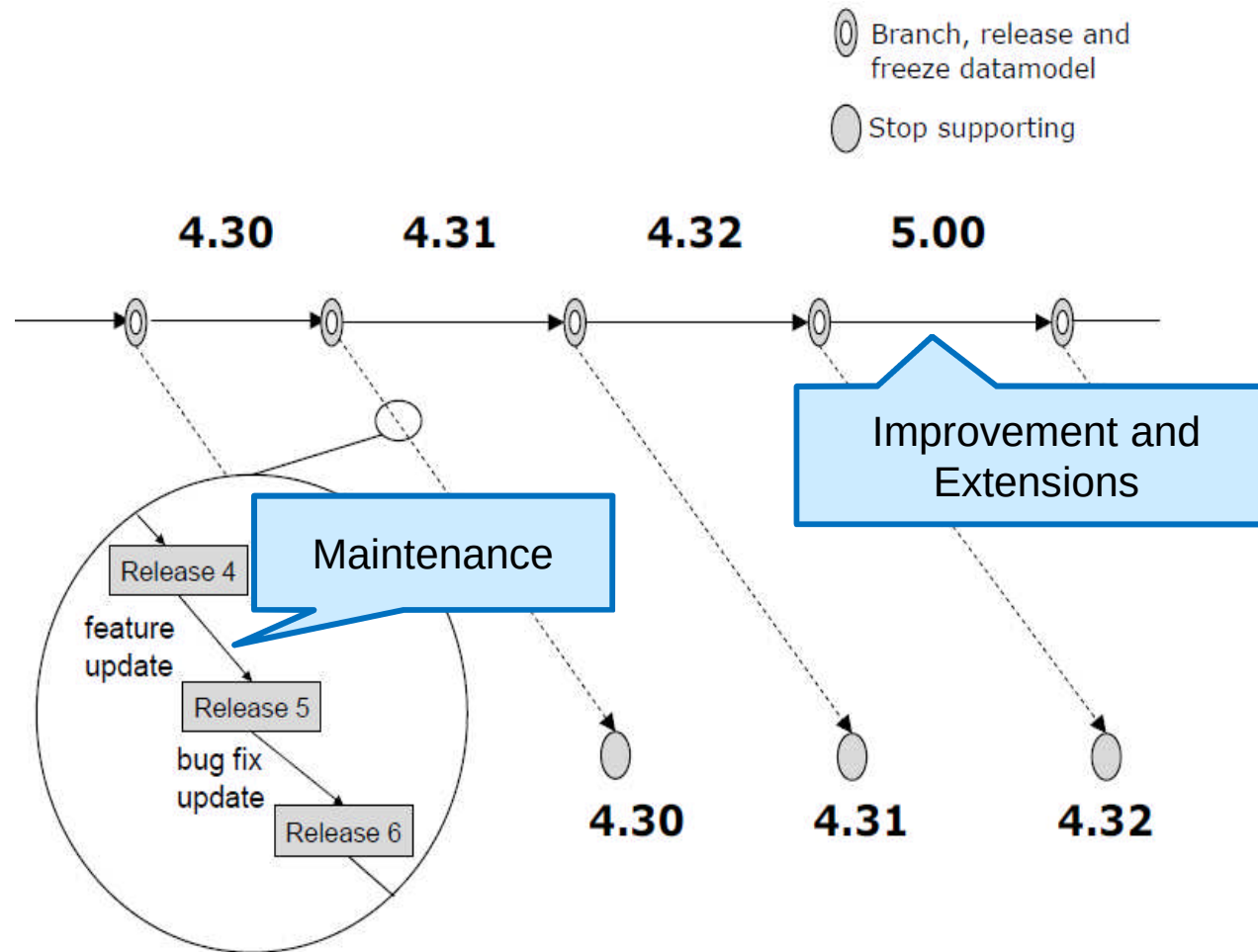


- Software Engineering in the Large
 - Prototype, Product, Project, Process



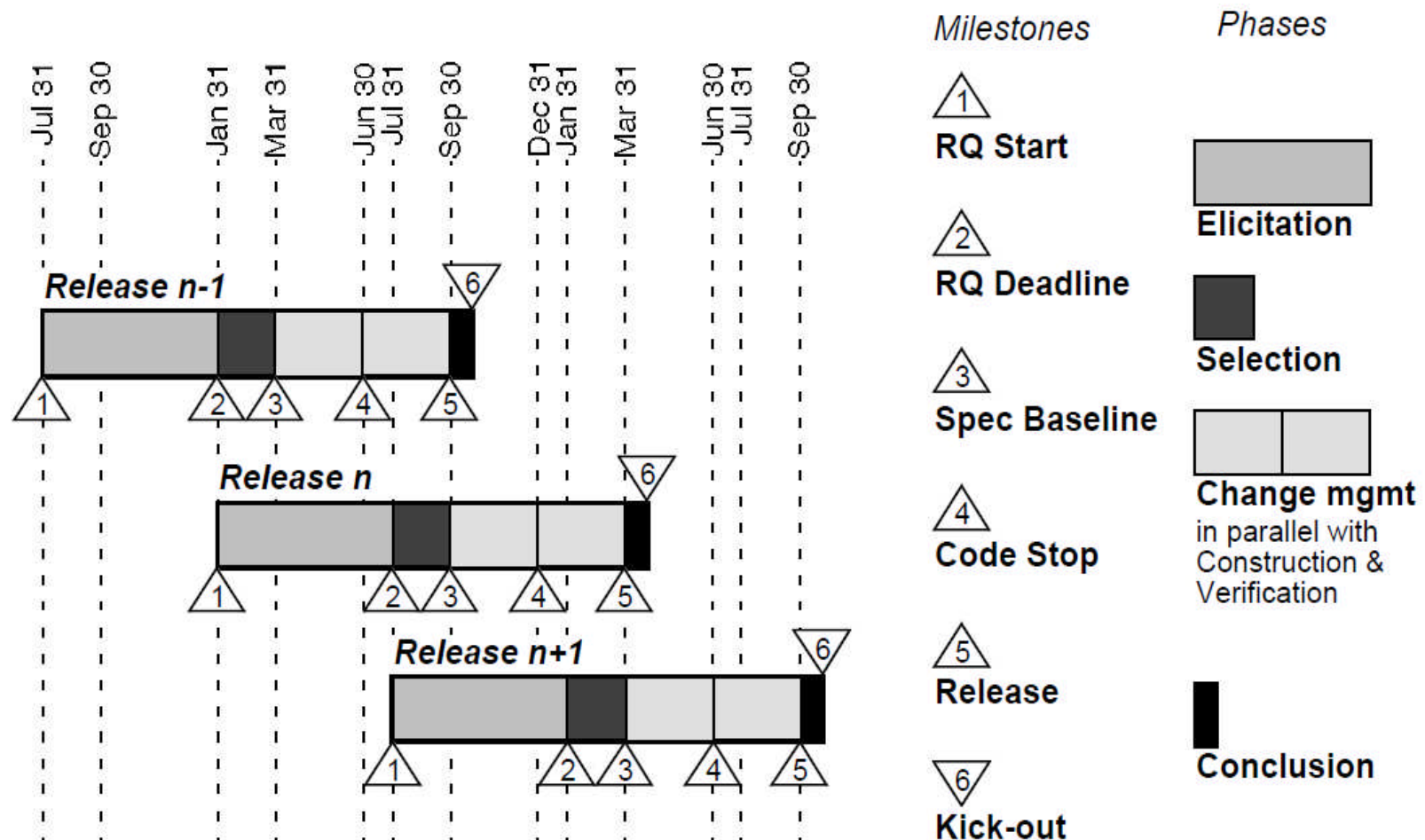


Software Evolution





Release Plans



Focus



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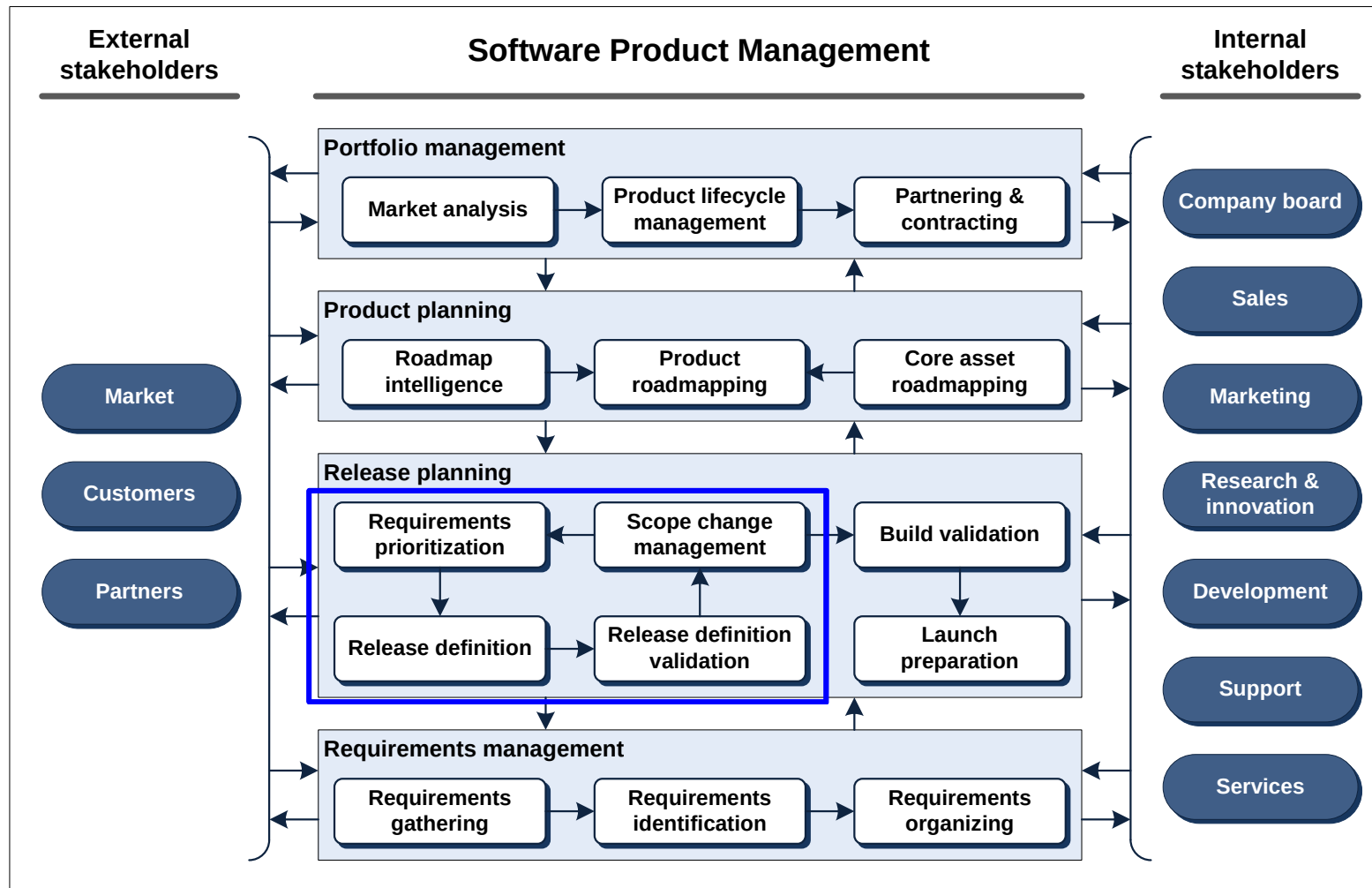


	Market Analysis	Product Analysis	Product Strategy	Product Planning	Development	Marketing	Sales and Distribution	Support and Services
Often on corporate level			Portfolio Management	Resource Allocation	Resource Allocation	Marketing Strategy and Plan	Sales Strategy and Plan	
Product (family) level	Market Research Market Sizing Market Problems Technology Assessment Competitive Analysis	Product Performance Customer Satisfaction Win/loss Analysis Opportunities	Positioning Delivery Model Pricing Model Pricing Business Case Make or buy Ecosystem Legal terms Protection of Intellectual Property	Roadmap Release Plan Requirements Management Functional Specification	Project Plan Technical Specification Project Requirements Management Implementation Quality Assurance Technology Innovation	Launch Plan Customer Analysis Partner Management Operational Marketing Material	Channel Preparation Operational Sales Operational Distribution Material	Customer Support Technical Support Marketing Support Sales Support Services Preparation Operational Services Provision

Focus



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Contents

Learning Objectives

- Understand release planning
- Be able to propose a release plan

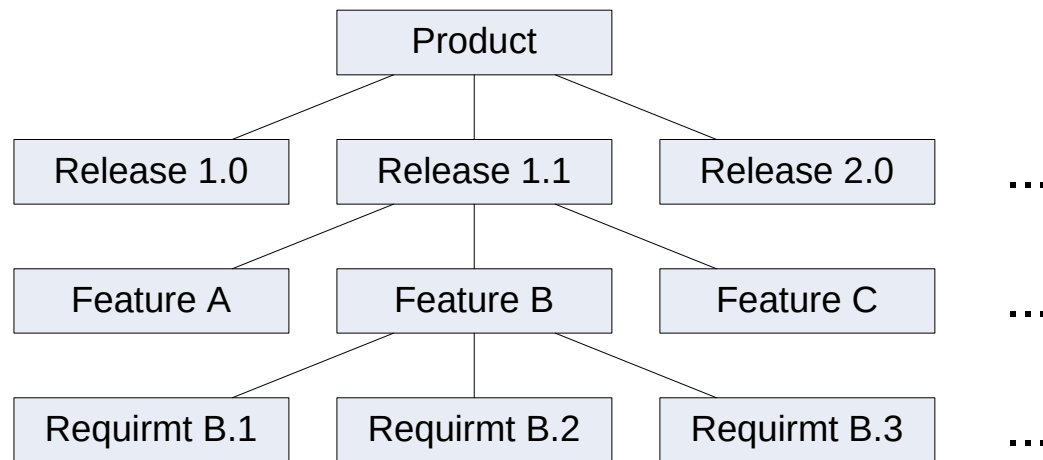
Agenda

- Release Planning
 - Fundamentals
- Prioritization
 - Simplification
 - Criteria
 - Techniques
 - Visualization



Software Product: Definitions

- Software product: a software that is offered to a market and that satisfies given customer expectations.
- Release: published version of the product.
- Feature: a functional or non-functional property of a product that is actively marketed. A feature corresponds to a thematic set of requirements.





Case Study iPhone: Features





Case Study iPhone: Releases

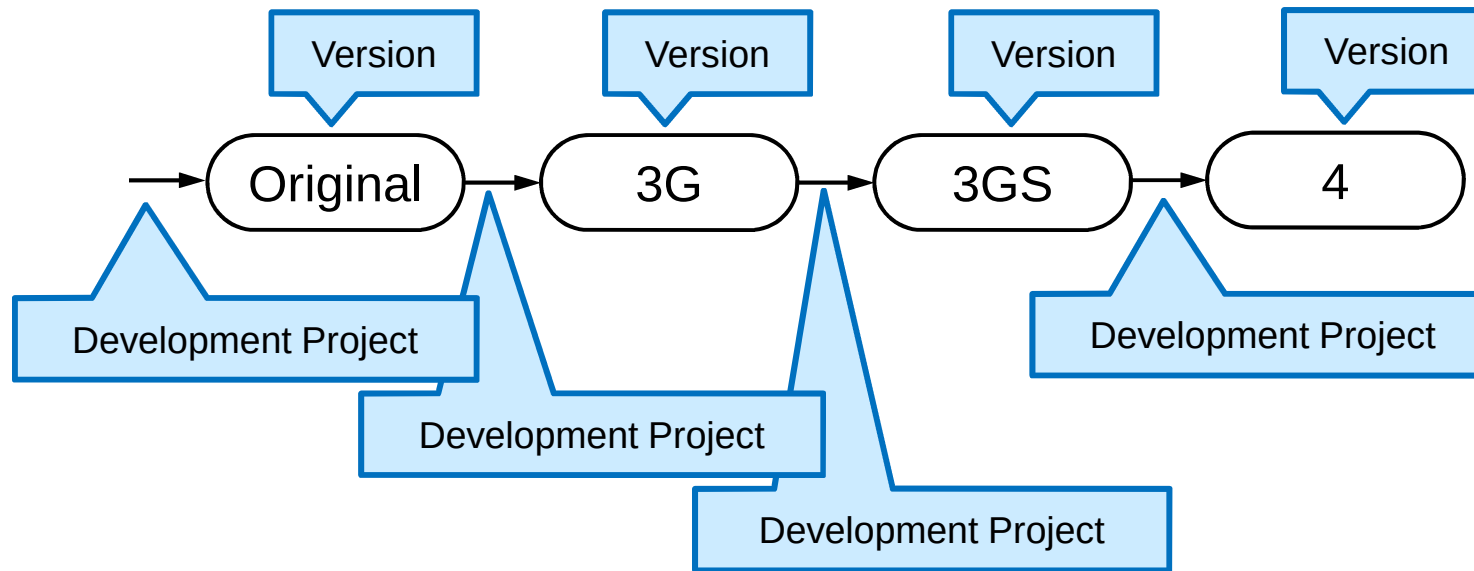


Merkmal	Version	Original	3G	3GS	4
Preis		-	\$99 für 8GB	\$199 für 16GB	
Releasedatum		29. Juni 2007	11. Juli 2008	19. Juni 2009	
Lautsprecher		Ja	Ja	Ja	
Kopfhöreranschluss		-	Ja	Ja	
Digitaler Kompass		-	-	Ja	
Safari		Ja	Ja	Ja	
EDGE Netzwerk		Ja	Ja	Ja	
3G Netzwerk		-	Ja	Ja	
4GB		Ja	-	-	
8GB		Ja	Ja	-	
16GB		Ja	Ja	Ja	
32GB		-	-	Ja	

Case Study iPhone: Development Projects



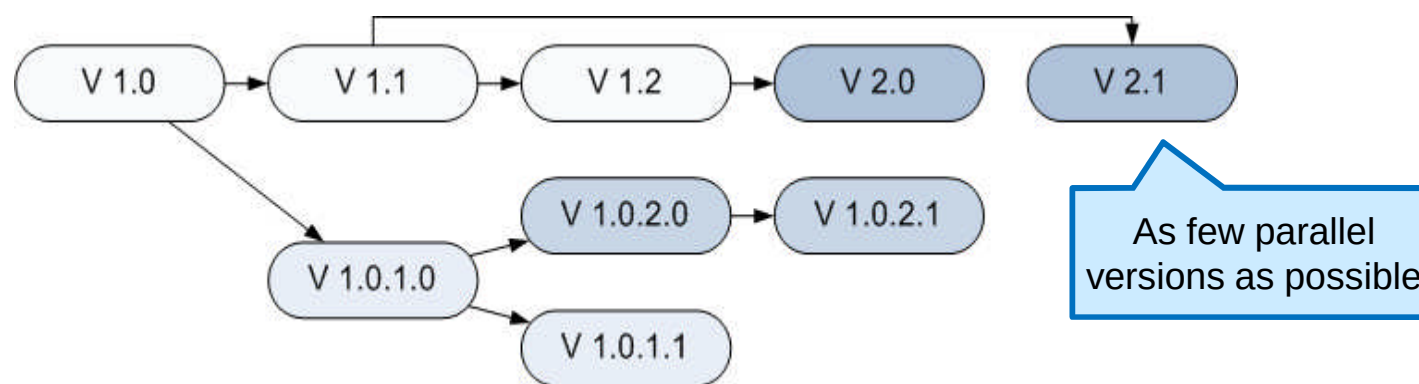
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Evolution of Software Products

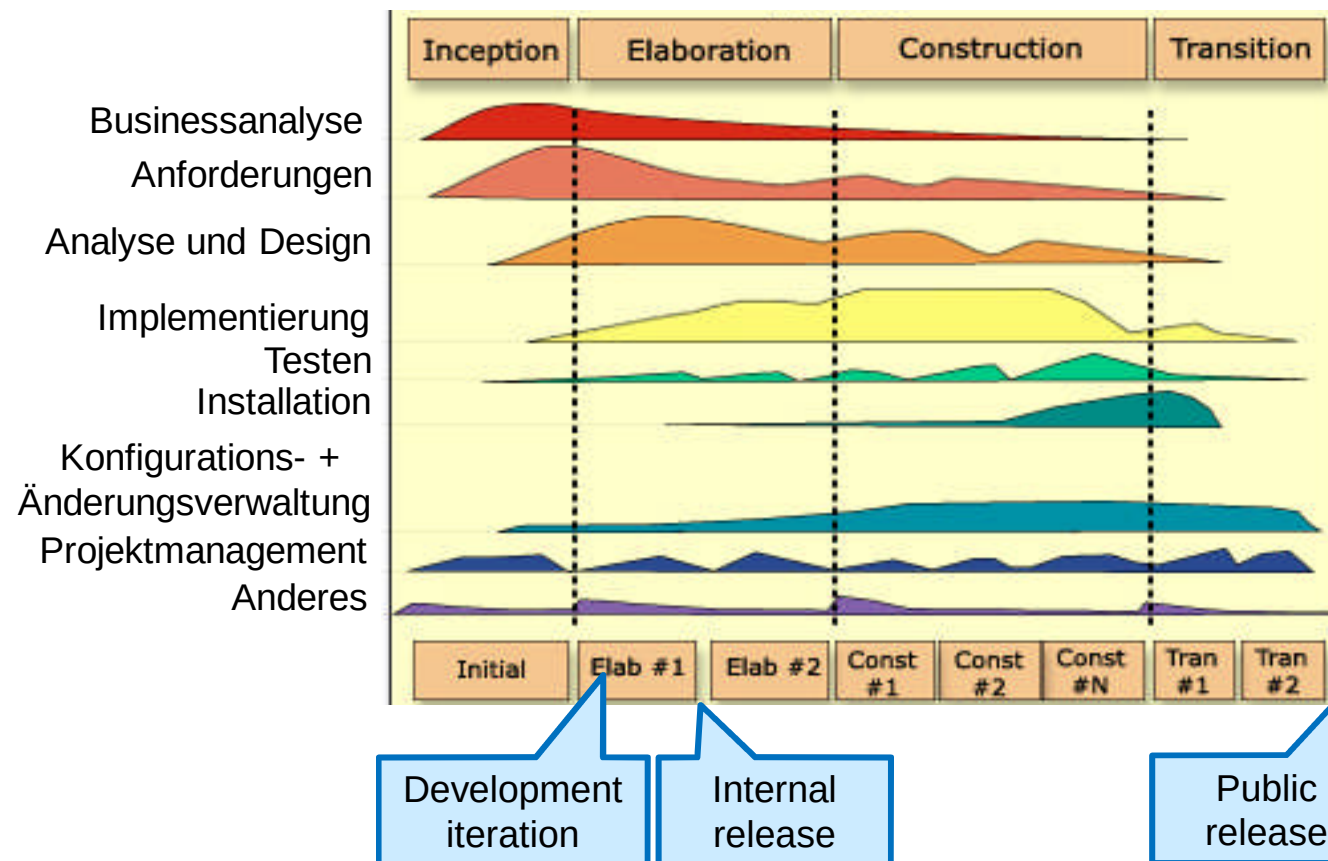
- A software product exists in different versions during its lifecycle.
- Conventions:
 - „X.0“ = significant changes,
 - „x.Y“ = improvements
 - Alternative: publication year (e.g. Windows 2007)



Release planning within the project: Rational Unified Process



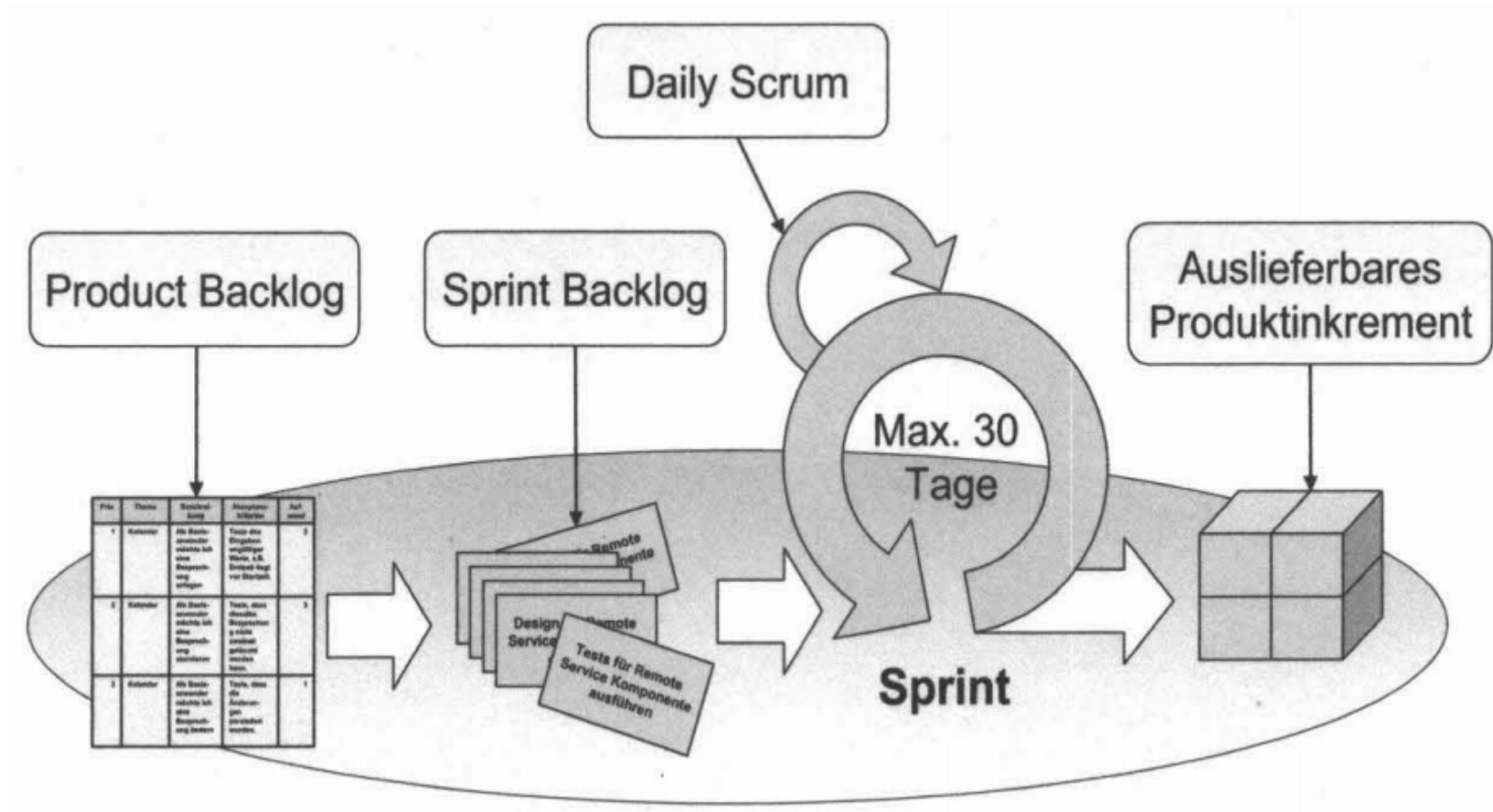
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Release planning within the project: Scrum



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Generic Release Planning Process



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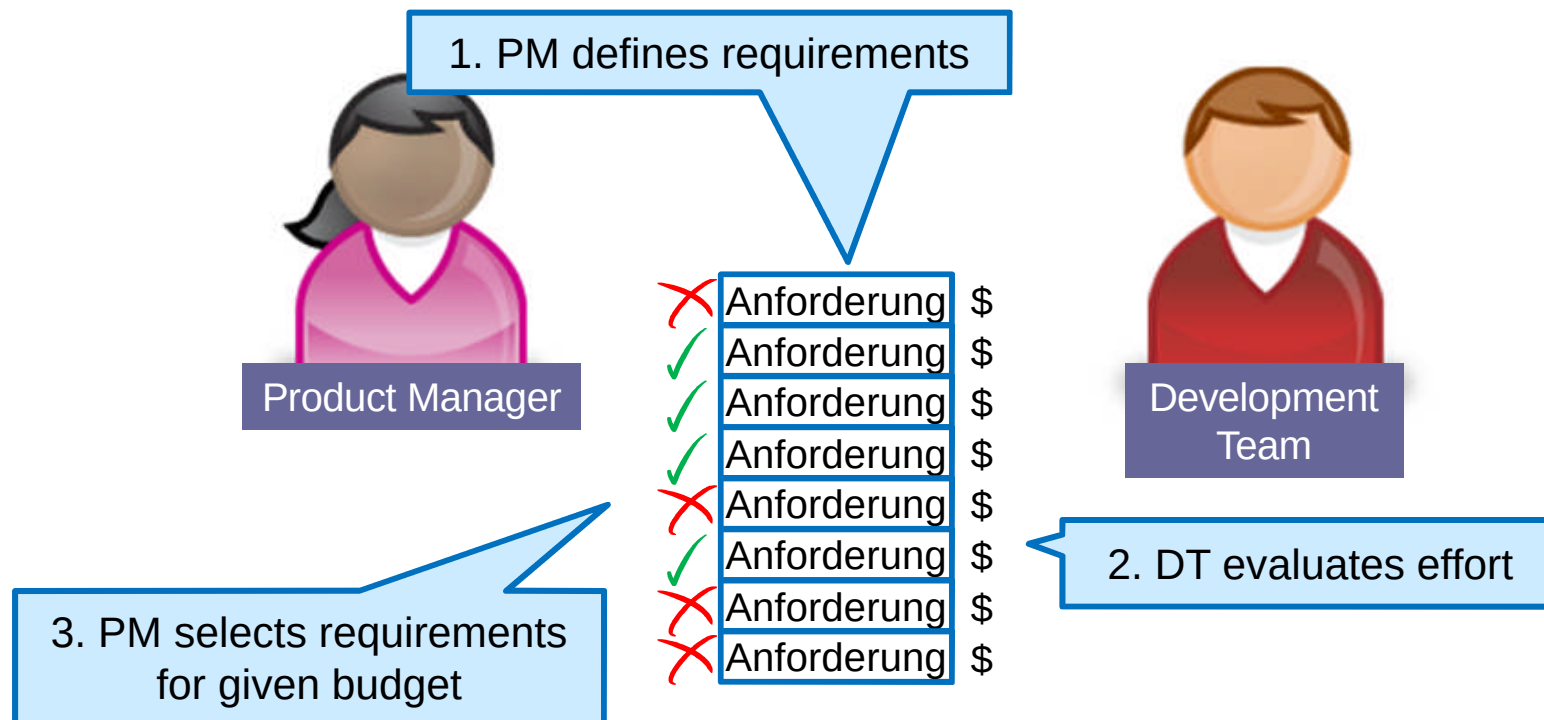


- Objectives:
 - Assign the right requirements to the right releases
 - Optimize release planning with experiences over time
- Process:
 1. Understand product context: organisation, process, culture
 2. Product RE: stakeholders, interests, expectations
 3. Evaluate requirements: dependencies, value, effort, etc.
 4. Prioritize requirements: development sequence
 5. Negotiate with stakeholders: agree on release plan
 6. Develop: Implement release
 7. Analyze experience: lessons-learned, process development

Easiest Case: Agile Planning Game



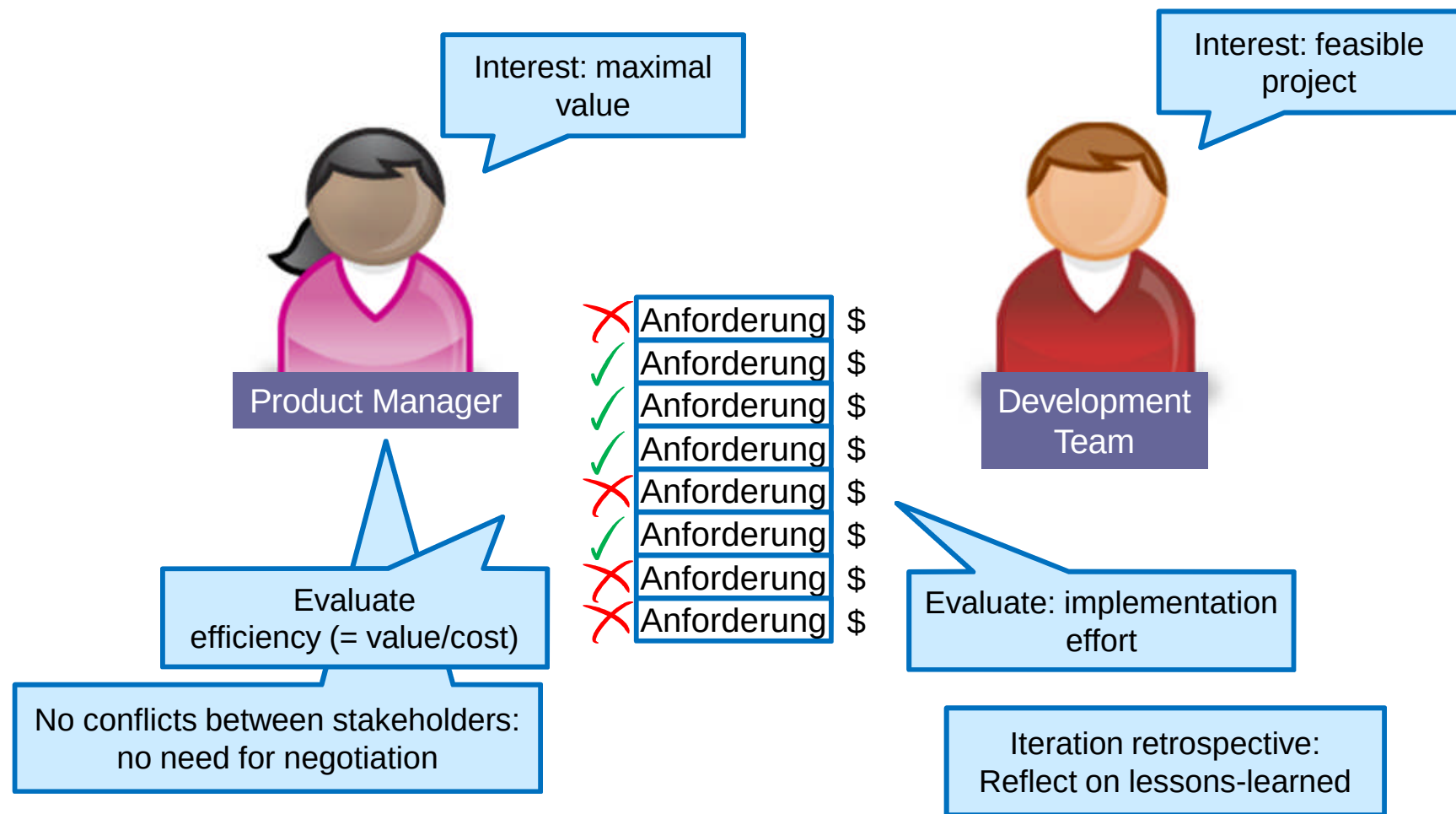
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Easiest Case: Agile Planning Game



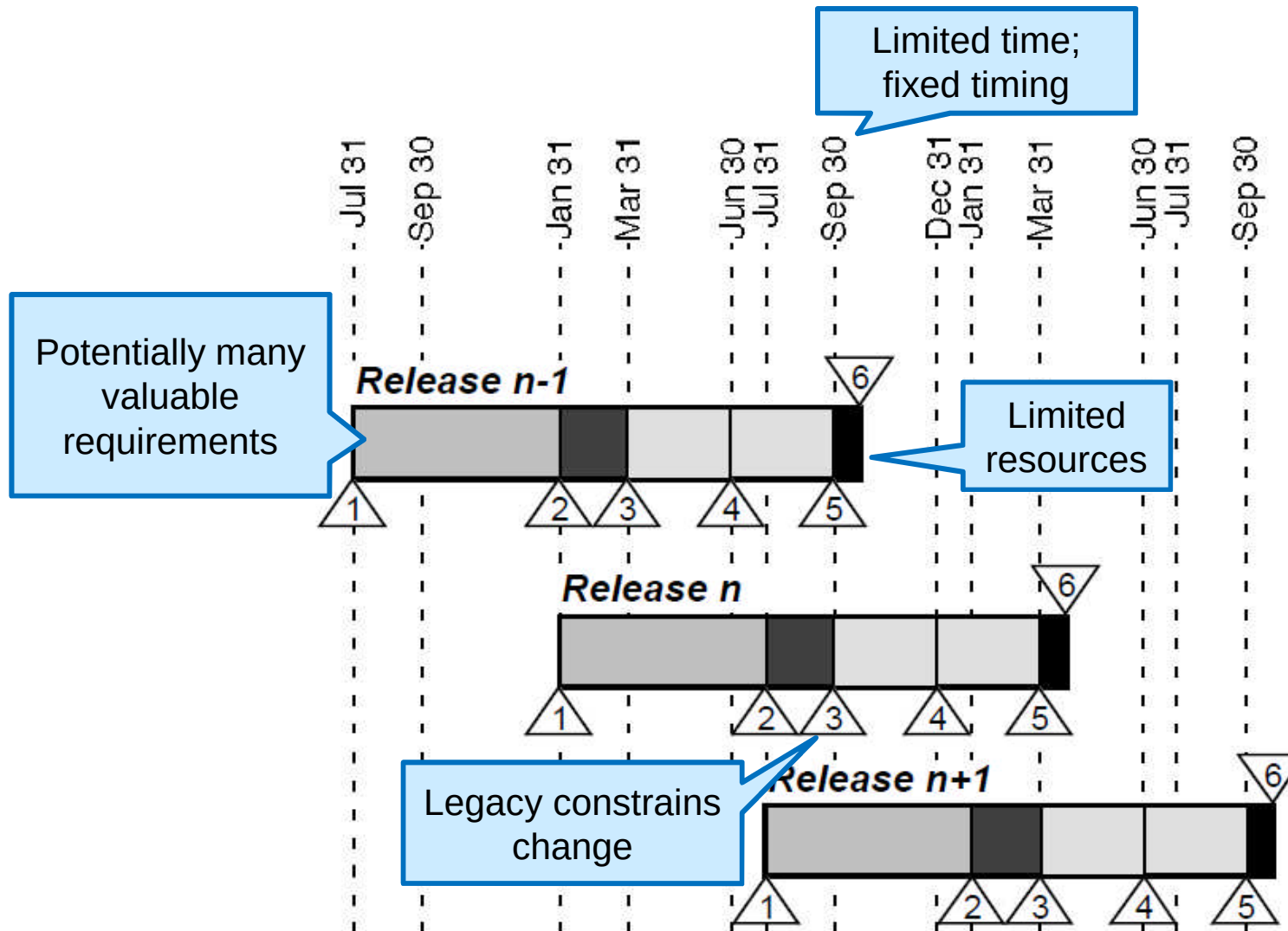
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More general way of looking at the release planning problem



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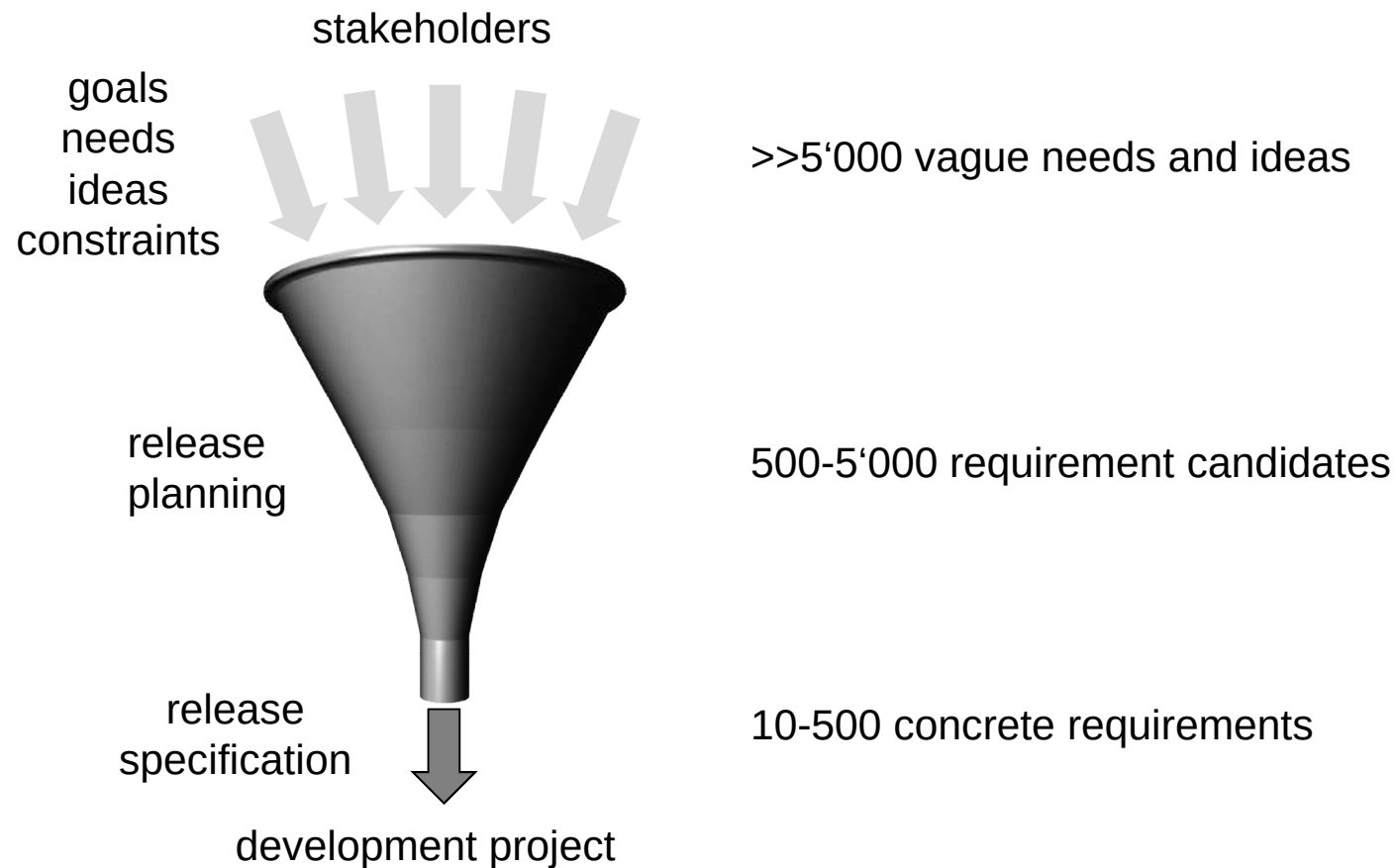
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Typical Situation in a Market-Driven Environment



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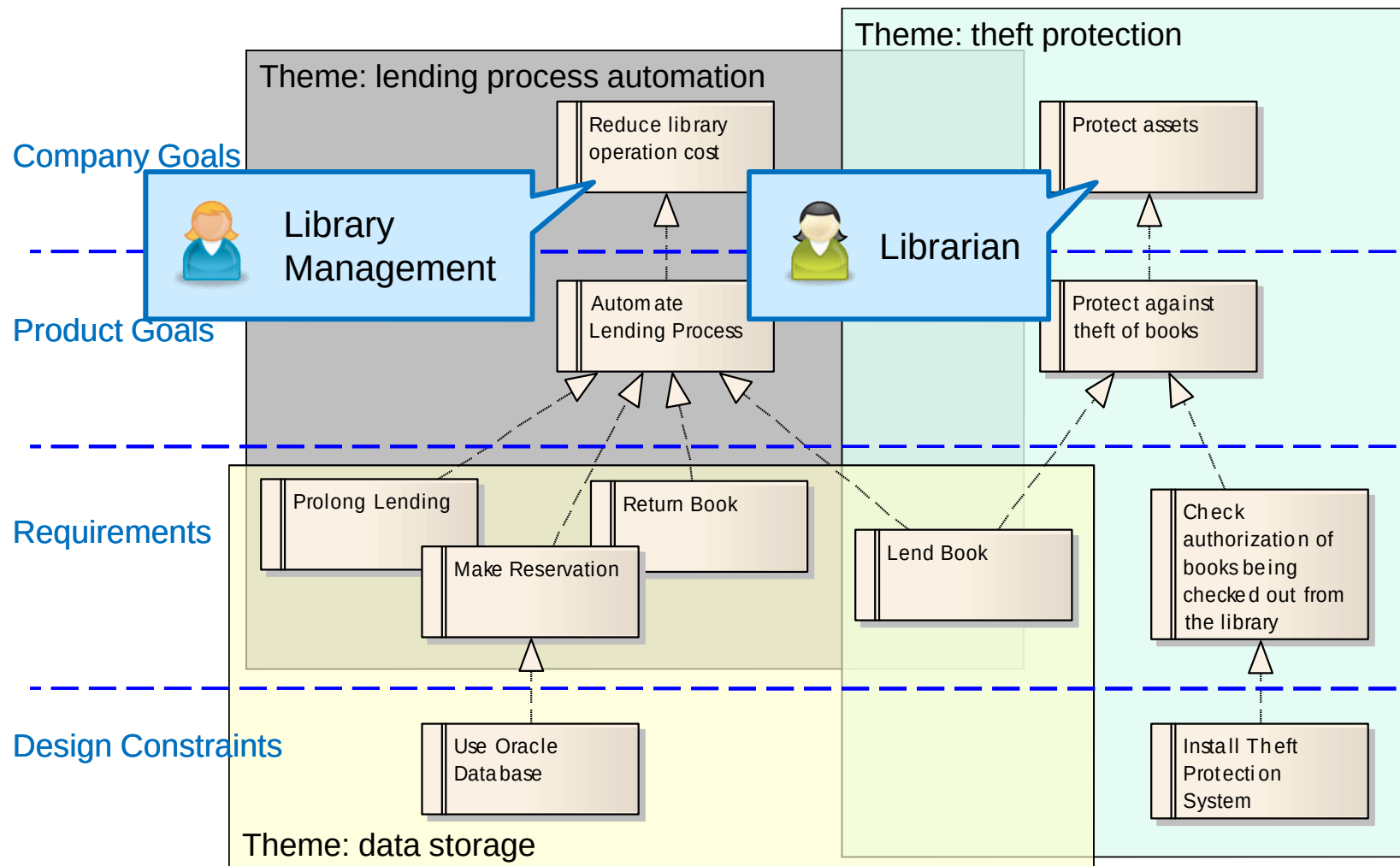
Structuring Requirements

- Objectives
 - Reduce the number of entities to be considered by evaluation and prioritization activities
 - Prepare the argumentation for a release plan proposal
- Approaches
 - **Separation of abstraction levels**: goals, requirements, and design constraints
 - Means and ends should not be compared to each other when prioritizing.
 - **Thematic grouping**
 - Requirements part of a thematic group should be implemented together.
 - **Allocation to beneficiaries**
 - A software release should sufficiently satisfy selected stakeholders.

Beneficiaries of the Library Management System



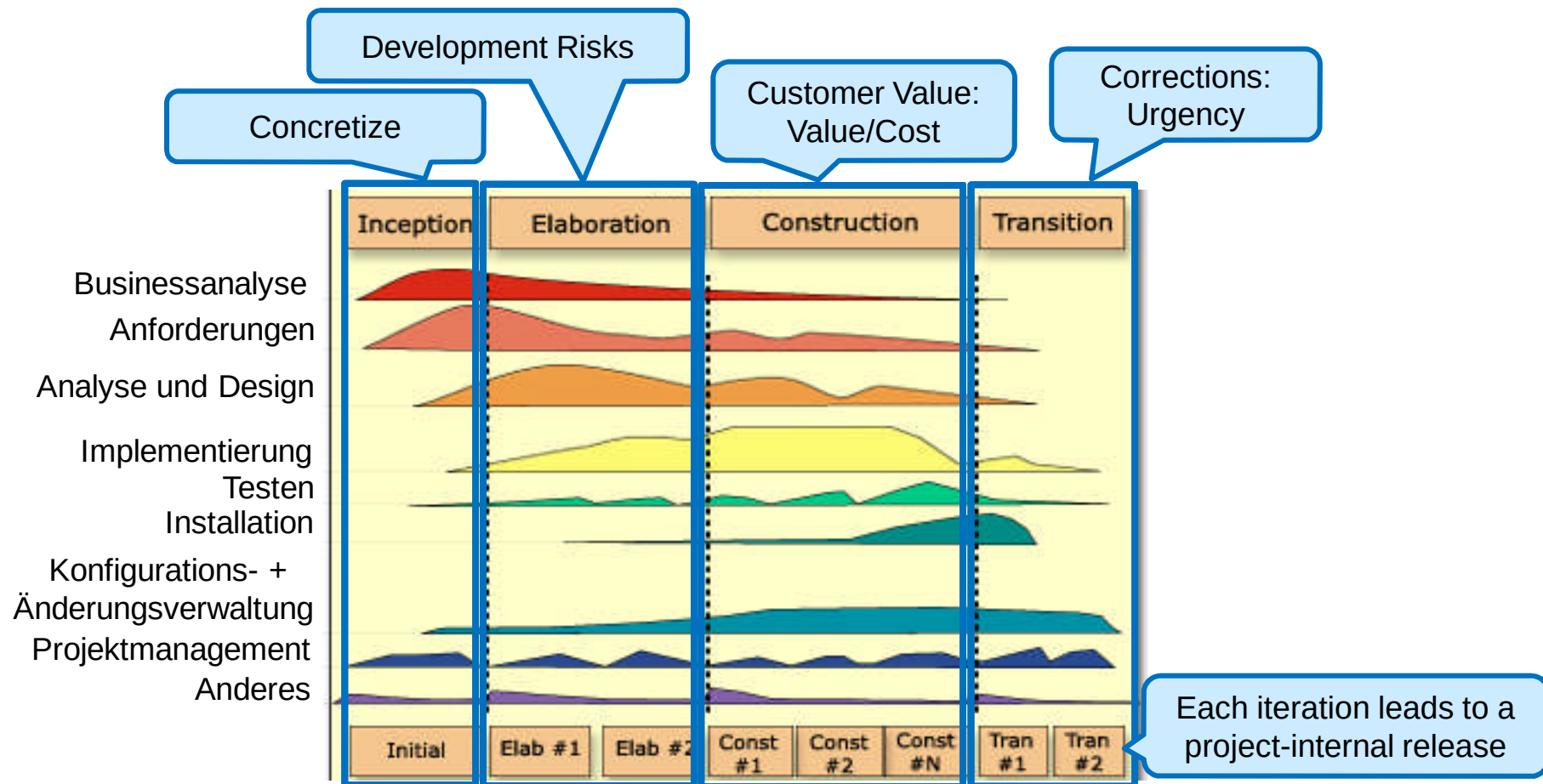
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Different Criteria for Different Project Phases



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Prioritization Criteria

- Hard Factors
 - Dependencies between requirements
 - Regulation
 - Cost, resources, capacity, and time budget
- Soft Factors (difficult to estimate)
 - Stakeholder influence (politics)
 - Value creation
 - Risks
 - Development effort

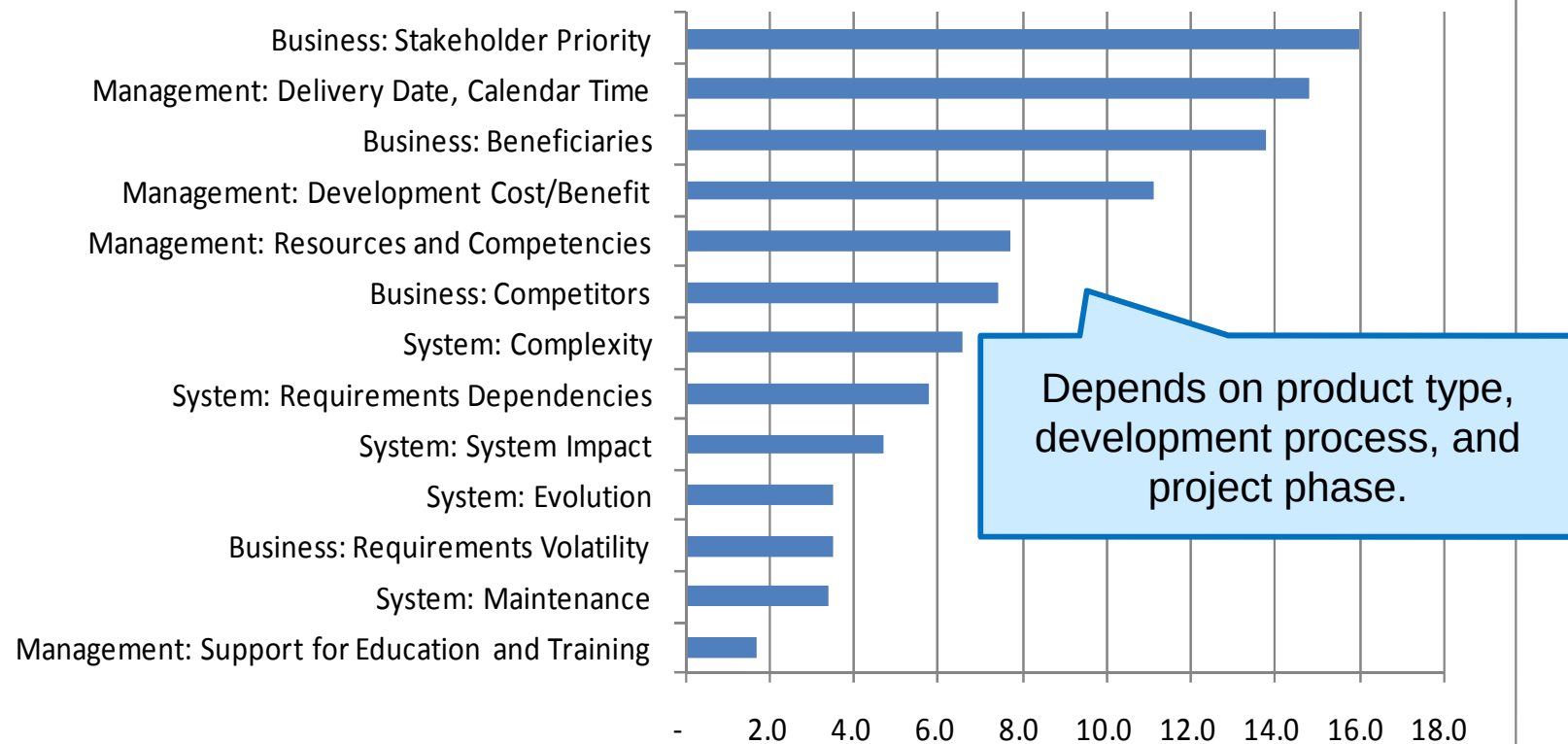
Not all criteria are equally important



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Importance (contribution in % for release decision)



Fundamental Prioritization Considerations



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- Different stakeholders have different knowledge.
- The following roles prioritize:
 - Importance and criticality:
Customers, User Representatives, Stakeholders
 - Cost and risk:
Architect, Developers
- Prioritize only comparable items
 - Goals among each other
 - Functional and quality requirements among each other
 - Ideas and constraints for solutions among each other



Prioritization Techniques

- Manual techniques
 - Top-Ten
 - Numerical assignment (grouping)
 - Ranking (sorting)
 - Cumulative voting (100\$ Test)
- Analytical techniques
 - Wiegers Prioritization Matrix
- Tool-based techniques
 - Integer Linear Programming (ILP)
 - Analytical Hierarchy Process (AHP)
- Tool-based techniques are simple to perform if tool available
 - ILP: Release Planner (Expert Decisions)
 - AHP: Focal Point (IBM Rational)

Simplicity

Precision,
Robustness

Key ideas of the manual prioritization techniques



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„Relevance“ always according to the chosen prioritization criterium

- Top-Ten
 - Choose the 10 most relevant items
 - Success enhancer: choose 10%-30% of all items
 - Aggregate >1 opinion:
Count the number of item nominations
- Numerical assignment (grouping)
 - Assign each items to one of 3 groups
(in case of importance: *critical*, *important*, *optional*)
 - Success enhancer: each group has same size
 - Aggregate >1 opinion: weighted sum of assignments
(critical=9x, important=3x, optional=1x)

Key Ideas of the Manual Techniques



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- Ranking (sorting)
 - Sort all items
 - Success enhancer: use Bubble Sort for manual work
 - Aggregate >1 opinion:
compute average or median rank of each item
- Cumulative voting (100\$ Test)
 - Divide 100 points on the items
 - Success enhancer: distribute 1'000, 10'000, or 1'000'000 points as necessary
 - Aggregate >1 opinion:
sum up the number of points given to each item



Analytical Prioritization

- Wiegiers Prioritization Matrix
 - Evaluate according to chosen set of criteria
 - Weight criteria

$$\frac{\text{value \%} * \text{value weight}}{(\text{cost \%} * \text{cost weight}) + (\text{risk \%} * \text{risk weight})}$$

Relative weight	2	1			1			0.5		
Requirement	Priority Group Benefit	Priority Group Penalty	Weighted Sum	Value %	Priority Group Cost	Cost %	Priority Group Risk	Risk %	Priority	Rank
R ₁	5	3	13	16.9%	2	12.5%	1	8.7%	0.203	1
R ₂	9	7	25	32.5%	5	31.3%	3	26.1%	0.150	3
R ₃	5	7	17	22.1%	3	18.8%	2	17.4%	0.166	2
R ₄	2	1	5	6.5%	1	6.3%	1	8.7%	0.130	4
R ₅	4	9	17	22.1%	4	25.0%	4	34.8%	0.110	5

Analytical Hierarchy Process (AHP)



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- Preference Matrix

„Preferences“ always according to the chosen prioritization criterium

Weight	Count	ID	Item	Preferences				
30%	3	a	Erfassen	a	c	a	a	
20%	2	b	Mahnwesen	c	b	b		
40%	4	c	MwSt-Abrechnung	c	c			
0%	0	d	Auswerten	e				
10%	1	e	Schnittstellen					

Pairwise Comparisons

Analytical Hierarchy Process (AHP): pairwise comparisons



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Comparison Question

Comparison Question

Comparison Question

Items to be compared

Comparison

Principal components analysis allows to use few comparisons.

Welches Merkmal ist Wichtiger aus Kundensicht? 🏆

Welches Merkmal ist vom Entwicklungsteam weniger verstanden? 🤖

Welches Merkmal braucht mehr Entwicklungsaufwand? 🏆

Sprachsteuerung

ID 007

Title Sprachsteuerung

Description

Element Information

Owner Samuel Fricker (Admin)

Creator Samuel Fricker (Admin)

Created Date 19.09.09

Last Changed By Samuel Fricker (Admin)

Last Changed Date 19.09.09

Parent Folder Elements

App Store

ID 016

Title App Store

Description

Element Information

Owner Samuel Fricker (Admin)

Creator Samuel Fricker (Admin)

Created Date 19.09.09

Last Changed By Samuel Fricker (Admin)

Last Changed Date 19.09.09

Parent Folder Elements

>> > = < <<

< Back OK

Completed: 37. Required: 17. Recommended: 37. Number of elements: 18. Comparison: 38.

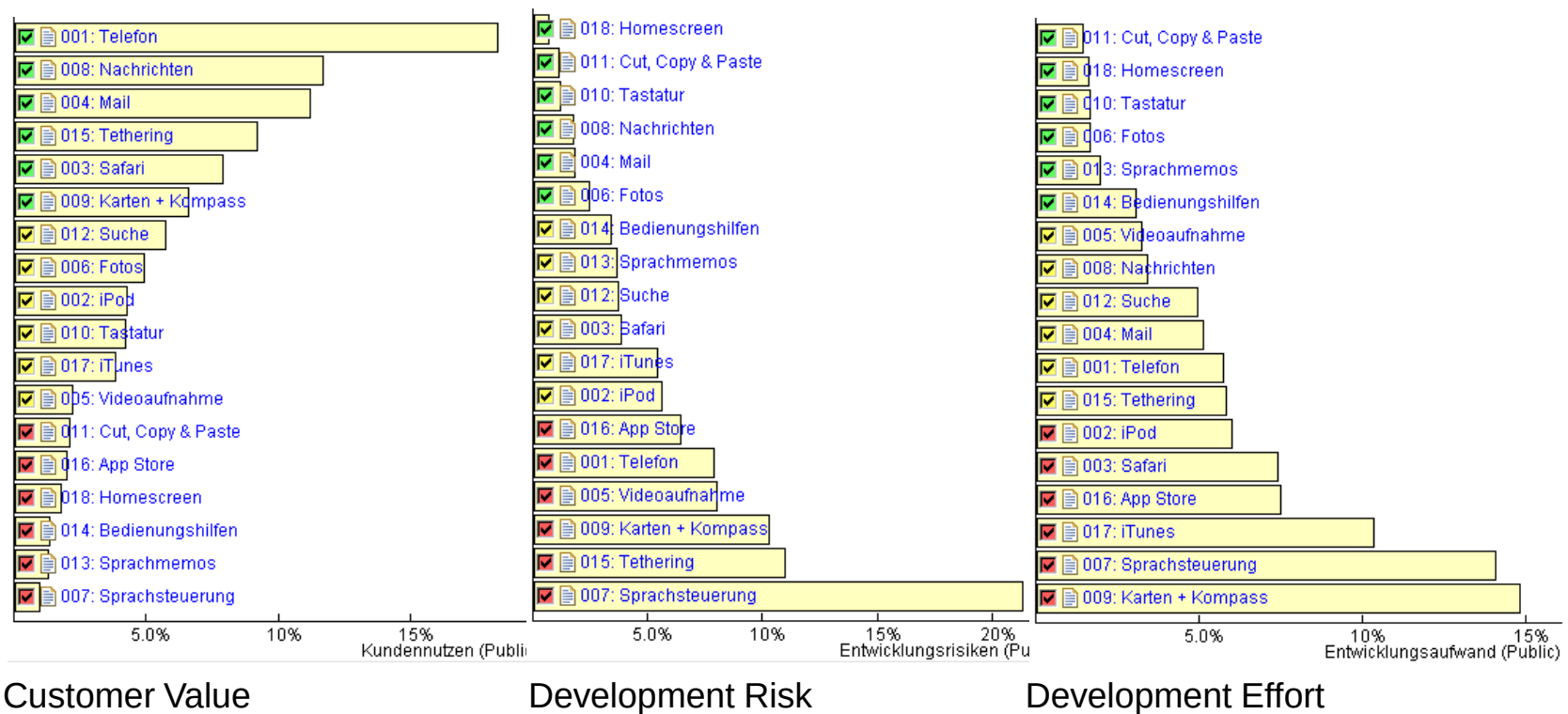
Example with IBM FocalPoint.

Karlsson, Ryan: „Cost-Value Approach for Prioritizing Requirements“. IEEE Software. 1997.

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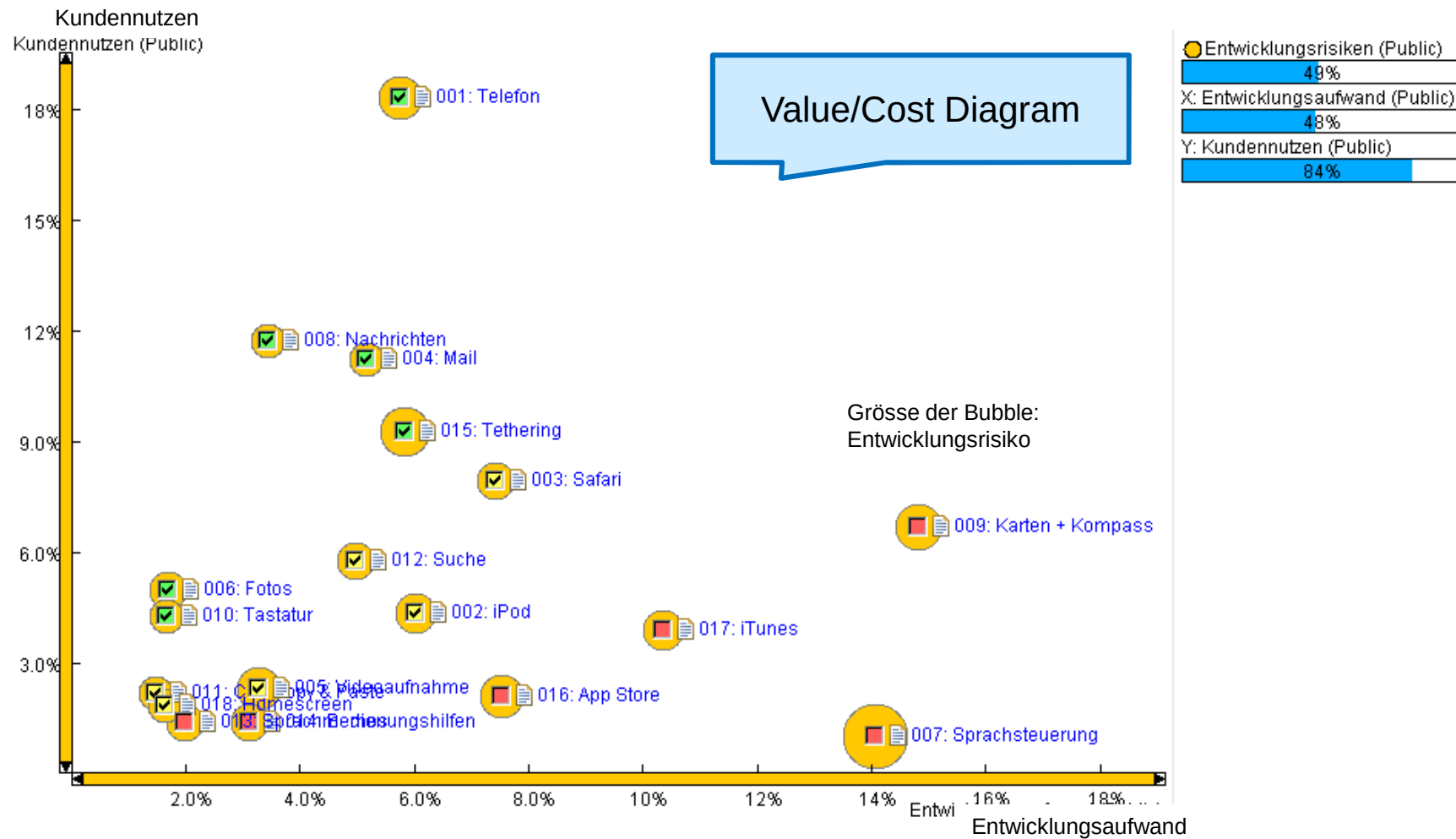
Visualize Priorities

Bar Diagrams

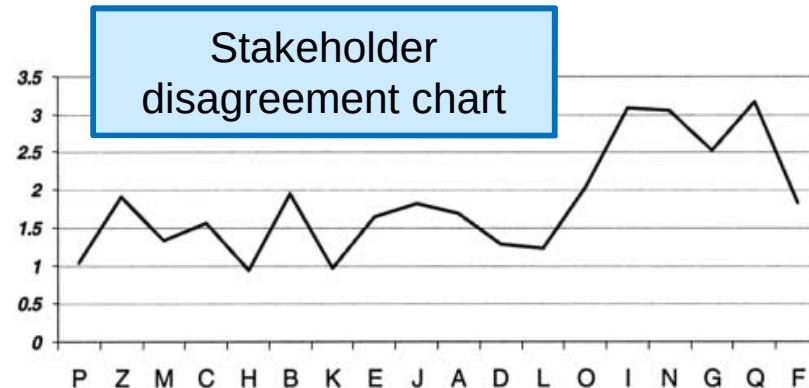




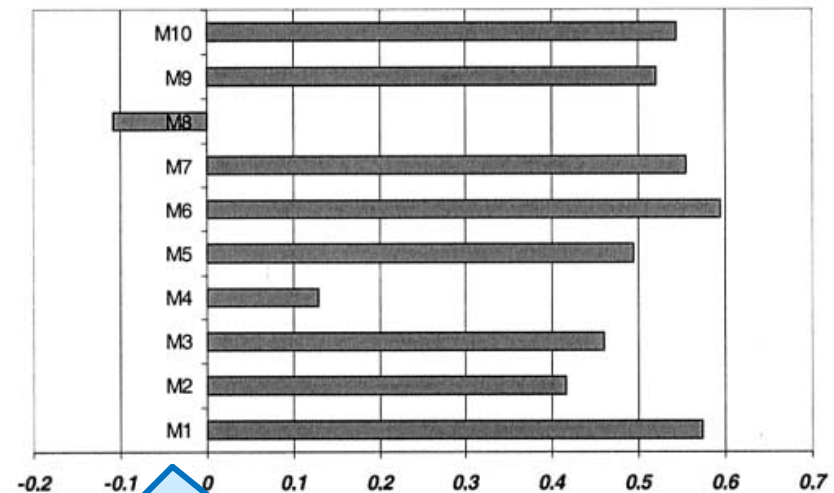
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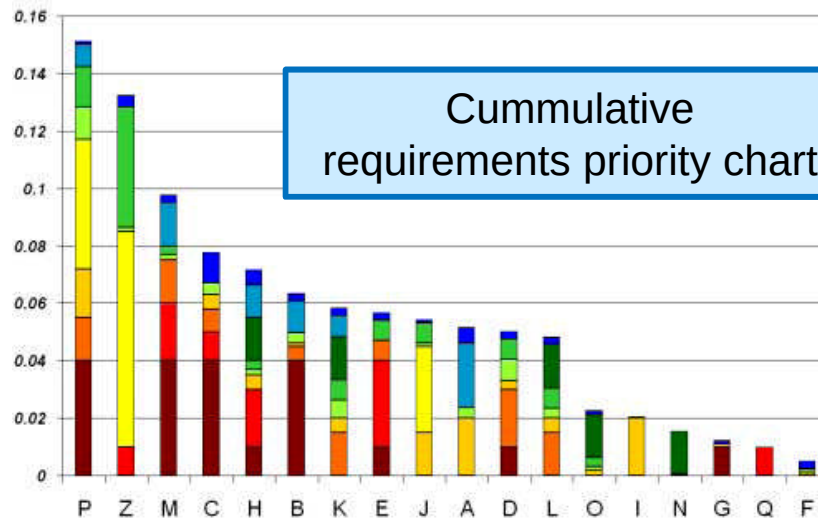
Visualize Prioritization Results



Stakeholder satisfaction chart



M1..10: Stakeholders



P..Z: Requirements

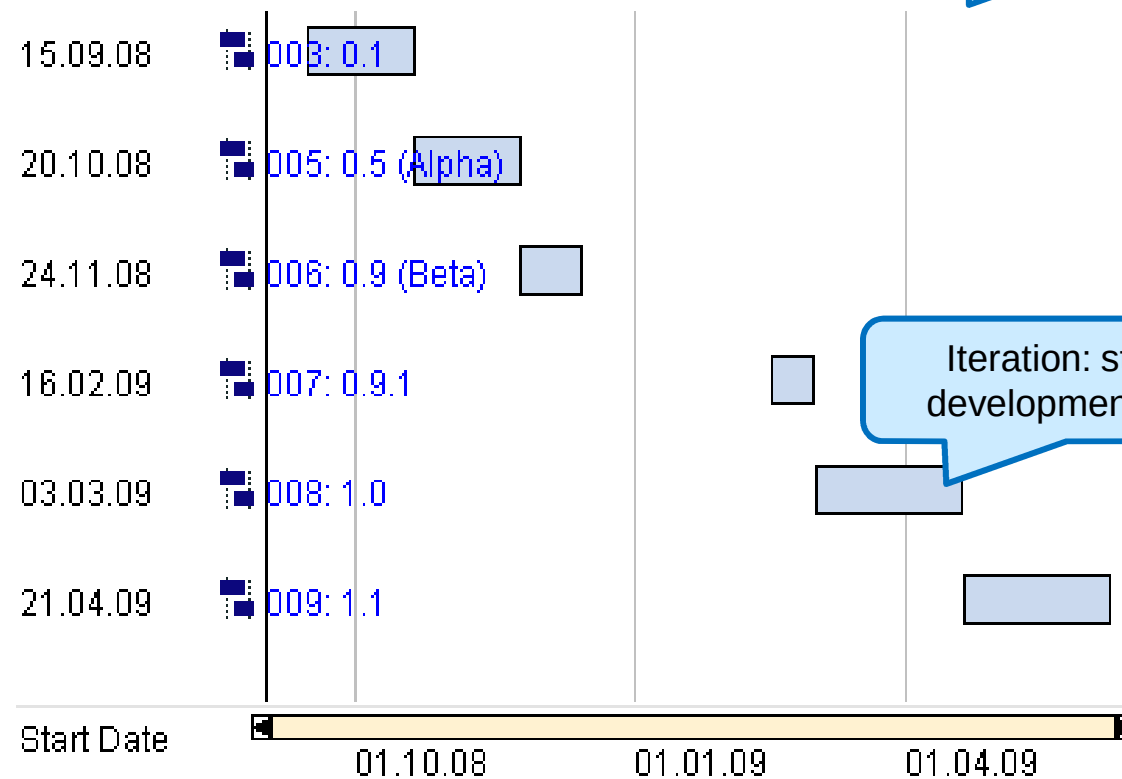
Release Planning: Define Development Timing



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Example: Gantt Chart of an iteration plan

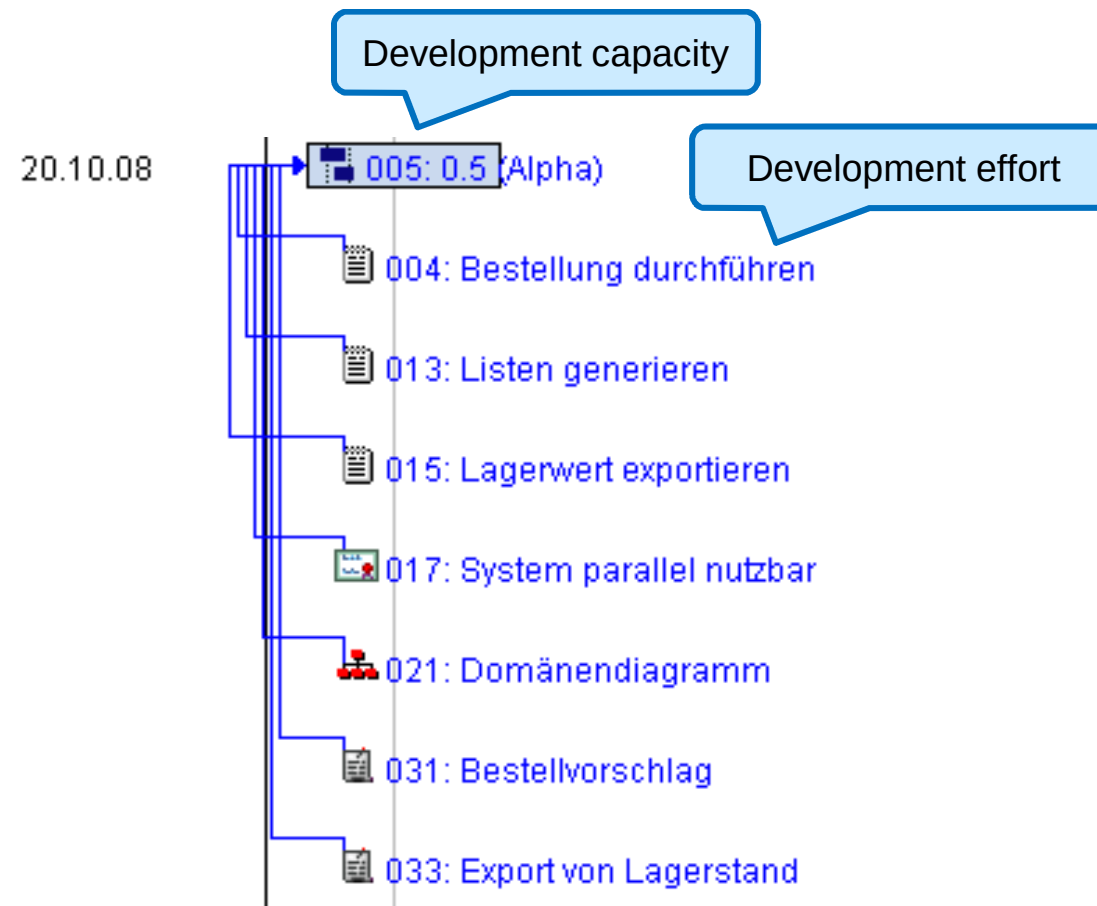


Iteration: start, end, development capacity

Release Planning: Allocate Requirements to Releases



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Release Planning: Tabular release plan



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Development capacity
(not shown here)

Release timing

Release scope

Release identifier

Release themes

ID	Title	Description	Start Date	End Date	Scope
003	0.1	Early stage draft as from prototyping	15.09.08	20.10.08	⬆ 025:Start-Schirm ⬆ 026:Hauptmenü Mechaniker ⬆ 027:Hauptmenü Magaziner ⬆ 028:Hauptmenü Werkstattleiter ⬆ 029:Hauptmenü Techniker
005	0.5 (Alpha)	First functional release, may contain bugs and lack of functionality.	20.10.08	24.11.08	📄 031:Bestellvorschlag 📄 033:Export von Lagerstand 🧑 021:Domänendiagramm 🖨 017:System parallel nutzbar 📄 013:Listen generieren
006	0.9 (Beta)	Second runnable Version with full functionality. May contain minor bugs.	24.11.08	15.12.08	📄 007:Inventur durchführen
007	0.9.1	beta version of the software until review 1	16.02.09	02.03.09	📄 030:Werkstattauftrag 📄 005:Artikel erfassen 📄 008:Artikel löschen
008	1.0	final version that will be deployed to the customer.	03.03.09	20.04.09	📄 032:Export von Fahrzeugkosten 📄 014:Kosten für Fahrzeug exportieren
009	1.1	fixed end version after deployment. contains changes that came out in pr	21.04.09	08.06.09	🖨 019:System bedienbar mit wenig Aufwand 🖨 020:System lernbar durch Nutzerhandbücher 📄 002:Auftrag erstellen 📄 003:Auftrag durchführen

Appraisal of Requirements Prioritization



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- Advantages
 - **Priorities** are a key input for planning:
 - Risk: elaboration phase of new product development
 - Value/Cost ratio: construction phase of new product development
 - Dependencies: maintenance projects
 - **Visualization**:
 - Base to discuss requirements priorities in release negotiations
- Disadvantages
 - Prioritization requires effort
 - Tools are expensive
 - Themes can be implemented incompletely:
 - prioritization with feature vectors
 - Priorities need to be interpreted carefully:
 - release scope should tell a story



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