Ten Steps to Better Requirements Management

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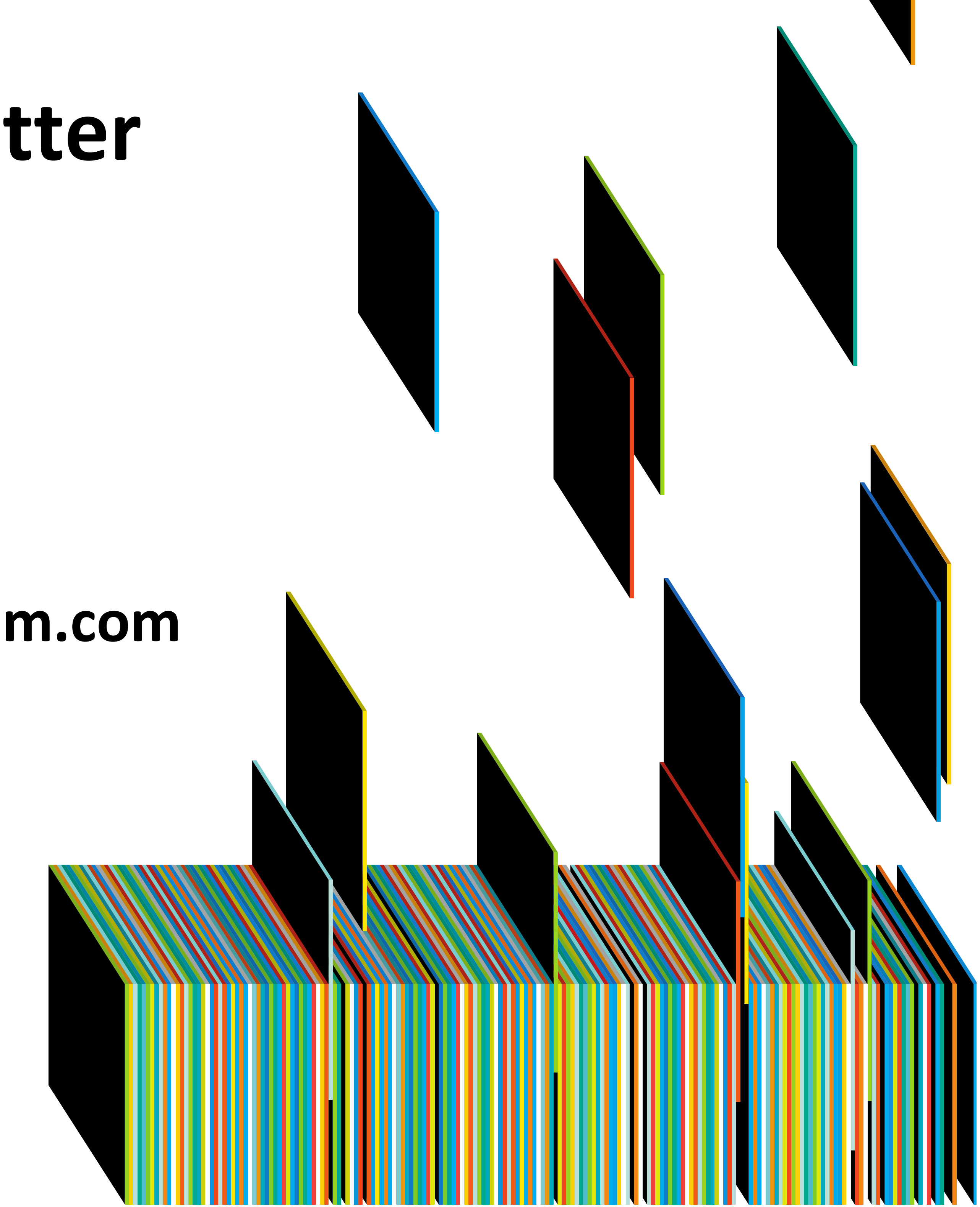
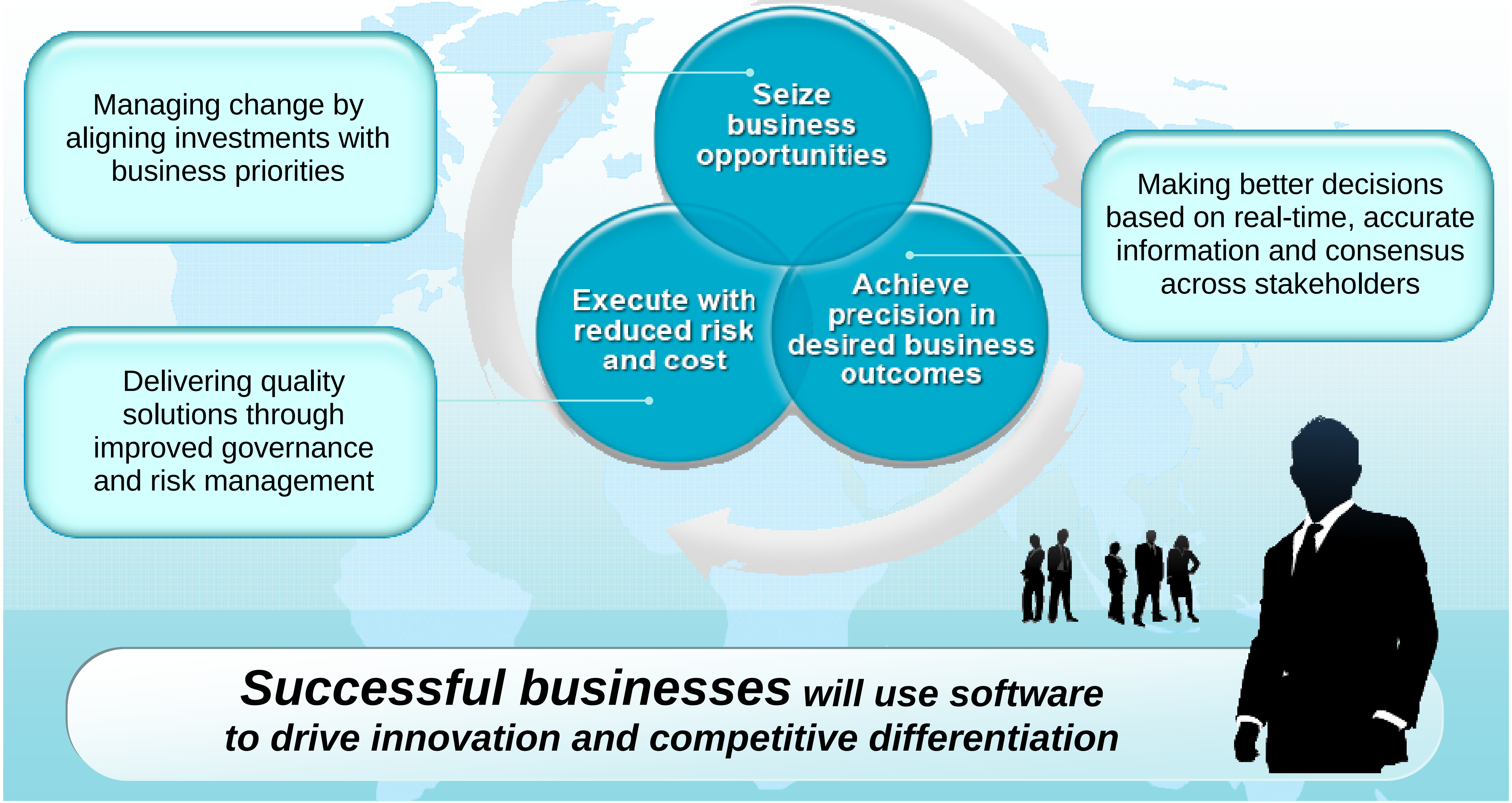


Agenda

- The Case for Requirements Management
- 10 Good Requirements Management Practices
- Break
- 10 Good Requirements Management Practices cont.
- Case study

IBM Rational software

Delivering greater value from your investments in software



Managing change by aligning investments with business priorities

Delivering quality solutions through improved governance and risk management

Seize business opportunities

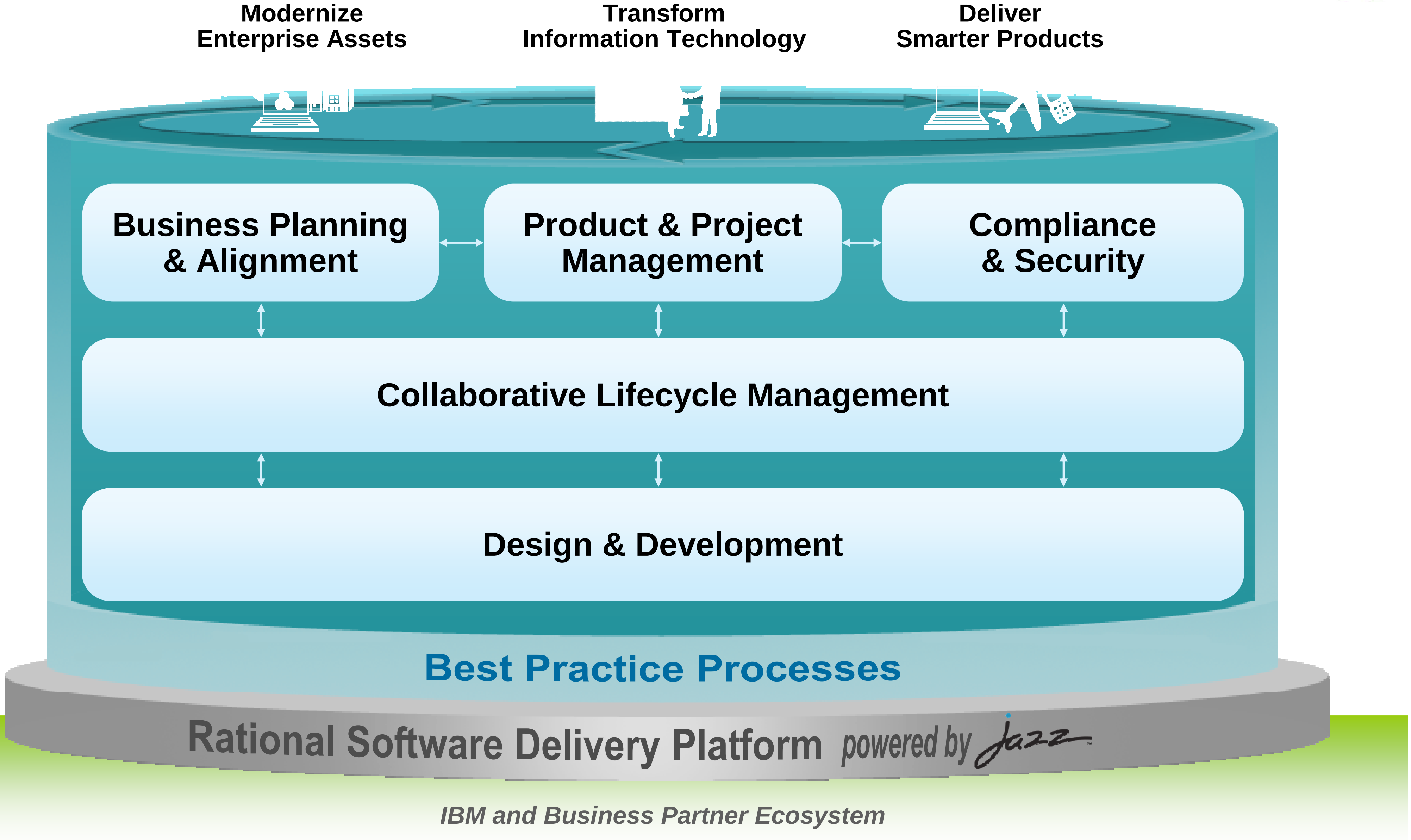
Execute with reduced risk and cost

Achieve precision in desired business outcomes

Making better decisions based on real-time, accurate information and consensus across stakeholders

***Successful businesses** will use software*
to drive innovation and competitive differentiation

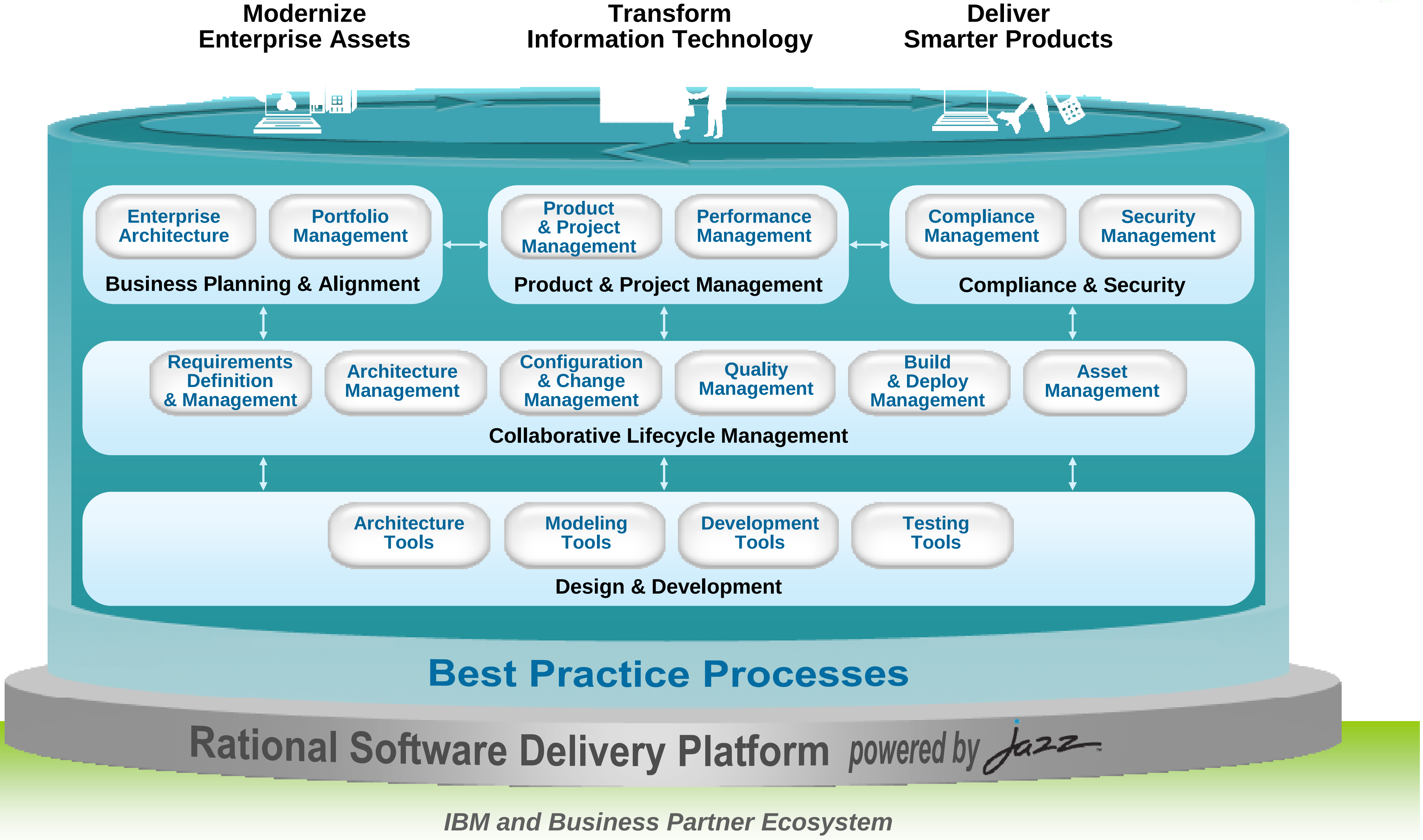
Enabled by the Rational Software Delivery Platform & ecosystem



Modernize Enterprise Assets
Transform Information Technology
Deliver Smarter Products
Business Planning & Alignment
Product & Project Management
Compliance & Security
Collaborative Lifecycle Management
Design & Development
Best Practice Processes
Rational Software Delivery Platform powered by Jazz

IBM and Business Partner Ecosystem

Delivered through a rich set of software delivery capabilities



Modernize Enterprise Assets

Transform Information Technology

Deliver Smarter Products

Business Planning & Alignment: Enterprise Architecture; Portfolio Management

Product & Project Management: Product & Project Management; Performance Management

Compliance & Security: Compliance Management; Security Management

Collaborative Lifecycle Management: Requirements Definition & Management; Architecture Management; Configuration & Change Management; Quality Management; Build & Deploy Management; Asset Management

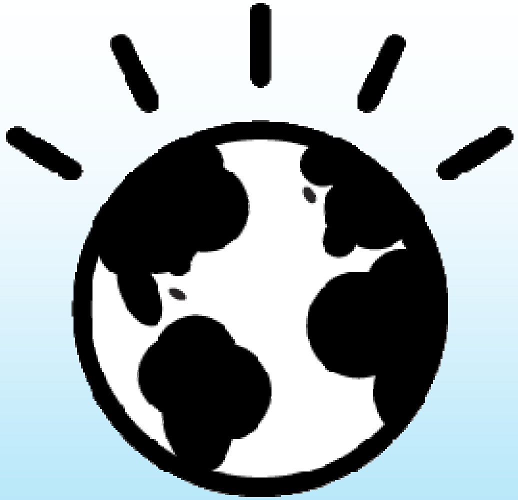
Design & Development: Architecture Tools; Modeling Tools; Development Tools; Testing Tools

Best Practice Processes

Rational Software Delivery Platform powered by Jazz

IBM and Business Partner Ecosystem

The Innovation Agenda: Something meaningful is happening



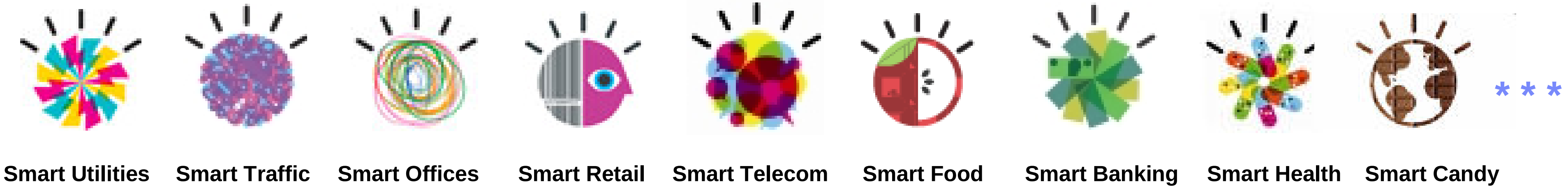
SMALLER. FLATTER. SMARTER.

Our world is becoming **INSTRUMENTED**

Our world is becoming **INTERCONNECTED**

All things are becoming **INTELLIGENT**

Resulting in transformational change across all industries



Smarter products ar ilding blocks for new solutions ll collectively

Smarter Health care

Smarter transportation

Smarter devices and machinery

Innovation for a smarter planet.

The *Innovation* Agenda

Smarter green technologies

Smarter aerospace systems

Smarter energy

Software, the Great Enabler!

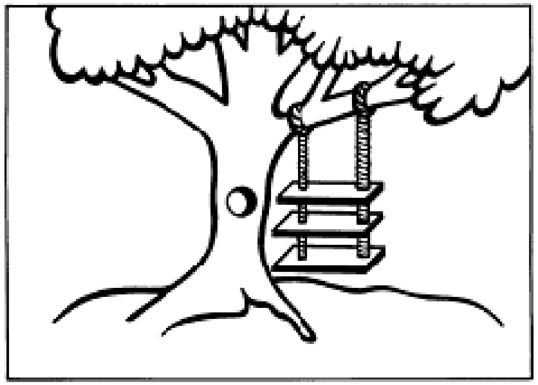
- ‘Smart’ is increasingly delivered through increasingly intelligent software
- Requirements are getting more complex
- More and more stakeholders
- The stakes are higher than ever
- Delivering a greener planet
- Managing effective software delivery is key
- There’s less reason than ever for failure
  - Process support
  - Software support
  - Experience

Requirements Management - The Driver

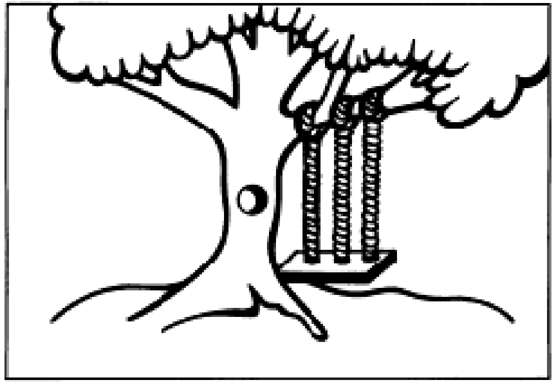
"Analysts report that as many as 71 percent of software projects that fail do so because of poor requirements management, making it the single biggest reason for project failure"

CIO Magazine, 15 November 2005

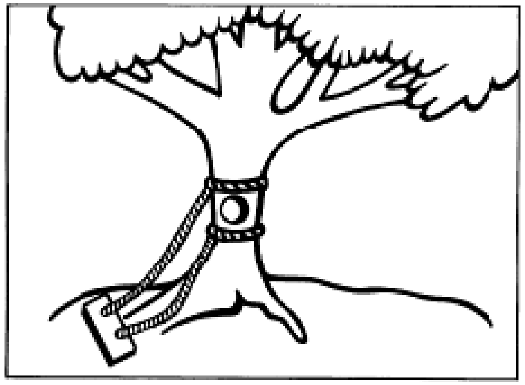
The oldest (IT) joke in the book



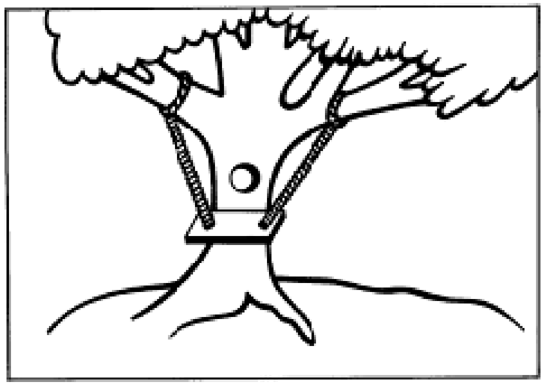
As it was requested



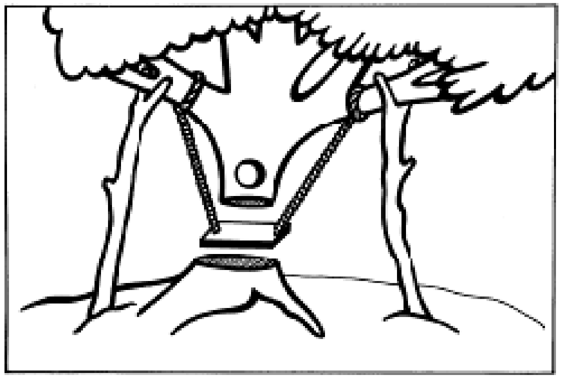
As the analyst saw it



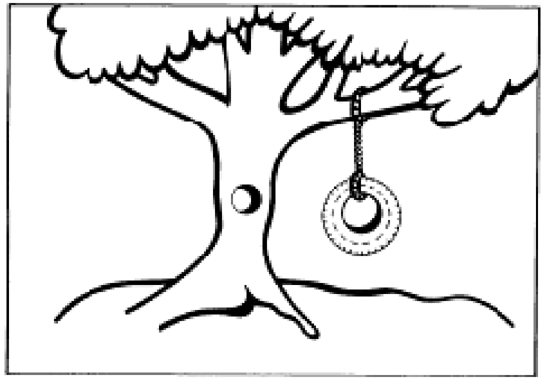
As the system was designed



As it was delivered



As it was installed



What the user really wanted

The Hardest Part

The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements, including all the interfaces to people, to machines, and to other software systems. No other part of the work so cripples the resulting system if done wrong. No other part is more difficult to rectify later.

Frederick Brooks in his classic 1987 Essay

“No Silver Bullet: Essence and Accidents of Software Engineering”

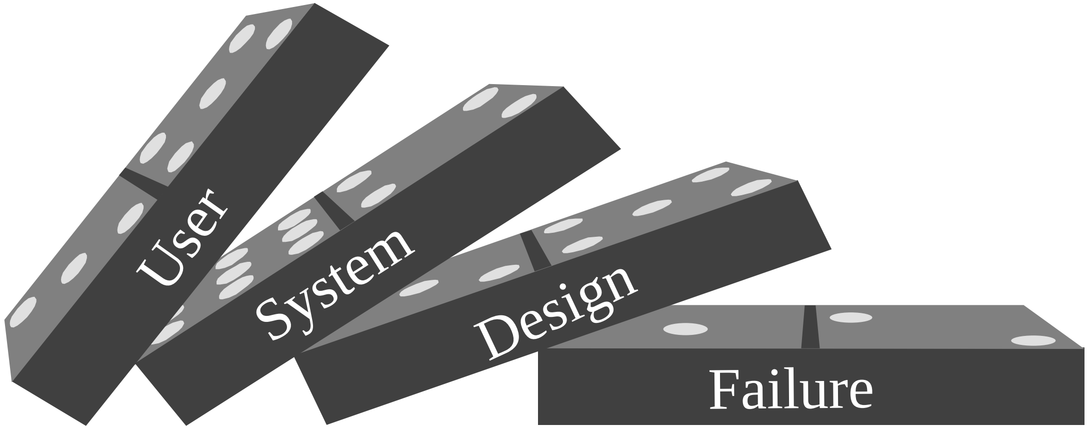
Source: Wikimedia Commons

The Domino Effect

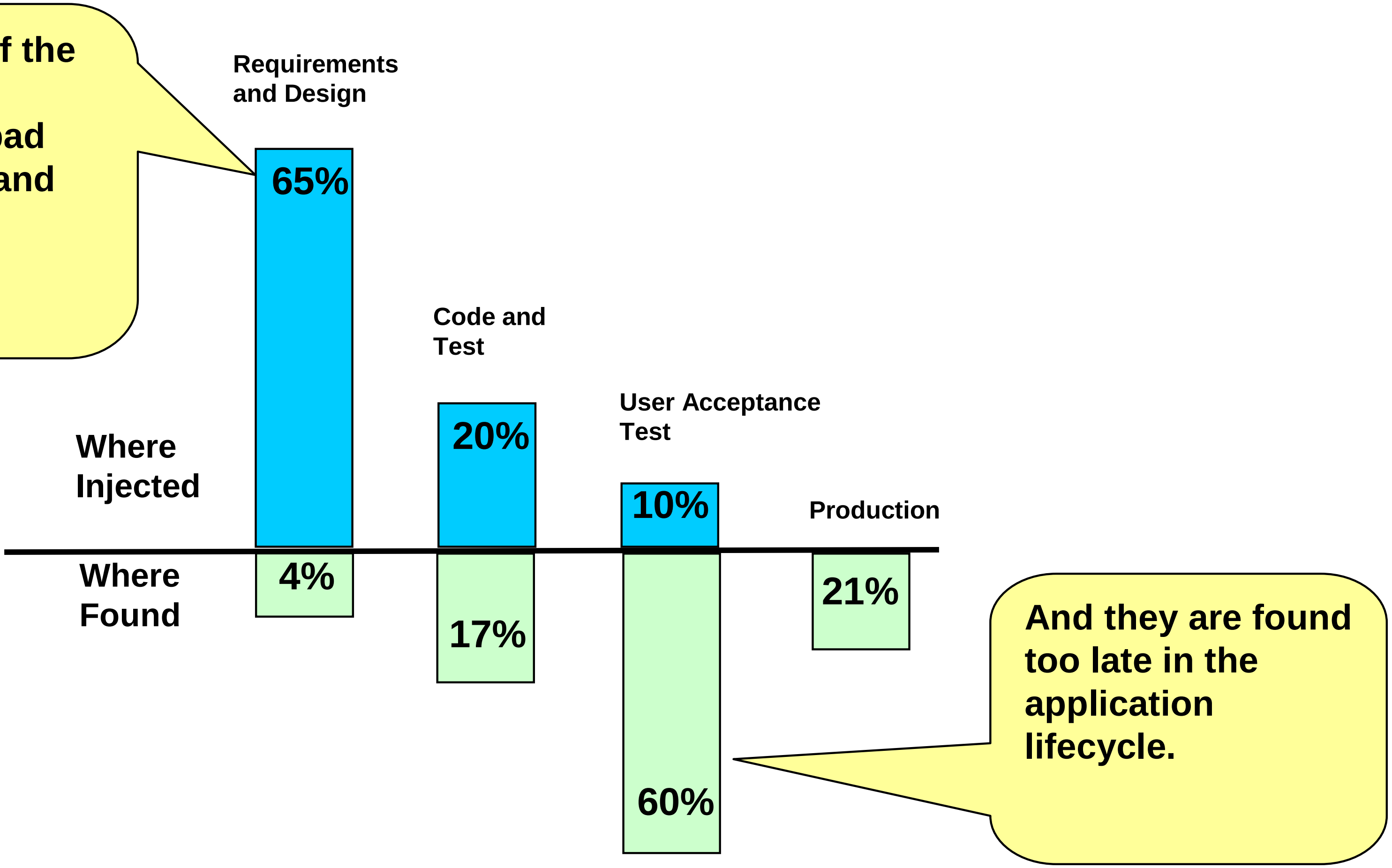
Missing requirements have a domino effect throughout the project lifecycle.

Missing user requirements lead to:-

- missing system requirements
- missing design elements
- missing functions
- failure!



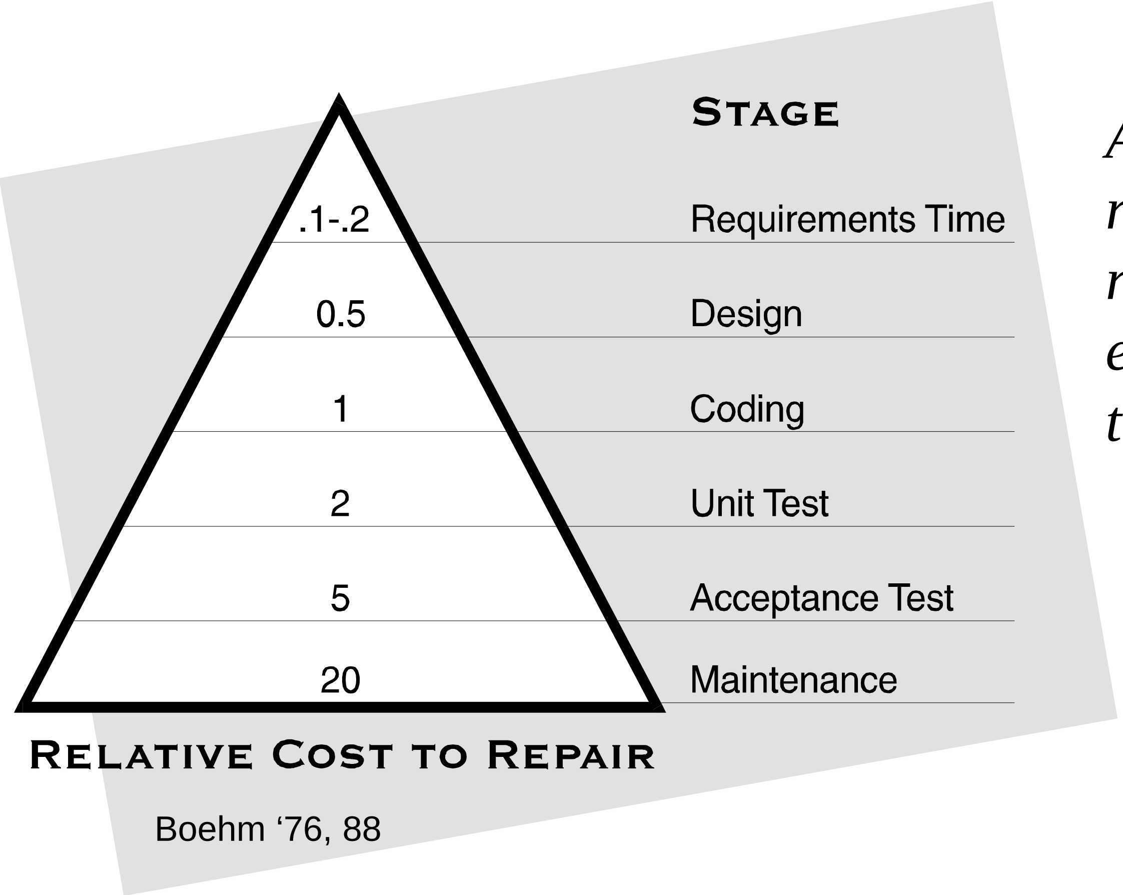
Start at the beginning.



The majority of the problems are coming from bad requirements and design.

And they are found too late in the application lifecycle.

Requirements Management: Quality Improvement and Cost Savings



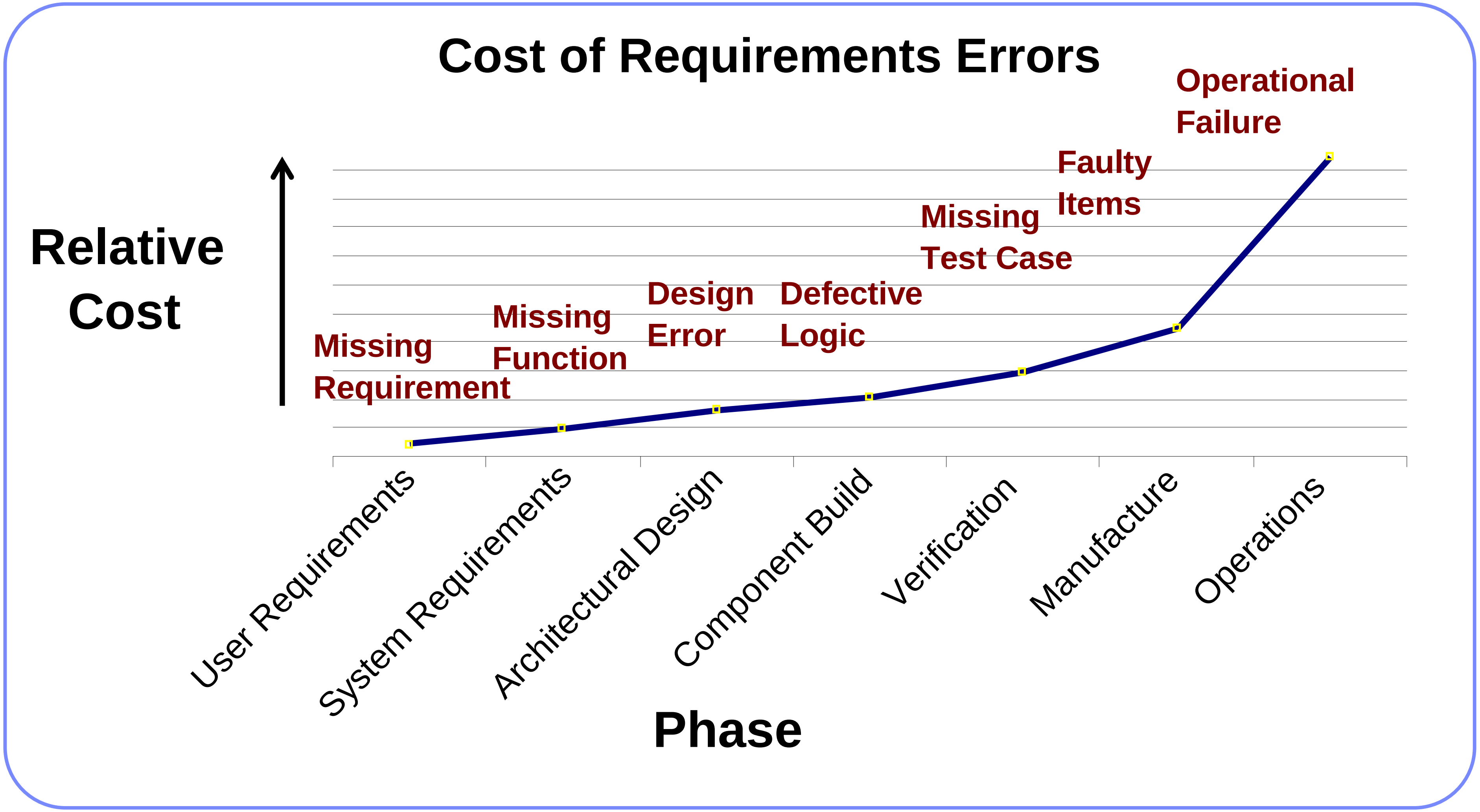
Relative Cost to Repair	Stage
.1-.2	Requirements Time
0.5	Design
1	Coding
2	Unit Test
5	Acceptance Test
20	Maintenance

Boehm ‘76, 88

As much as a 200:1 cost savings results from finding errors in the requirements stage versus finding errors in the maintenance stage of the software lifecycle.

56% of all bugs can be traced to errors made during the requirements stage

Cost of requirements errors

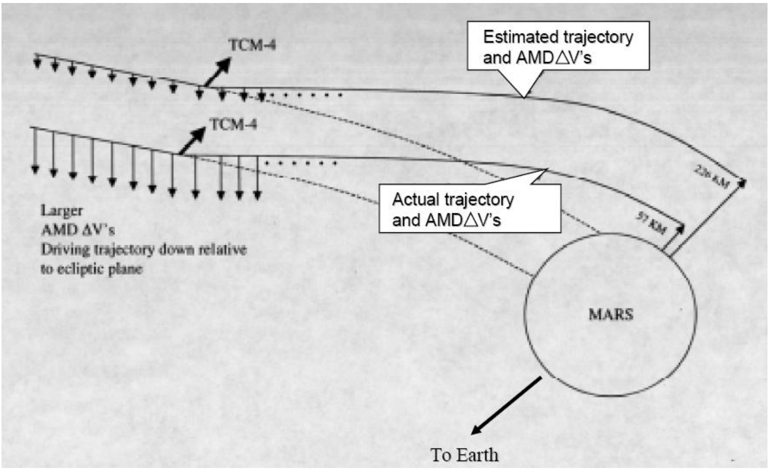


The message is simple. The later you catch an error the more it costs to fix! It will never be cheaper to catch errors than in the Requirements Phases.

Mars Climate Orbiter

“The peer review preliminary findings indicate that one team used English units (e.g., inches, feet and pounds) while the other used metric units for a key spacecraft operation “

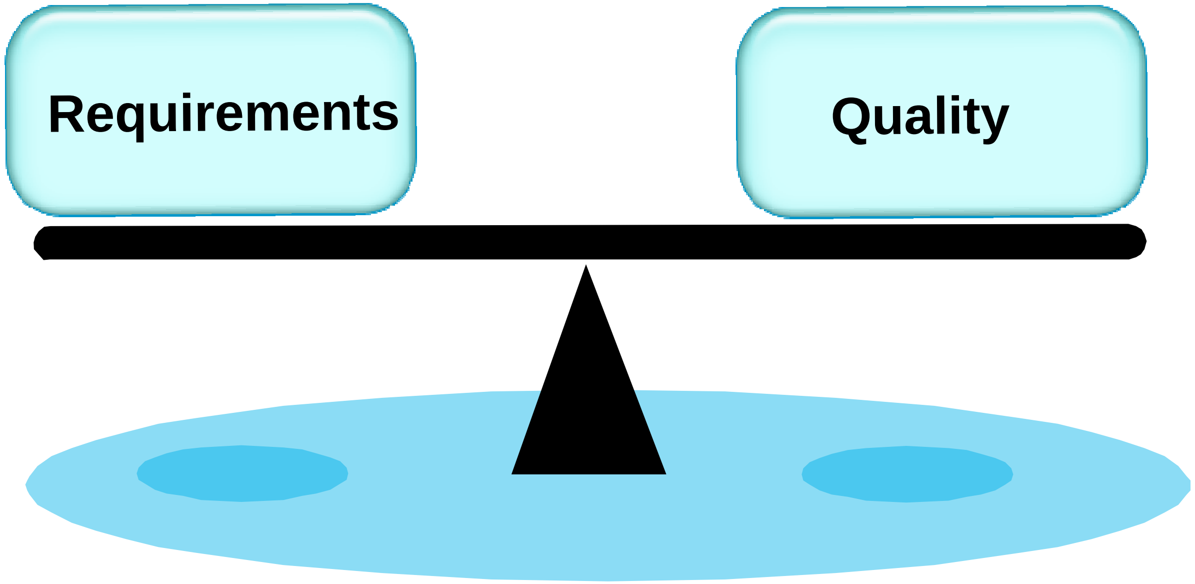
“The process to verify and validate certain engineering requirements and technical interfaces between some project groups, and between the project and its prime mission contractor, was inadequate”


TCM-4
TCM-4
Estimated trajectory and AMD△V's
Actual trajectory and AMD△V's
Larger AMD ΔV's Driving trajectory down relative to ecliptic plane
226 KM
57 KM
MARS
To Earth

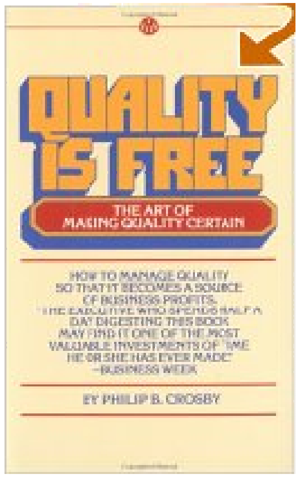
Images Courtesy NASA/JPL-Caltech."

Why are better requirements needed?

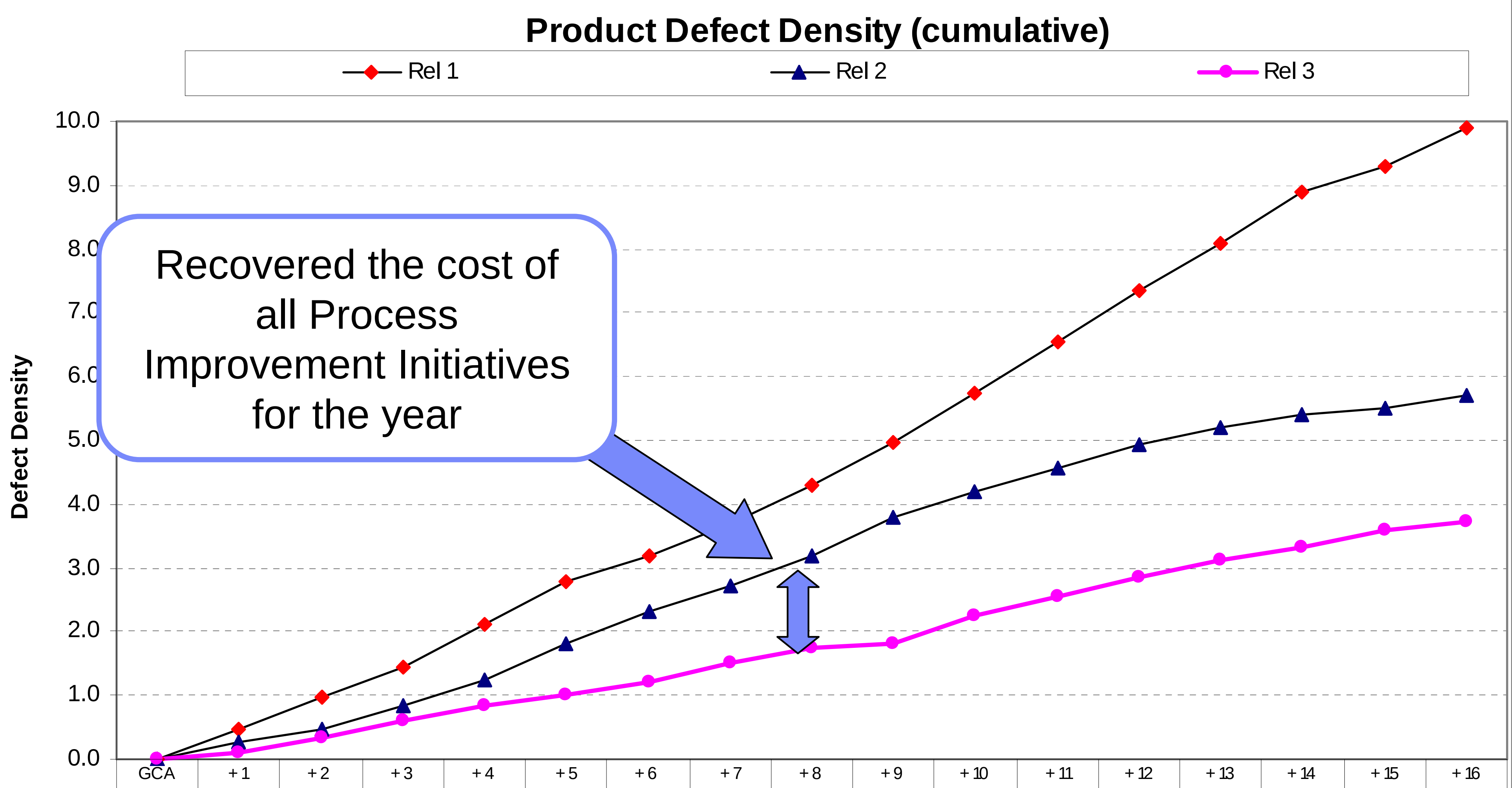
Requirements Management is a High Leverage Activity



“Quality is free”
Phillip Crosby


QUALITY IS FREE
THE ART OF MAKING QUALITY CERTAIN
HOW TO MANAGE QUALITY SO THAT IT BECOMES A SOURCE OF BUSINESS PROFITS.
"THE EXECUTIVE WHO SPENDS HALF A DAY DIGESTING THIS BOOK MAY FIND IT ONE OF THE MOST VALUABLE INVESTMENTS OF TIME HE OR SHE HAS EVER MADE" —BUSINESS WEEK
BY PHILIP B. CROSBY

Unisys - Return on Investment



Recovered the cost of all Process Improvement Initiatives for the year

	GCA	+ 1	+ 2	+ 3	+ 4	+ 5	+ 6	+ 7	+ 8	+ 9	+ 10	+ 11	+ 12	+ 13	+ 14	+ 15	+ 16
Rel 1	0	0.5	10	14	2.1	2.8	3.2	3.7	4.3	5.0	5.7	6.6	7.3	8.1	8.9	9.3	9.9
Rel 2	0	0.3	0.5	0.8	12	18	2.3	2.7	3.2	3.8	4.2	4.6	4.9	5.2	5.4	5.5	5.7
Rel 3	0	0.1	0.3	0.6	0.8	10	12	15	17	18	2.2	2.5	2.9	3.1	3.3	3.6	3.7

The Benefits of Requirements Management

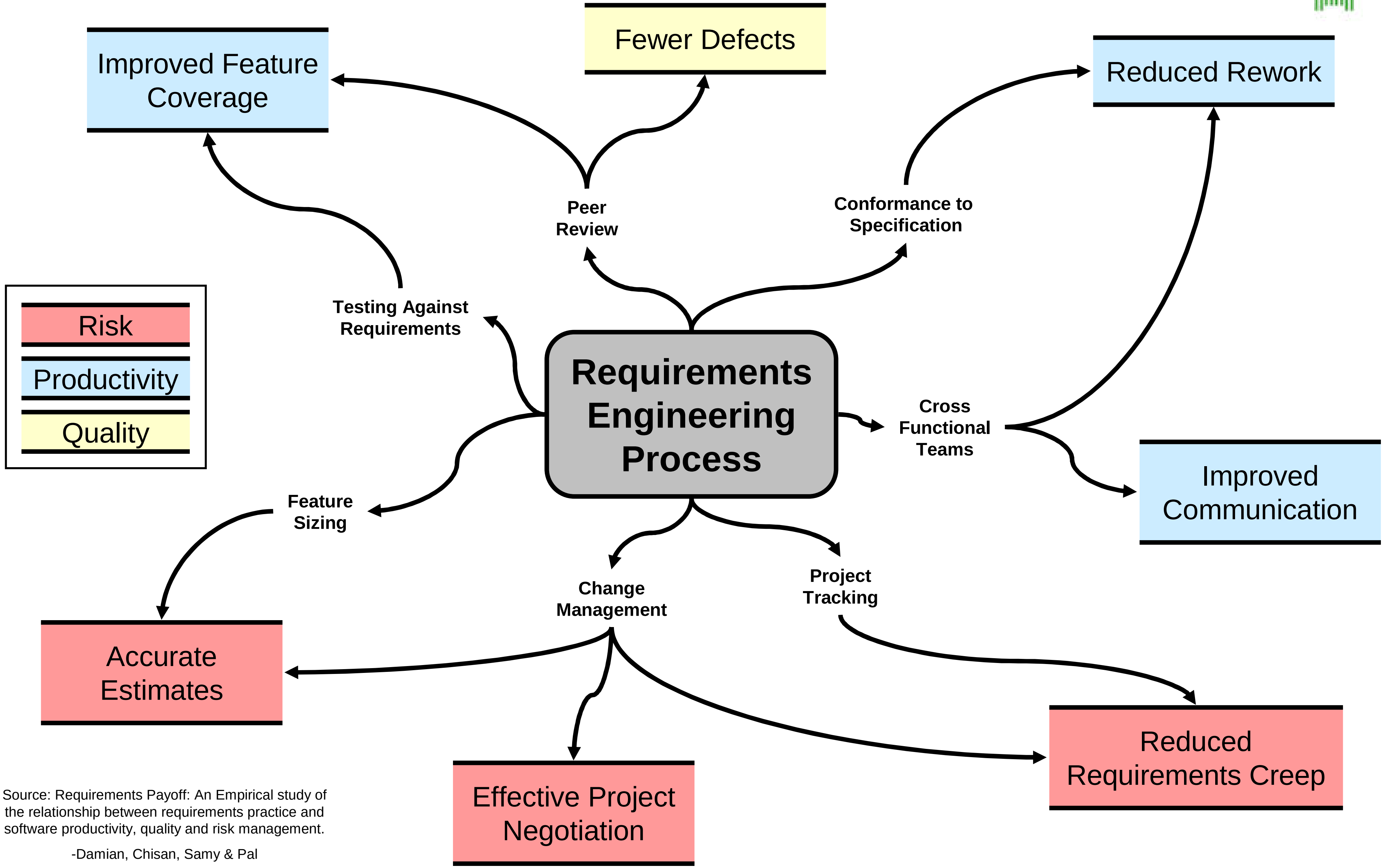
- **Satisfaction:** real stakeholder needs met
- **Risk Management:** reducing operating risk
- **Integration:** the pieces work together
- **Testability:** know what to test the product against
- **Communication:** developers know what the product is for
- **Visibility:** managers can take a global view
- **Change control:** the impact of change can be assessed
- **Quality:** build once and get it right
- **Optimization:** build right solution
- **Re-use:** understand what you’ve got and improve on it
- **Corporate Knowledge Asset**: significant inherent value

Yphise “Requirements Driven Application Lifecycle Management” Assessment

Benefits for the Business

- Reducing the cost and duration of projects
- Improving the responsiveness in implementing changes
- Improving the value of the applications developed
- Taking into account the service level and security requirements

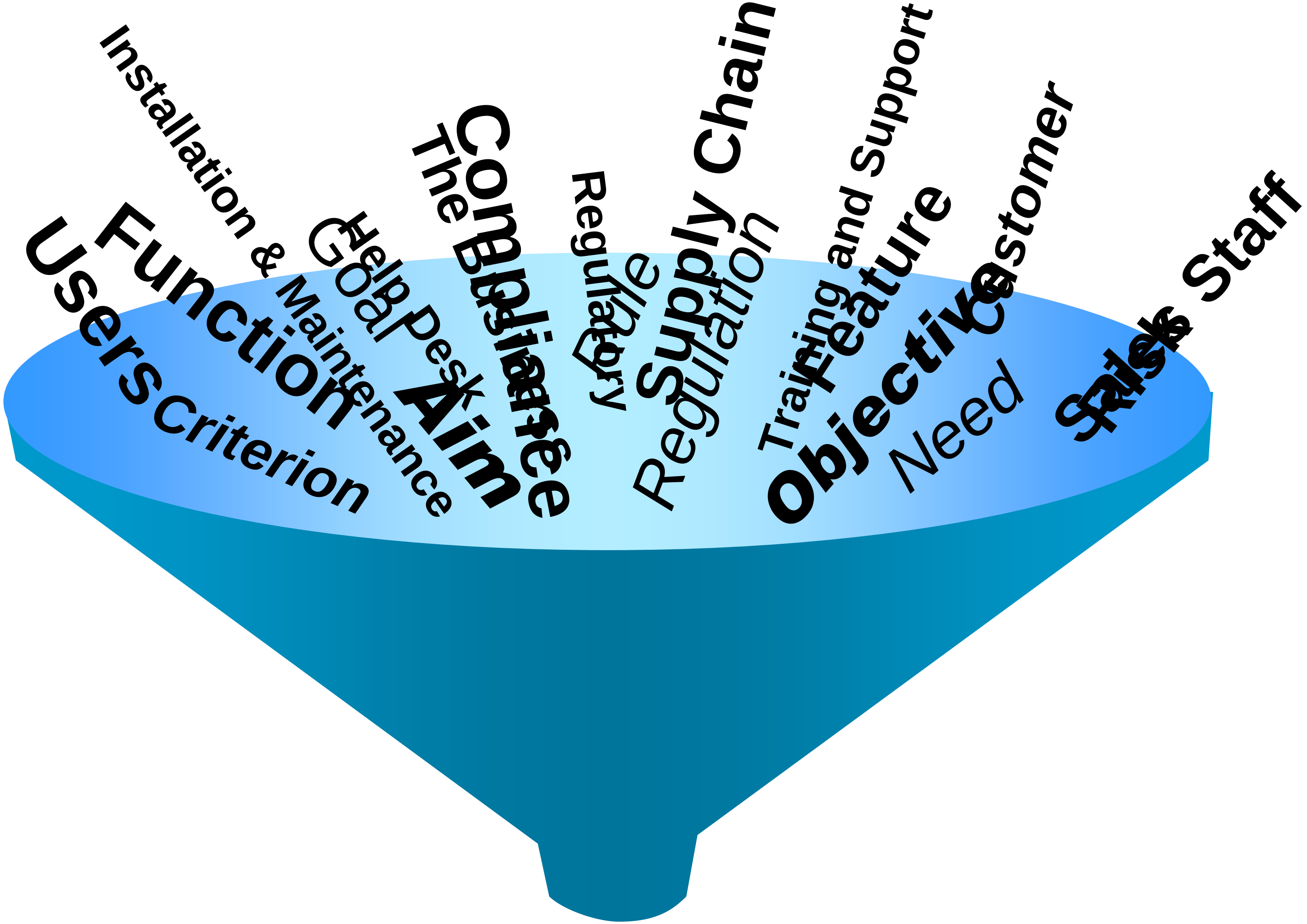
Impact of Requirements Practice - Unisys



Source: Requirements Payoff: An Empirical study of the relationship between requirements practice and software productivity, quality and risk management.

-Damian, Chisan, Samy & Pal

Requirements Are Everywhere



Installation & Maintenance

Help Desk

Goal

The Business

Compliance

Aim

Regulatory

Rule

Supply Chain

Regulation

Training and Support

Feature

Customer

Objective

Need

Sales Staff

Task

Users

Function

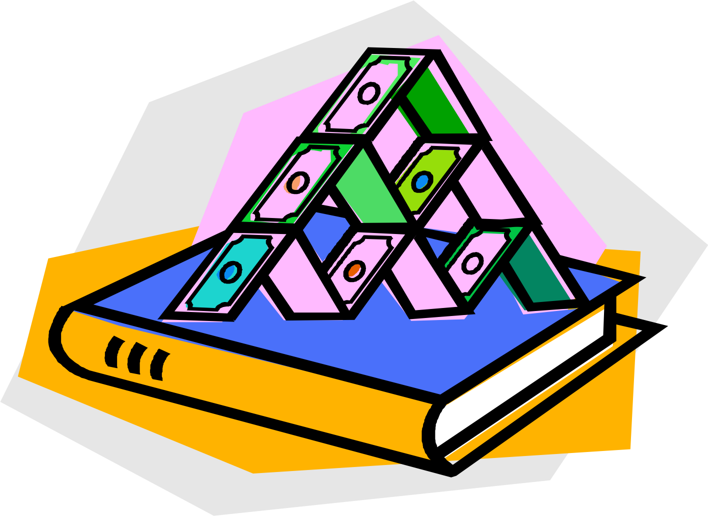
Criterion

Requirements

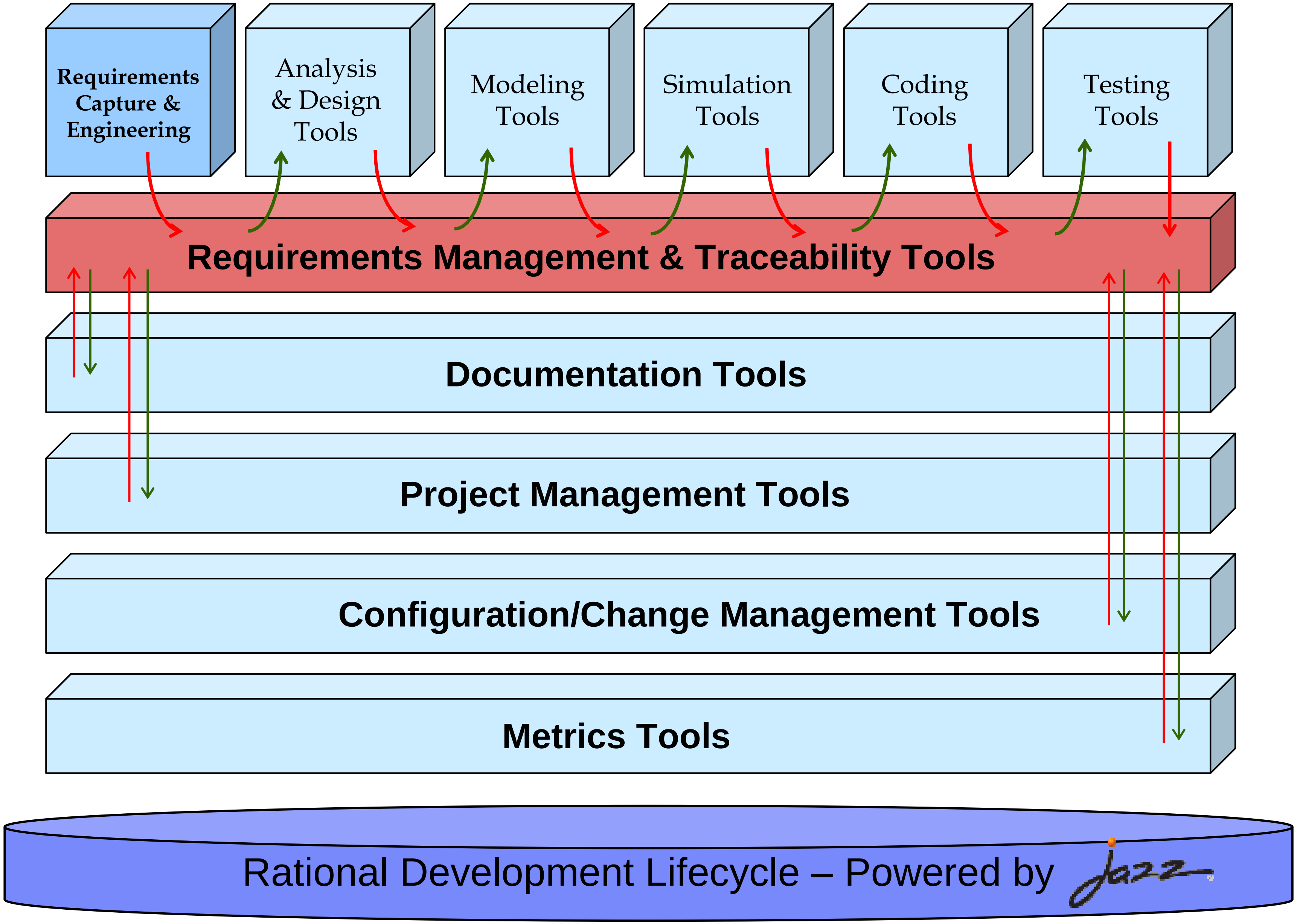
Whole-life Management

Requirements form the basis for:

- project planning
- risk management
- acquisition management
- trade-off
- change control
- qualification / testing
- deployment
- maintenance / support / enhancements
- retirement / disposal



Requirements through the lifecycle



Requirements Capture & Engineering

Analysis & Design Tools

Modeling Tools

Simulation Tools

Coding Tools

Testing Tools

Requirements Management & Traceability Tools

Documentation Tools

Project Management Tools

Configuration/Change Management Tools

Metrics Tools

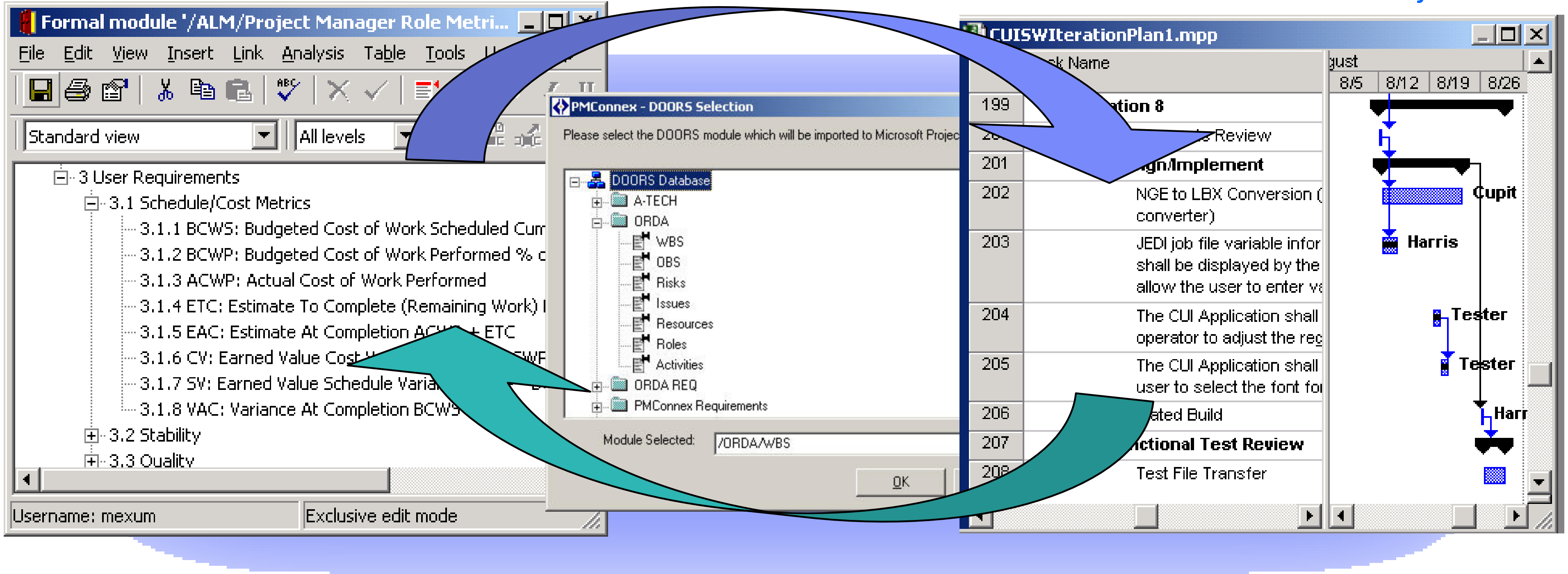
Rational Development Lifecycle – Powered by Jazz

Accurate Project Planning

- Project plans based on requirements
  - Ensure all project goals (requirements) are planned and resourced
  - Enable assessment of the impact of requested changes on the plan
  - Enable assessment of the impact of schedule or resource changes on the requirements

Requirements

Project Plan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Standard view
All levels
PMConnex - DOORS Selection
OK
CUISWIterationPlan1.mpp
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3 User Requirements
3.1 Schedule/Cost Metrics
3.1.1 BCWS: Budgeted Cost of Work Scheduled Cum
3.1.2 BCWP: Budgeted Cost of Work Performed % c
3.1.3 ACWP: Actual Cost of Work Performed
3.1.4 ETC: Estimate To Complete (Remaining Work) I
3.1.5 EAC: Estimate At Completion AC + ETC
3.1.6 CV: Earned Value Cost
3.1.7 SV: Earned Value Schedule Varia
3.1.8 VAC: Variance At Completion BCWS
3.2 Stability
3.3 Quality

Username: mexum
Exclusive edit mode

Please select the DOORS module which will be imported to Microsoft Projec

DOORS Database
A-TECH
ORDA
WBS
OBS
Risks
Issues
Resources
Roles
Activities
ORDA REQ
PMConnex Requirements

Module Selected: /ORDA/WBS

	k Name
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205	The CUI Application shall user to select the font fo
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208	Test File Transfer

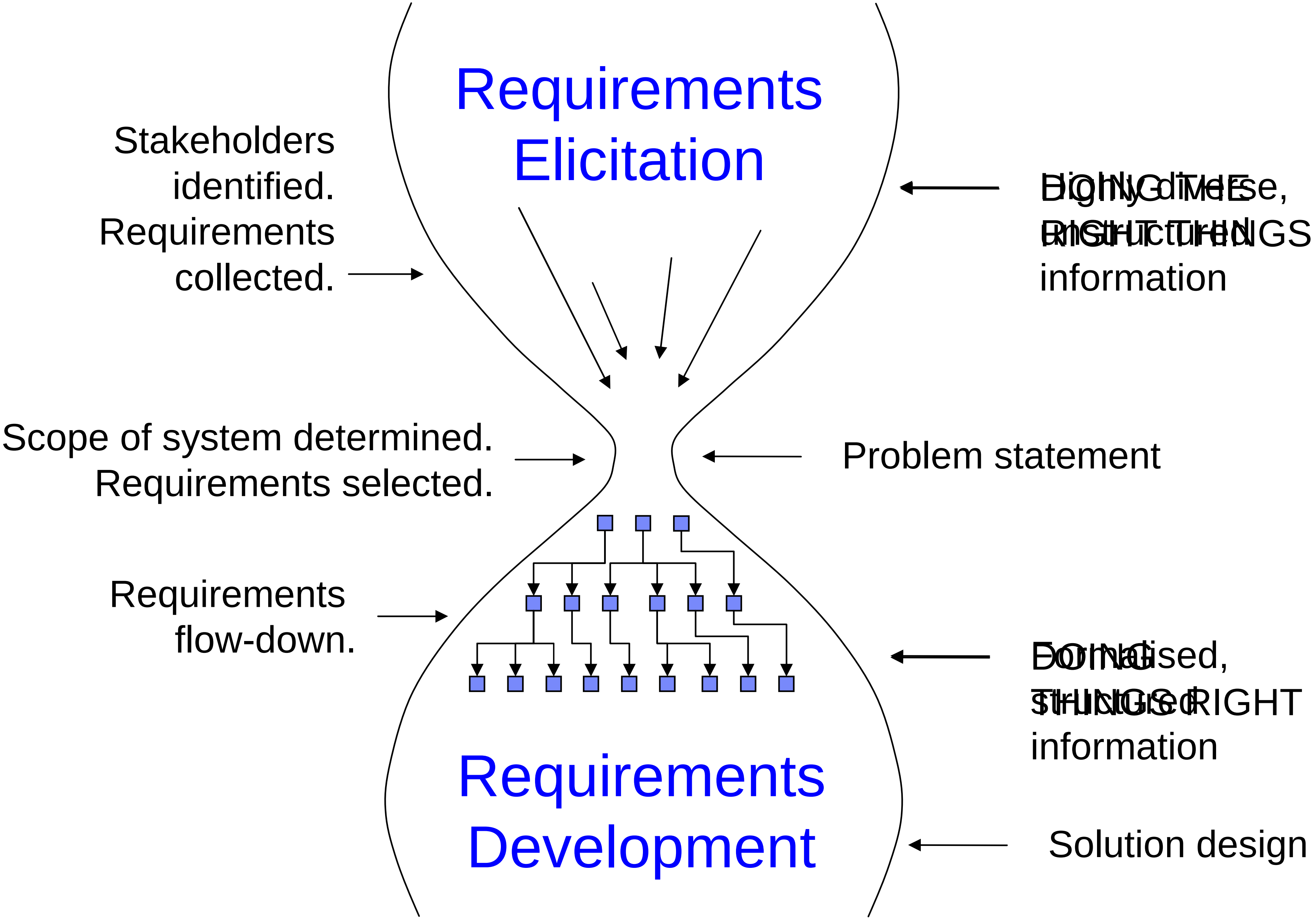
gust
8/5 8/12 8/19 8/26

10 GOOD PRACTICES

- Know where RM fits
- Distinguish between problem and solution
- Understand the Business Value of Requirements
- Use concise, clear, consistent language in statements
- Focus on documents as well statements
- Understand the role of modelling
- Employ quantification for testing
- Create, review and use traceability
- Use a tool-supported process
- Use attributes to support your process

Good Practice 1: Know where RM fits

The Requirements “Hourglass”



Requirements Elicitation

Stakeholders identified. Requirements collected.

Highly diverse, unstructured information

DOING THE RIGHT THINGS

Scope of system determined. Requirements selected.

Problem statement

Requirements flow-down.

Formalised, structured information

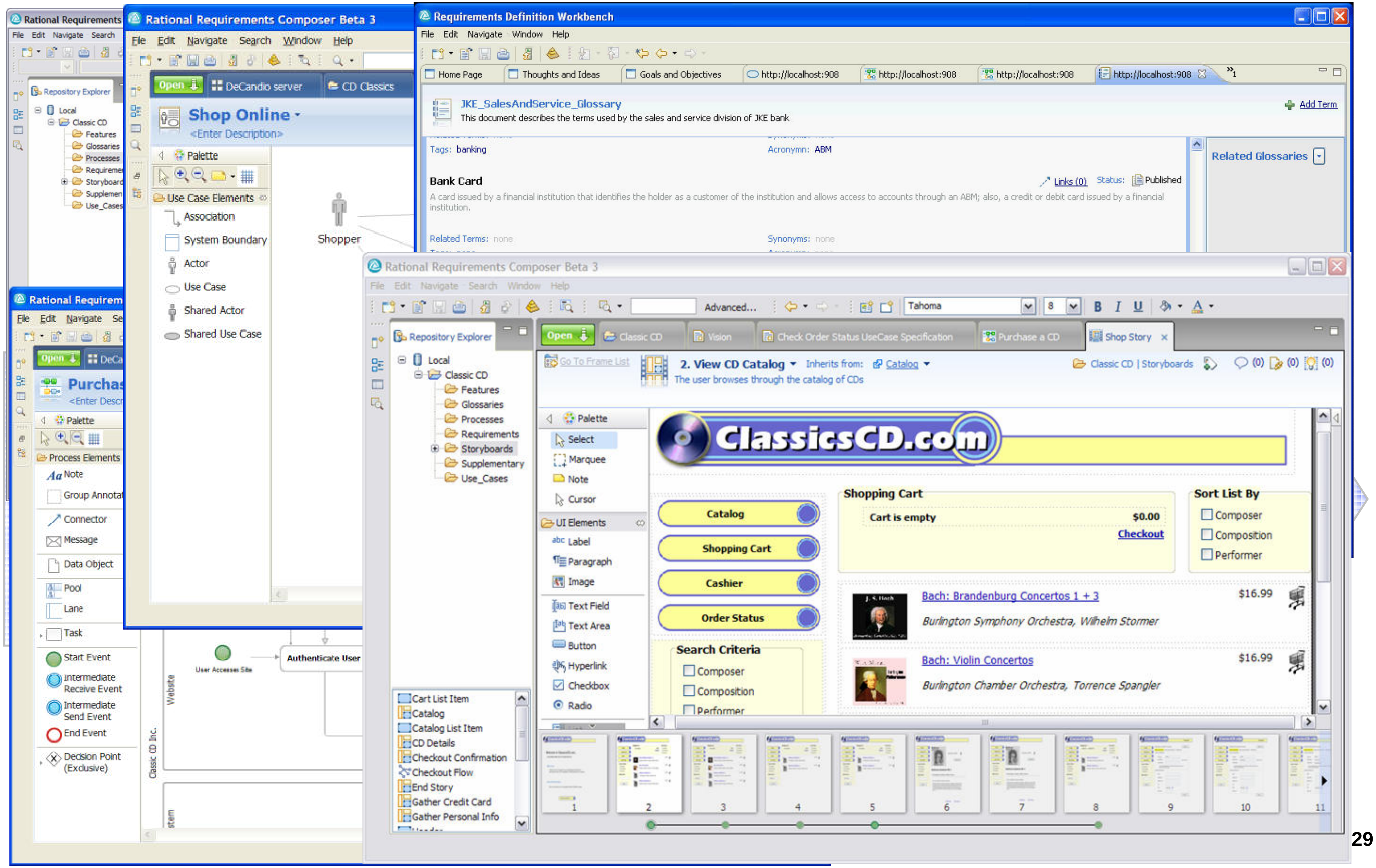
DOING THINGS RIGHT

Requirements Development

Solution design

Capture, connect & organize the web of requirements information

See the business, user and system implications of change



JKE_SalesAndService_Glossary

This document describes the terms used by the sales and service division of JKE bank

Tags: banking

Acronymn: ABM

Bank Card

Status: Published

A card issued by a financial institution that identifies the holder as a customer of the institution and allows access to accounts through an ABM; also, a credit or debit card issued by a financial institution.

Related Terms: none

Synonyms: none

2. View CD Catalog

Inherits from: Catalog

The user browses through the catalog of CDs

Cart is empty $0.00

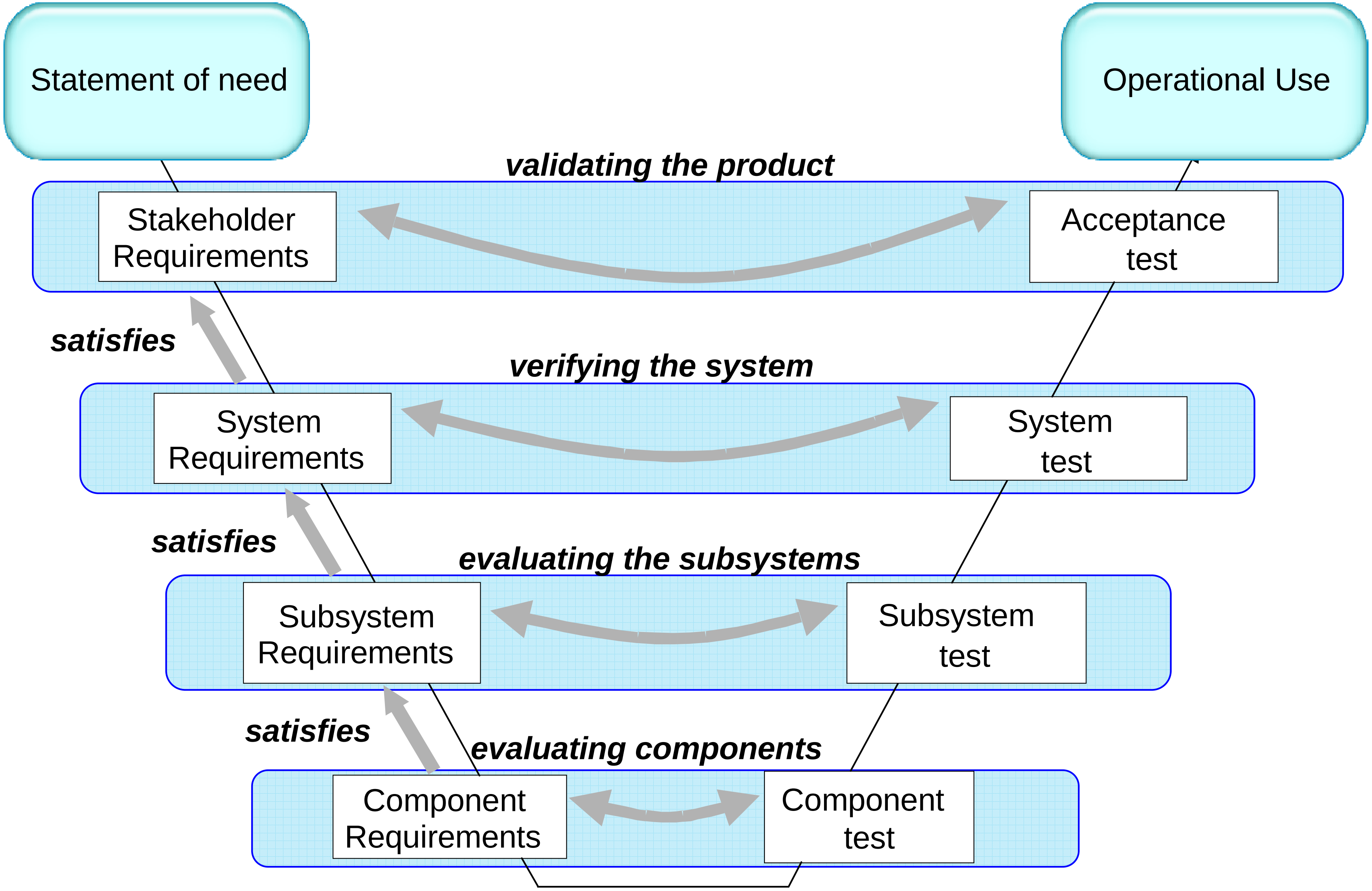
Bach: Brandenburg Concertos 1 + 3 $16.99

Burlington Symphony Orchestra, Wilhelm Stormer

Bach: Violin Concertos $16.99

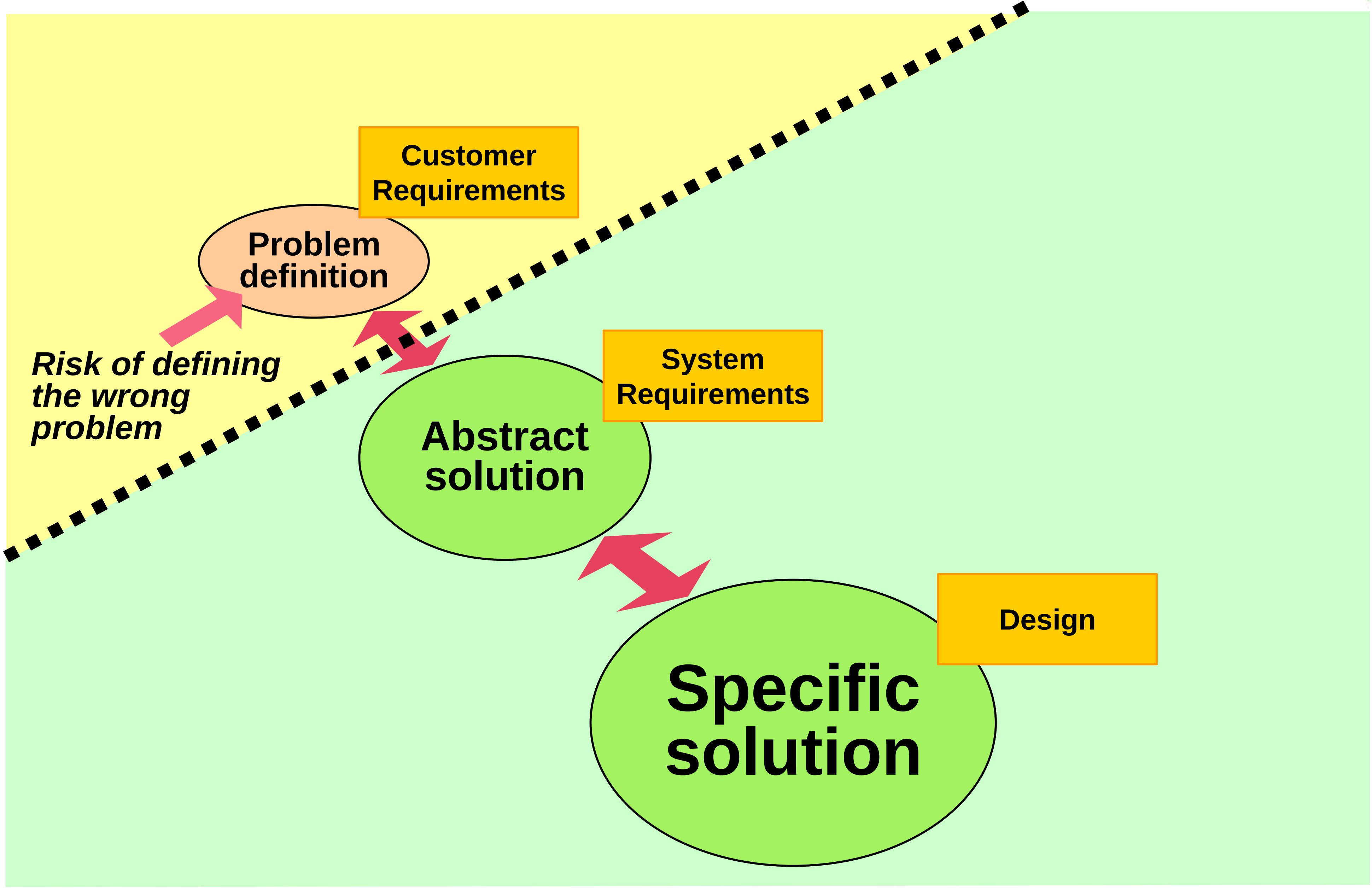
Burlington Chamber Orchestra, Torrence Spangler

Requirements Level / Traceability in the Lifecycle / The V-Model

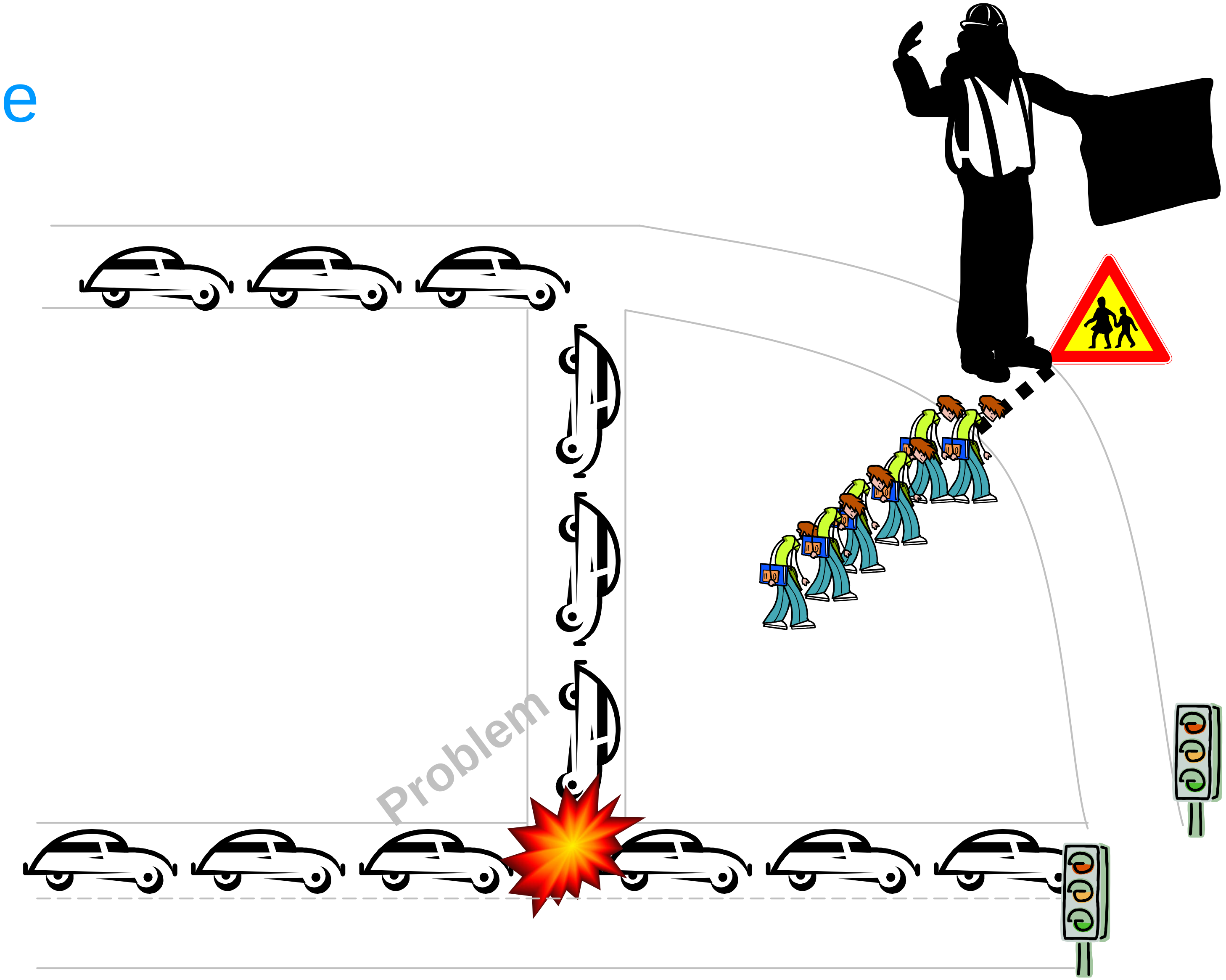


Detailed/Sub-system

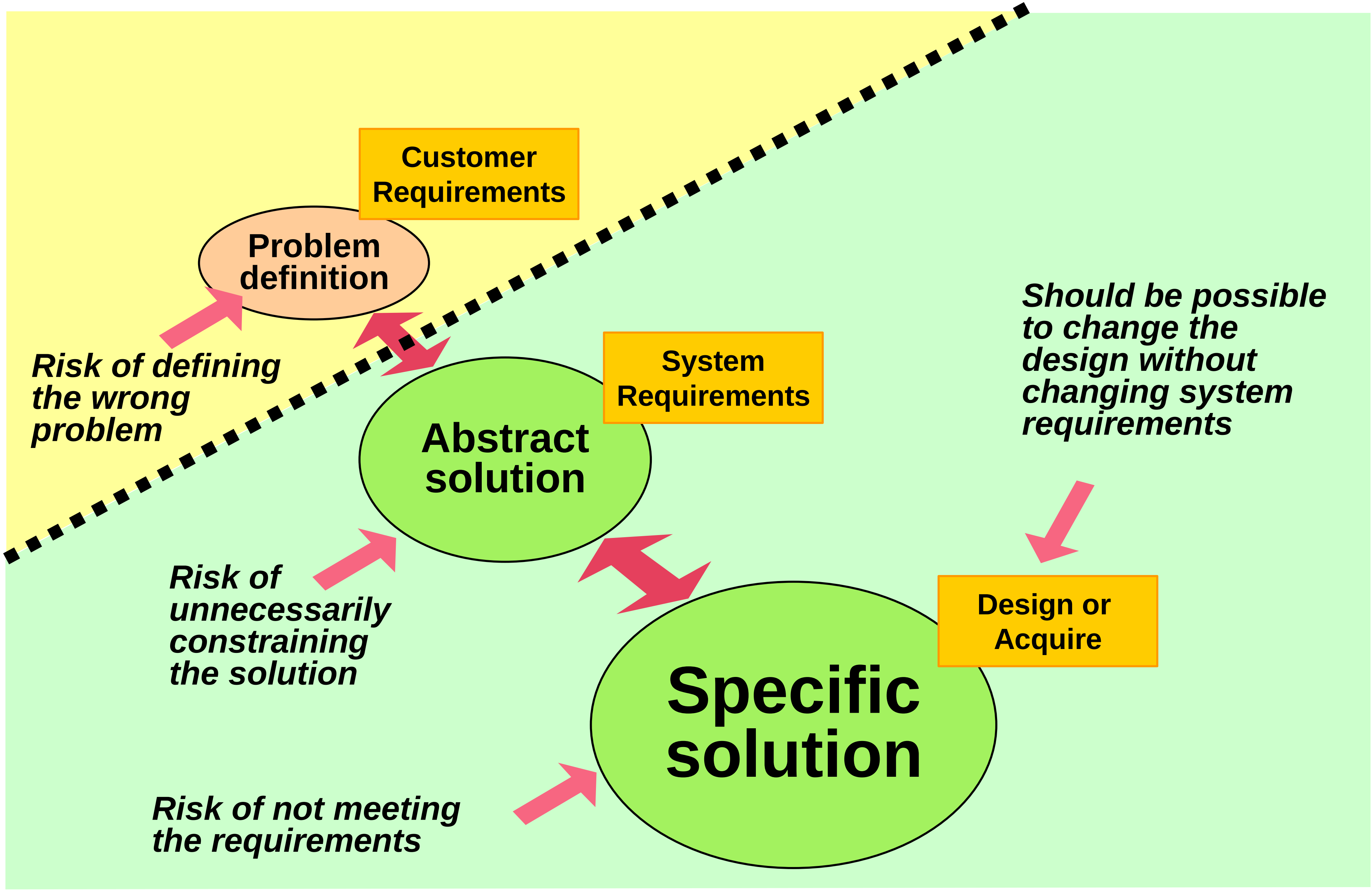
Good Practice: Distinguish between Problem and Solution



Example



Good Practice 2: Distinguish between Problem and Solution



Customer Requirements

Problem definition

Risk of defining the wrong problem

System Requirements

Abstract solution

Should be possible to change the design without changing system requirements

Risk of unnecessarily constraining the solution

Design or Acquire

Specific solution

Risk of not meeting the requirements

Differentiating Problem and Solution

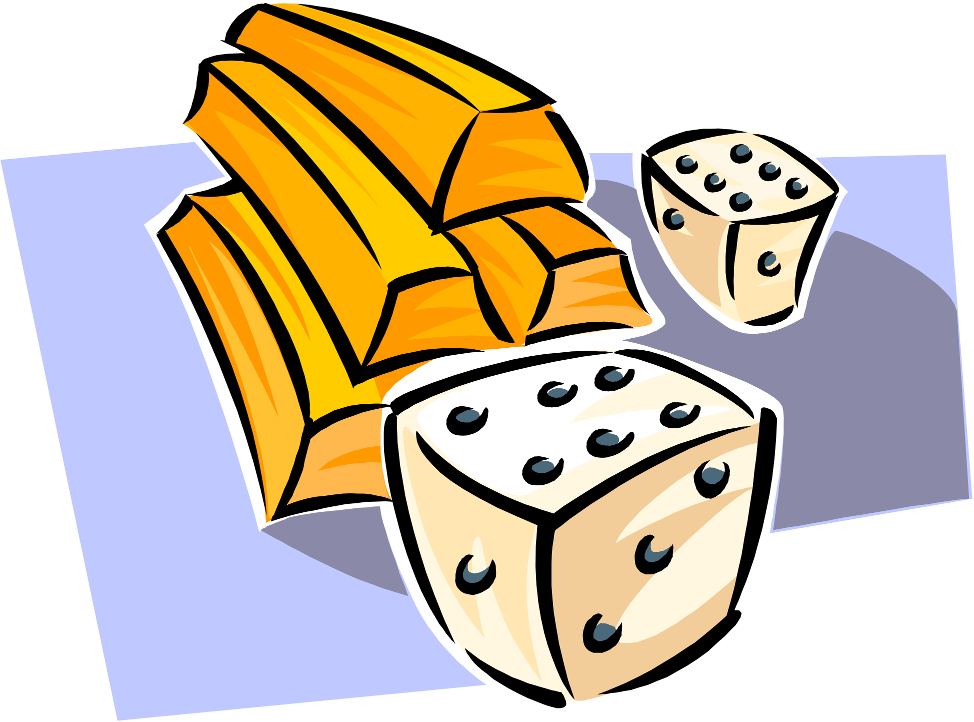
Problem	***Solution***
Customer requirements	***System requirements***
• A description of the problem and its context	• An *abstract* representation of the solution
• Results that stakeholders want from the system	• What the system does
• Do not define the solution, other than for environment	• Do not define the design
• Quality of results	• How well it does it
• Owned by stakeholders or their representatives (e.g. marketing)	• Owned by systems engineers

"The user shall be able to …."

"The system shall do …."

Good Practice 3: Understand the Business Value of Requirements

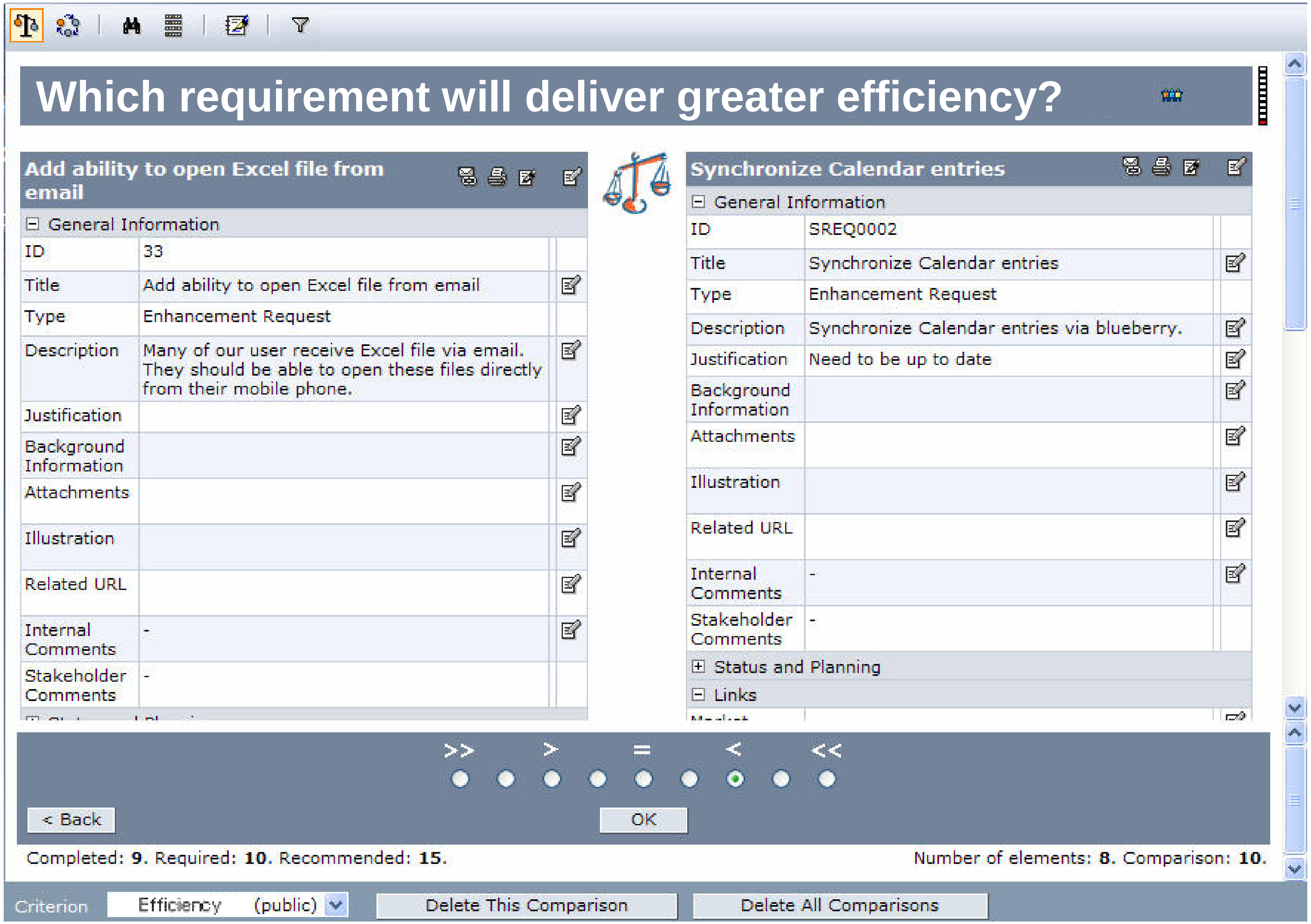
- We always have limited resources
- Despite what they say, all requirements are not critical!
- Some requirements have higher value than others
- Some requirements deliver value at different times
- This is a complex task
- Some requirements add value to others



We humans have limitations when it comes to decision-making

- Humans are good at comparing two alternatives according to one criterion
  - Which one is cheaper? The apple or the orange?
  - Which one is more nutritious?
  - Which one is simpler to peel?
  - Which one goes better with icecream?
- But we have trouble dealing with all criteria at the same time
  - Which one is better? Apple or orange?
- And when we have more than two alternatives it gets worse
  - Rank: Apple, banana, orange, carrot, pear, pine…
- Not to mention if they have dependencies
  - You can only get an apple if you have eaten your potatoes.
  - You can have a carrot even if you didn’t eat your potatoes.
- Or if there is more than one opinion
  - We’ll only serve one of the fruits/vegetables to all of you.

Simplifying the Problem: Pairwise Comparison



Which requirement will deliver greater efficiency?

Add ability to open Excel file from email

⊟ General Information

ID	33
Title	Add ability to open Excel file from email
Type	Enhancement Request
Description	Many of our user receive Excel file via email. They should be able to open these files directly from their mobile phone.
Justification	
Background Information	
Attachments	
Illustration	
Related URL	
Internal Comments	-
Stakeholder Comments	-

⊞ Status and Planning

Synchronize Calendar entries

⊟ General Information

ID	SREQ0002
Title	Synchronize Calendar entries
Type	Enhancement Request
Description	Synchronize Calendar entries via blueberry.
Justification	Need to be up to date
Background Information	
Attachments	
Illustration	
Related URL	
Internal Comments	-
Stakeholder Comments	-

⊞ Status and Planning

⊟ Links

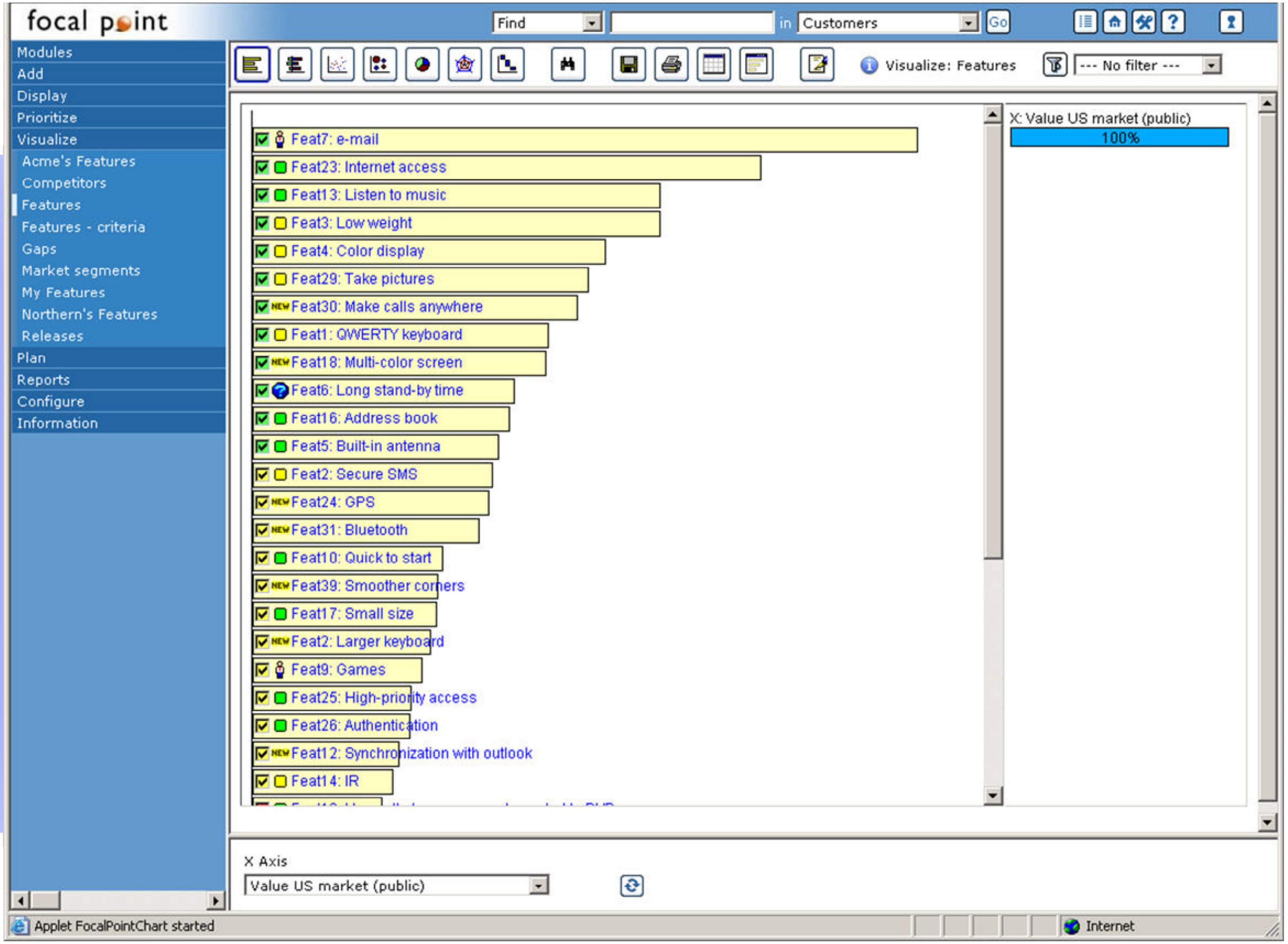
Market

Completed: **9**. Required: **10**. Recommended: **15**.

Number of elements: **8**. Comparison: **10**.

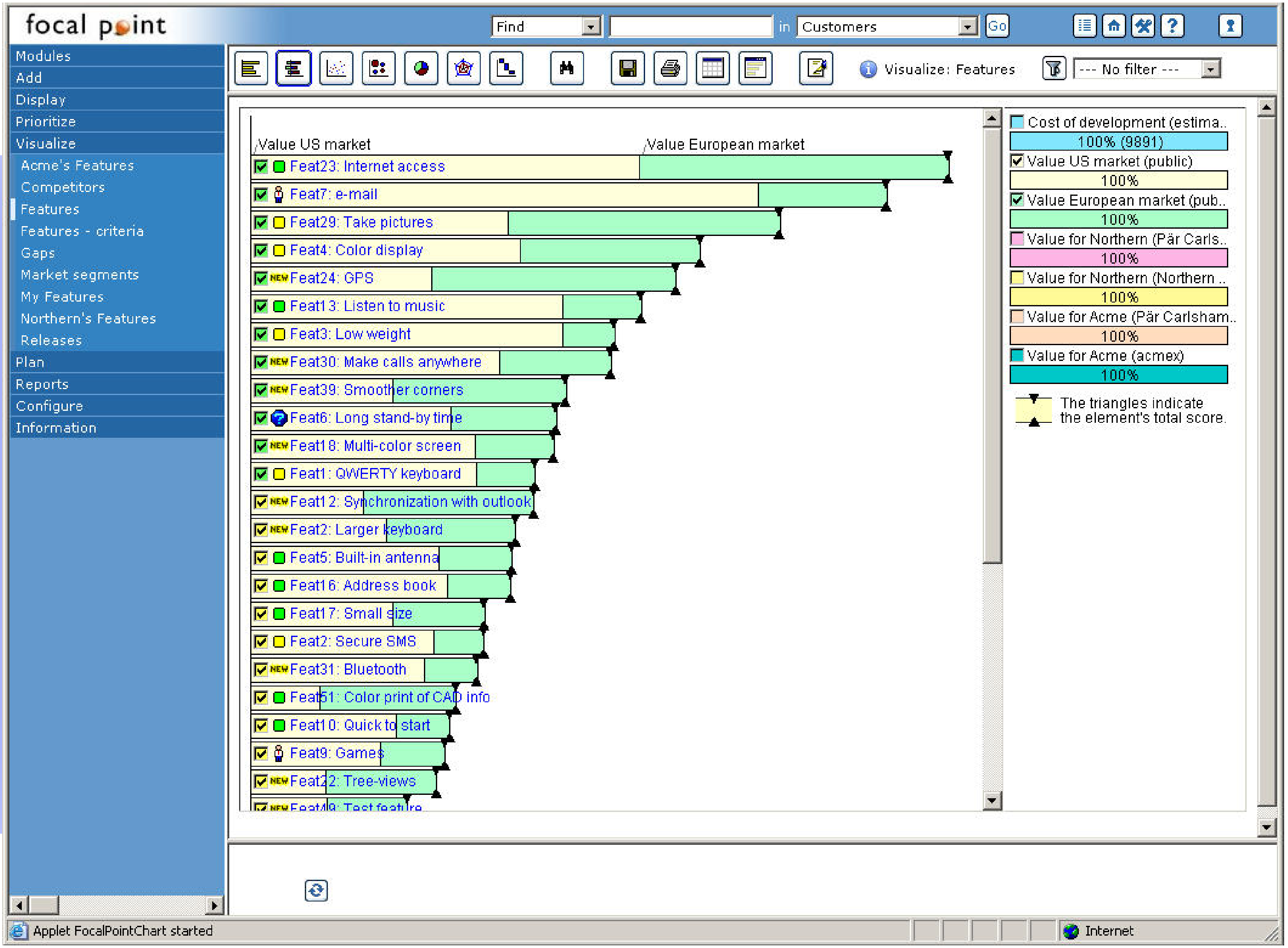
Criterion: Efficiency (public)

The result: Bar charts



- ☑ Feat7: e-mail
- ☑ 🟩 Feat23: Internet access
- ☑ 🟩 Feat13: Listen to music
- ☑ □ Feat3: Low weight
- ☑ □ Feat4: Color display
- ☑ □ Feat29: Take pictures
- ☑ NEW Feat30: Make calls anywhere
- ☑ □ Feat1: QWERTY keyboard
- ☑ NEW Feat18: Multi-color screen
- ☑ Feat6: Long stand-by time
- ☑ 🟩 Feat16: Address book
- ☑ 🟩 Feat5: Built-in antenna
- ☑ □ Feat2: Secure SMS
- ☑ NEW Feat24: GPS
- ☑ NEW Feat31: Bluetooth
- ☑ 🟩 Feat10: Quick to start
- ☑ NEW Feat39: Smoother corners
- ☑ 🟩 Feat17: Small size
- ☑ NEW Feat2: Larger keyboard
- ☑ Feat9: Games
- ☑ 🟩 Feat25: High-priority access
- ☑ 🟩 Feat26: Authentication
- ☑ NEW Feat12: Synchronization with outlook
- ☑ □ Feat14: IR

The result: Bar charts



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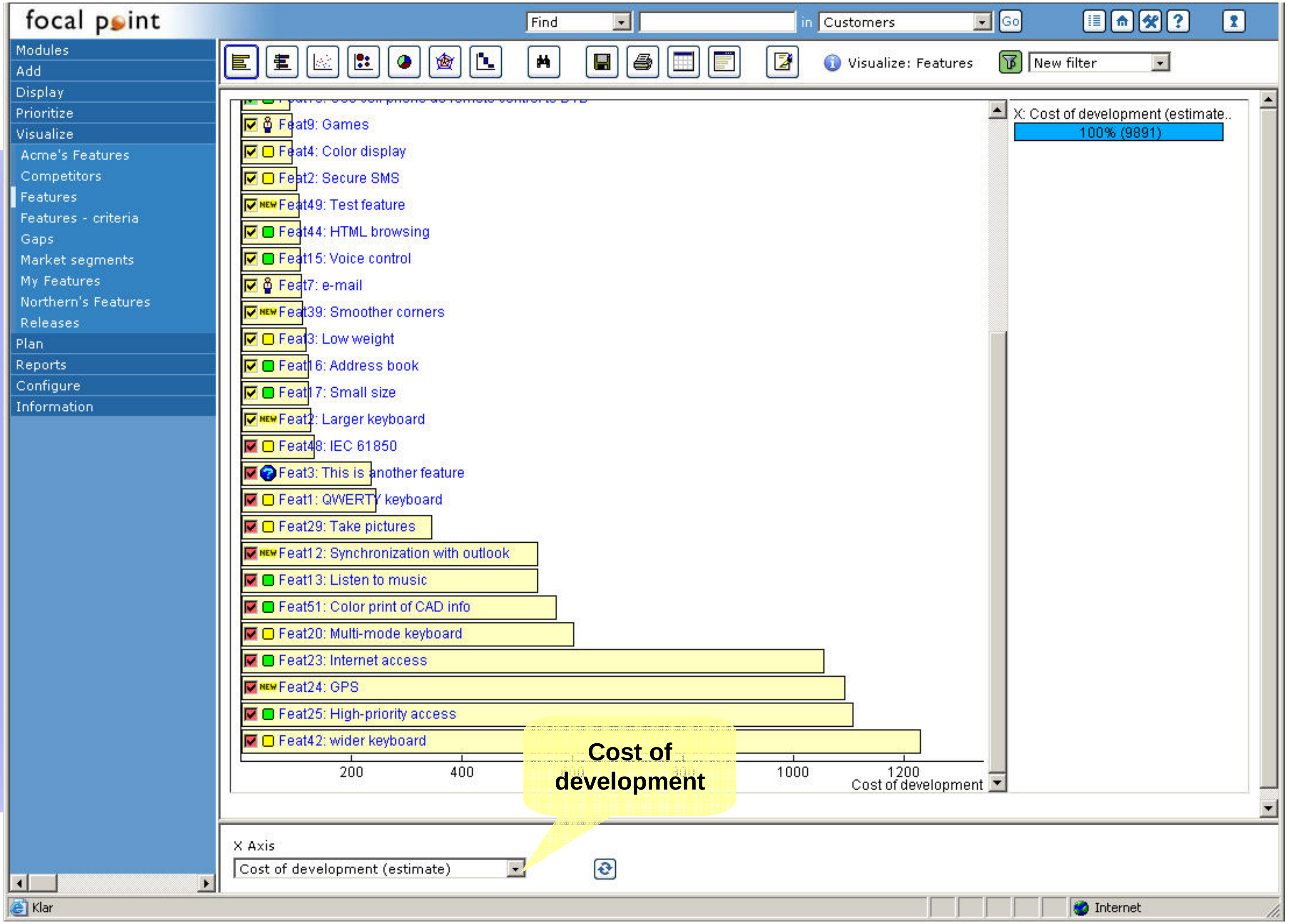
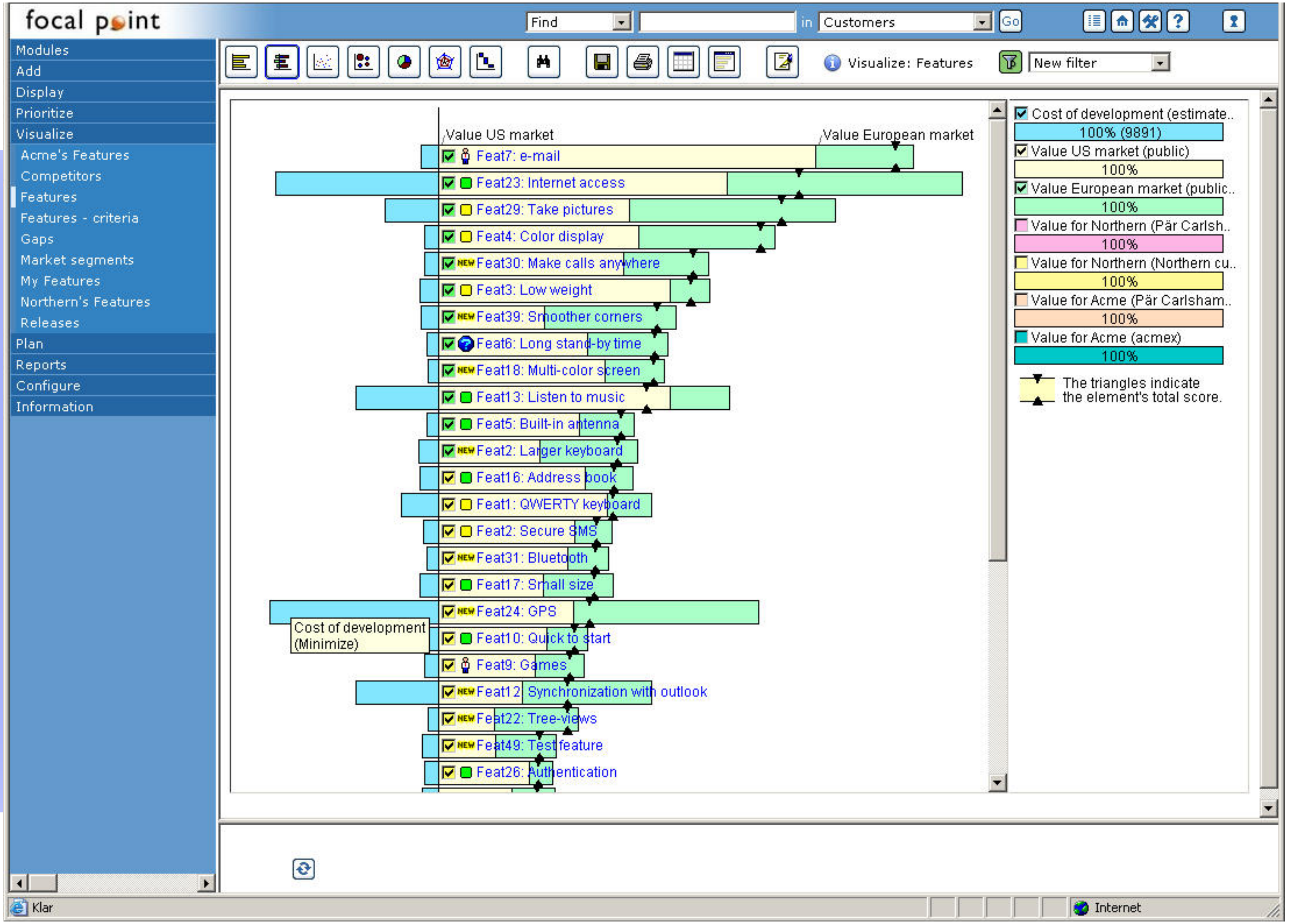
The result: Bar charts

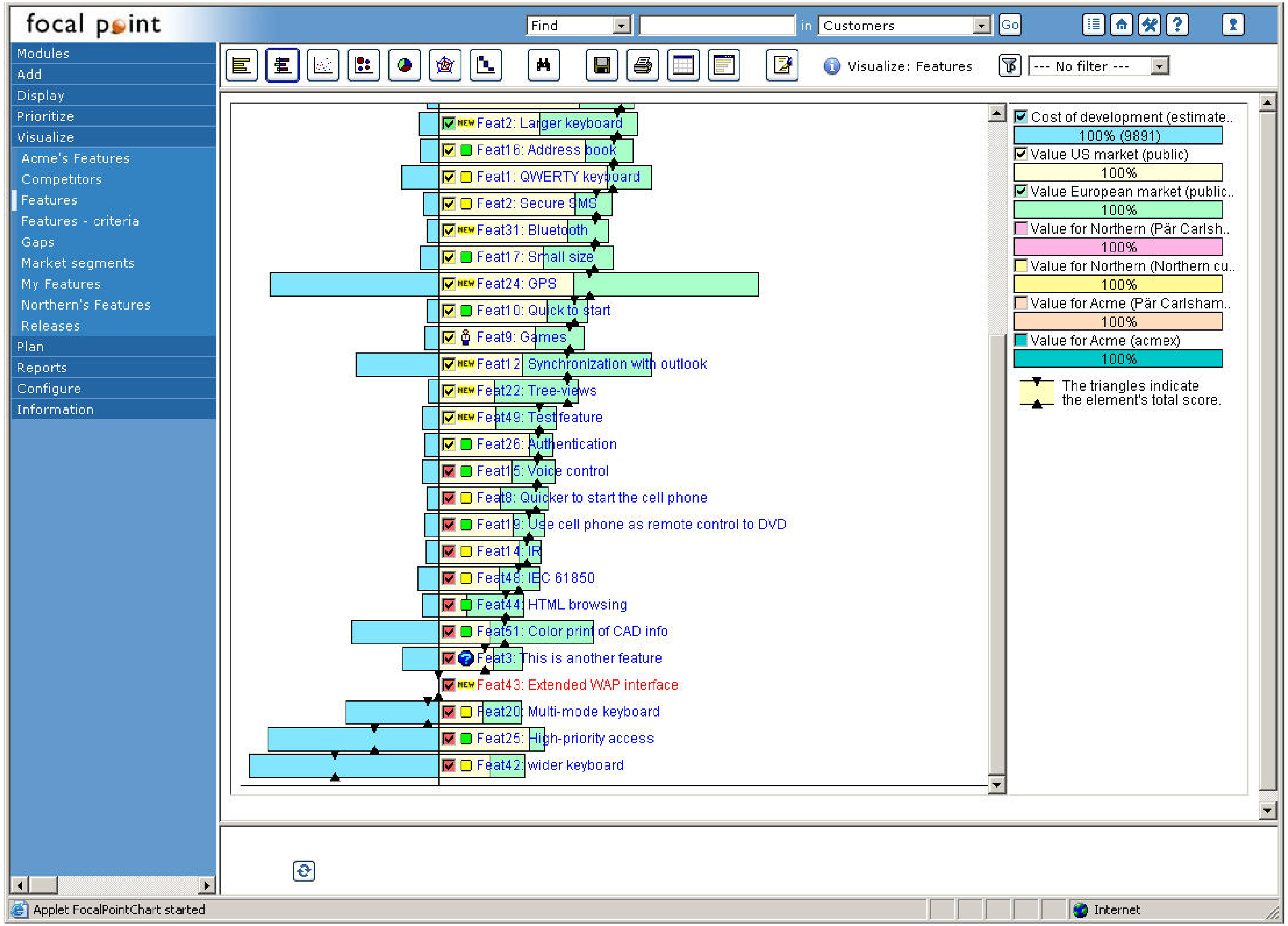


Cost of development

The result: Bar charts



Scenario analysis



- ☑ NEW Feat2: Larger keyboard
- ☑ Feat16: Address book
- ☑ Feat1: QWERTY keyboard
- ☑ Feat2: Secure SMS
- ☑ NEW Feat31: Bluetooth
- ☑ Feat17: Small size
- ☑ NEW Feat24: GPS
- ☑ Feat10: Quick to start
- ☑ Feat9: Games
- ☑ NEW Feat12: Synchronization with outlook
- ☑ NEW Feat22: Tree-views
- ☑ NEW Feat49: Test feature
- ☑ Feat26: Authentication
- ☒ Feat15: Voice control
- ☒ Feat8: Quicker to start the cell phone
- ☒ Feat19: Use cell phone as remote control to DVD
- ☒ Feat14: IR
- ☒ Feat48: IEC 61850
- ☒ Feat44: HTML browsing
- ☒ Feat51: Color print of CAD info
- ☒ Feat3: This is another feature
- ☒ NEW Feat43: Extended WAP interface
- ☒ Feat20: Multi-mode keyboard
- ☒ Feat25: High-priority access
- ☒ Feat42: wider keyboard

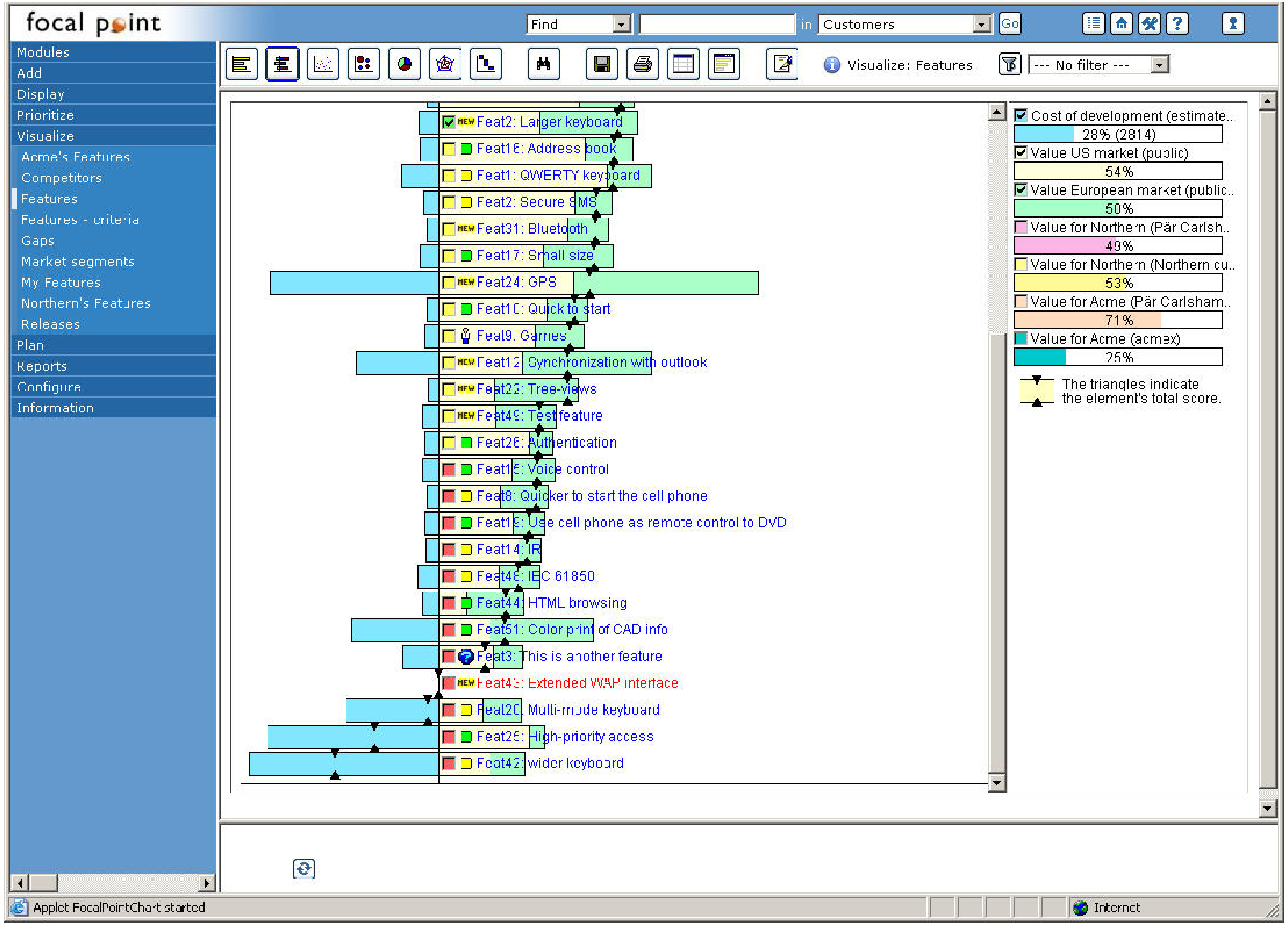
- ☑ Cost of development (estimate..
  100% (9891)
- ☑ Value US market (public)
  100%
- ☑ Value European market (public..
  100%
- □ Value for Northern (Pär Carlsh..
  100%
- □ Value for Northern (Northern cu..
  100%
- □ Value for Acme (Pär Carlsham..
  100%
- □ Value for Acme (acmex)
  100%

The triangles indicate the element's total score.

Applet FocalPointChart started

Internet

Scenario analysis



- NEW Feat2: Larger keyboard
- Feat16: Address book
- Feat1: QWERTY keyboard
- Feat2: Secure SMS
- NEW Feat31: Bluetooth
- Feat17: Small size
- NEW Feat24: GPS
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- NEW Feat12: Synchronization with outlook
- NEW Feat22: Tree-views
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- Feat14: IR
- Feat48: IEC 61850
- Feat44: HTML browsing
- Feat51: Color print of CAD info
- Feat3: This is another feature
- NEW Feat43: Extended WAP interface
- Feat20: Multi-mode keyboard
- Feat25: High-priority access
- Feat42: wider keyboard

☑ Cost of development (estimate..
28% (2814)

☑ Value US market (public)
54%

☑ Value European market (public..
50%

□ Value for Northern (Pär Carlsh..
49%

□ Value for Northern (Northern cu..
53%

□ Value for Acme (Pär Carlsham..
71%

□ Value for Acme (acmex)
25%

The triangles indicate the element's total score.

Applet FocalPointChart started

Internet

Good Practice 4: Use concise, clear, consistent language

Each requirement statement should be:

1. Individual: each statement is a single traceable element
2. Unique: each statement is uniquely identified
3. Clear: each statement is clearly understandable
4. Precise: each statement is precise and concise
5. Abstract: does not impose a solution on the next layer
6. Testable: each statement can be validated/verified
7. Quantified: each statement has acceptance criteria

Six Things to Avoid

1. Rambling: conciseness is a virtue
2. Let-out clauses: such as “if that should be necessary”; they render the requirements useless
3. Multiple requirements: often indicated by “and”, “or”, “but”, “however”
4. Vague terms: usually, generally, often, normally, typically, user friendly, versatile, flexible
5. Wishful thinking: “100% reliable”, “please all users”, “run on all platforms”, handle all unexpected failures”, “upgradeable to all future situations”
6. Speculation: stick to what you know

Good Practice 5: Focus on documents as well as statements

- Need to balance two aspects:

- Making each requirement statement manageable
  - Focus on the individual statement of requirement (…later)

- Making the requirements document understandable
  - Focus on the requirements document structure

Specifications Contain Statements

Two concerns:

- Focus on the individual statement of requirement:
  - Language
  - Clarity, preciseness
  - Identity, traceability
- Focus on the requirements document:
  - Understanding context
  - Assessing completeness
  - Identifying repetition/conflict
  - Navigating/searching requirements

Statements provide precision

Documents provide context

Seven Criteria for Requirements Documents

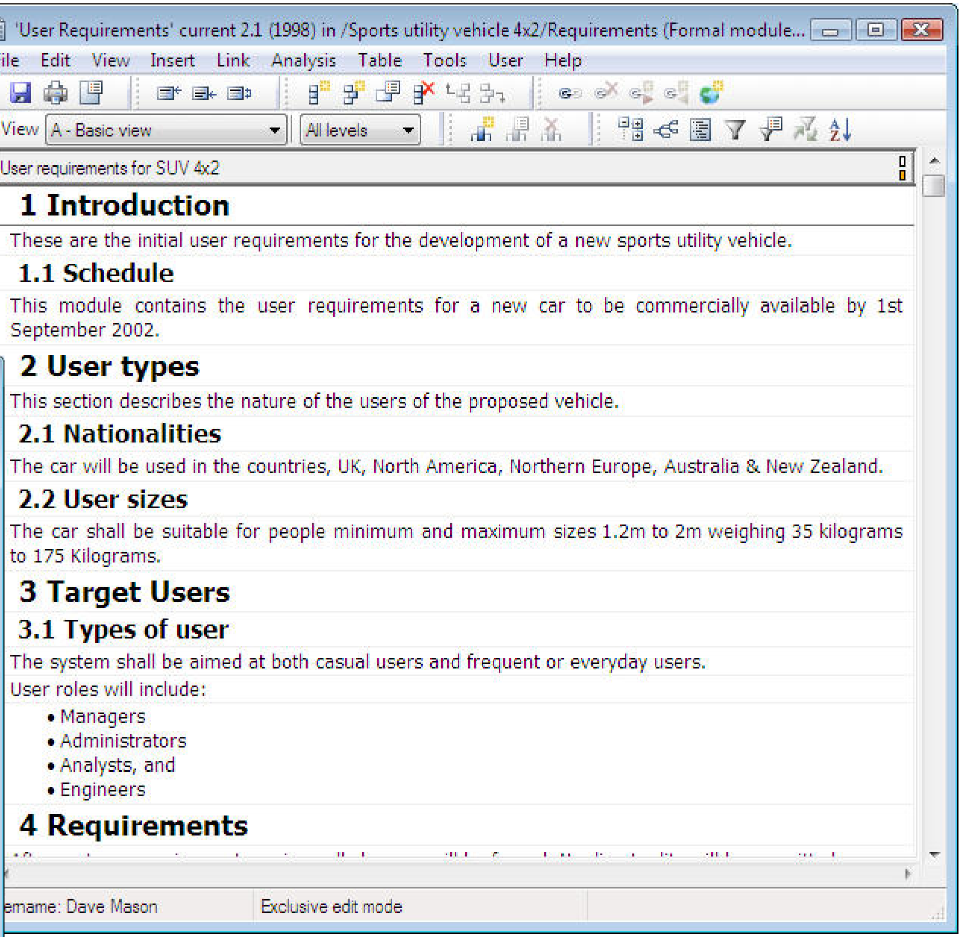
Each requirements set should be:

1. Complete / Sufficient: all requirements are present
2. Consistent: no two requirements are in conflict
3. Non-redundant: each requirement is expressed once
4. Modular: requirements statements that belong together are close to one another
5. Structured: there is a clear structure to the requirements document
6. Satisfied: the appropriate degree of design traceability has been achieved
7. Evaluated: the appropriate degree of test traceability has been achieved

Define an outline structure at the outset, and improve it as you go

DOORS Document Views

Simple document view of a database; get started quickly


'User Requirements' current 2.1 (1998) in /Sports utility vehicle 4x2/Requirements (Formal module...
File Edit View Insert Link Analysis Table Tools User Help
View A - Basic view
All levels
User requirements for SUV 4x2
ername: Dave Mason
Exclusive edit mode

1 Introduction

These are the initial user requirements for the development of a new sports utility vehicle.

1.1 Schedule

This module contains the user requirements for a new car to be commercially available by 1st September 2002.

2 User types

This section describes the nature of the users of the proposed vehicle.

2.1 Nationalities

The car will be used in the countries, UK, North America, Northern Europe, Australia & New Zealand.

2.2 User sizes

The car shall be suitable for people minimum and maximum sizes 1.2m to 2m weighing 35 kilograms to 175 Kilograms.

3 Target Users

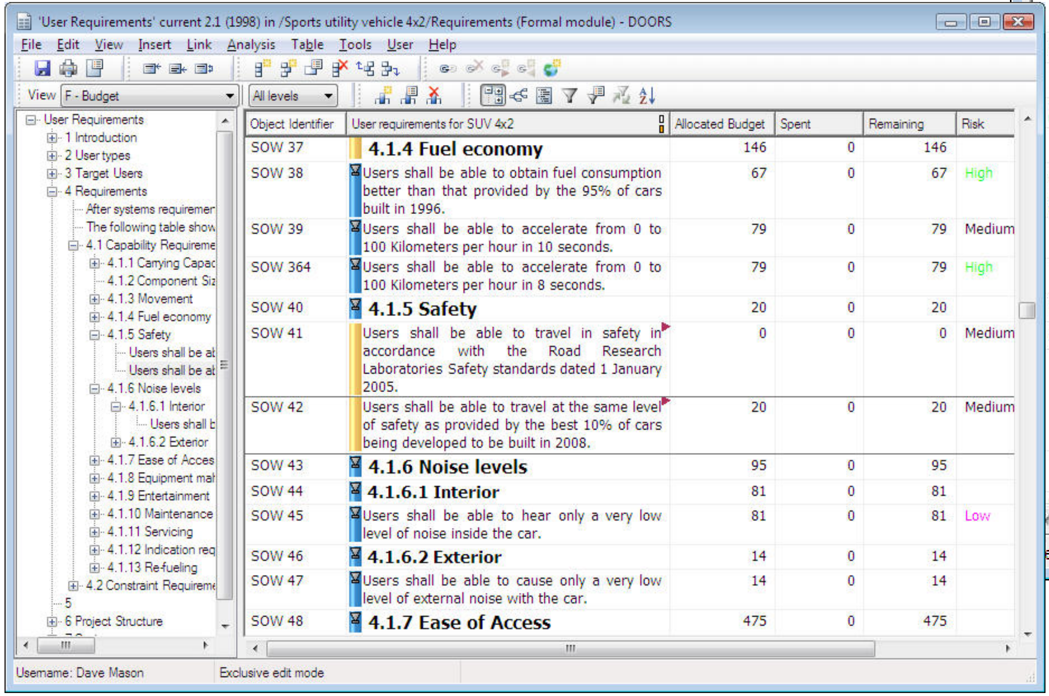
3.1 Types of user

The system shall be aimed at both casual users and frequent or everyday users.

User roles will include:

- Managers
- Administrators
- Analysts, and
- Engineers

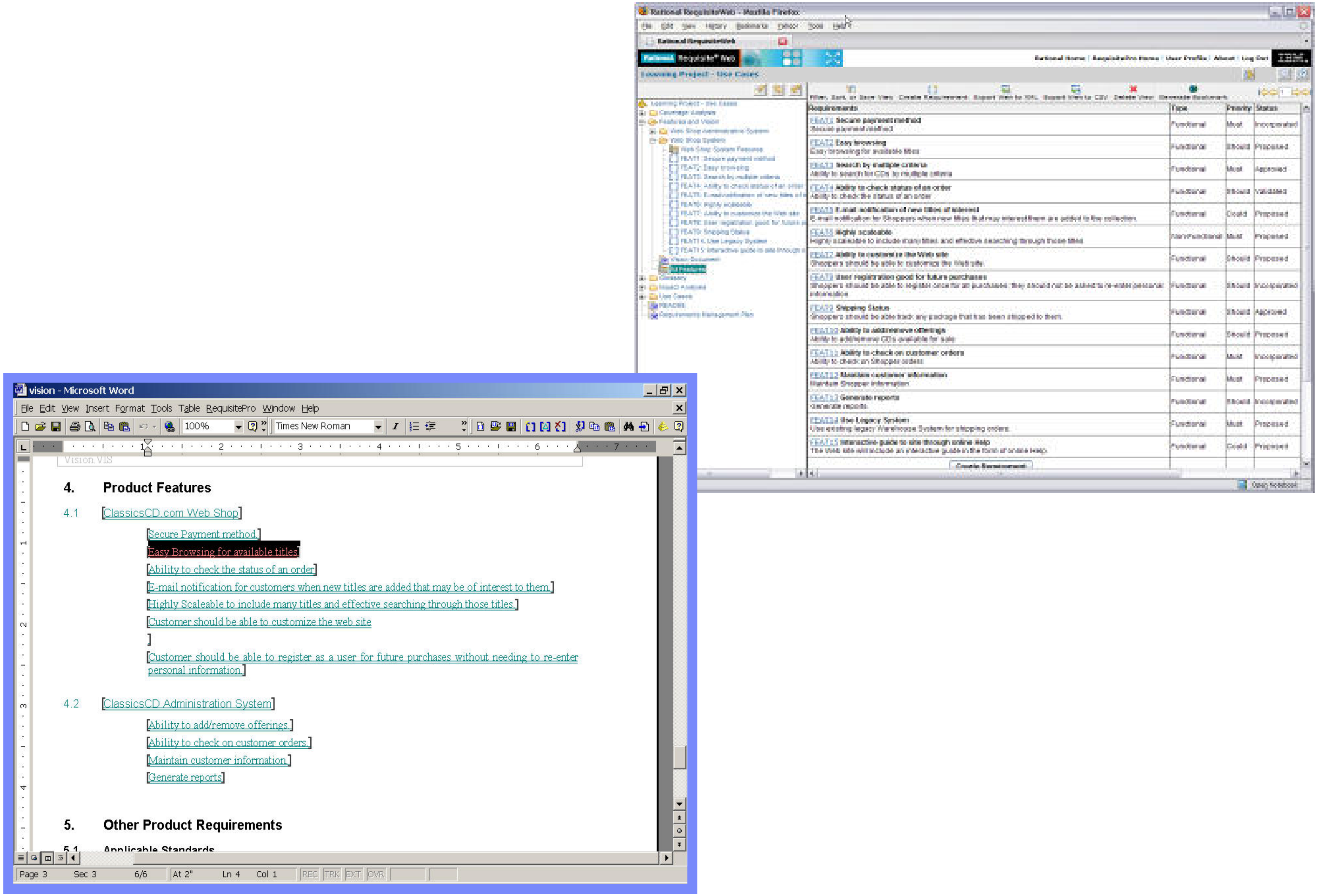
4 Requirements



Object Identifier	User requirements for SUV 4x2	Allocated Budget	Spent	Remaining	Risk
SOW 37	**4.1.4 Fuel economy**	146	0	146	
SOW 38	Users shall be able to obtain fuel consumption better than that provided by the 95% of cars built in 1996.	67	0	67	High
SOW 39	Users shall be able to accelerate from 0 to 100 Kilometers per hour in 10 seconds.	79	0	79	Medium
SOW 364	Users shall be able to accelerate from 0 to 100 Kilometers per hour in 8 seconds.	79	0	79	High
SOW 40	**4.1.5 Safety**	20	0	20	
SOW 41	Users shall be able to travel in safety in accordance with the Road Research Laboratories Safety standards dated 1 January 2005.	0	0	0	Medium
SOW 42	Users shall be able to travel at the same level of safety as provided by the best 10% of cars being developed to be built in 2008.	20	0	20	Medium
SOW 43	**4.1.6 Noise levels**	95	0	95	
SOW 44	**4.1.6.1 Interior**	81	0	81	
SOW 45	Users shall be able to hear only a very low level of noise inside the car.	81	0	81	Low
SOW 46	**4.1.6.2 Exterior**	14	0	14	
SOW 47	Users shall be able to cause only a very low level of external noise with the car.	14	0	14	
SOW 48	**4.1.7 Ease of Access**	475	0	475	

See multiple requirements logically

ReqPro Views



Rational RequisiteWeb - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
Rational RequisiteWeb
Rational RequisitePro Web
Rational Home | RequisitePro Home | User Profile | About | Log Out
Learning Project - Use Cases
Filter, Sort, or Save View
Create Requirement
Export View to XML
Export View to CSV
Delete View
Generate Bookmark
Learning Project - Use Cases
Coverage Analysis
Features and Vision
Web Shop Administration System
Web Shop System
Web Shop System Features
FEAT1: Secure payment method
FEAT2: Easy browsing
FEAT3: Search by multiple criteria
FEAT4: Ability to check status of an order
FEAT5: E-mail notification of new titles of i
FEAT6: Highly scalable
FEAT7: Ability to customize the Web site
FEAT8: User registration good for future p
FEAT9: Shipping Status
FEAT14: Use Legacy System
FEAT15: Interactive guide to site through o
Vision Document
All Features
Glossary
Hazard Analysis
Use Cases
README
Requirements Management Plan
Create Requirement
Open Notebook

Requirements	Type	Priority	Status
FEAT1 Secure payment method Secure payment method	Functional	Must	Incorporated
FEAT2 Easy browsing Easy browsing for available titles	Functional	Should	Proposed
FEAT3 Search by multiple criteria Ability to search for CDs by multiple criteria	Functional	Must	Approved
FEAT4 Ability to check status of an order Ability to check the status of an order	Functional	Should	Validated
FEAT5 E-mail notification of new titles of interest E-mail notification for Shoppers when new titles that may interest them are added to the collection.	Functional	Could	Proposed
FEAT6 Highly scalable Highly scaleable to include many titles and effective searching through those titles	Non-Functional	Must	Proposed
FEAT7 Ability to customize the Web site Shoppers should be able to customize the Web site.	Functional	Should	Proposed
FEAT8 User registration good for future purchases Shoppers should be able to register once for all purchases; they should not be asked to re-enter personal information	Functional	Should	Incorporated
FEAT9 Shipping Status Shoppers should be able track any package that has been shipped to them.	Functional	Should	Approved
FEAT10 Ability to add/remove offerings Ability to add/remove CDs available for sale	Functional	Should	Proposed
FEAT11 Ability to check on customer orders Ability to check on Shopper orders	Functional	Must	Incorporated
FEAT12 Maintain customer information Maintain Shopper information	Functional	Must	Proposed
FEAT13 Generate reports Generate reports.	Functional	Should	Incorporated
FEAT14 Use Legacy System Use existing legacy Warehouse System for shipping orders.	Functional	Must	Proposed
FEAT15 Interactive guide to site through online Help The Web site will include an interactive guide in the form of online Help.	Functional	Could	Proposed

vision - Microsoft Word
File Edit View Insert Format Tools Table RequisitePro Window Help
100%
Times New Roman
Vision VIS
Page 3 Sec 3 6/6 At 2" Ln 4 Col 1 REC TRK EXT OVR

4. Product Features

4.1 [ClassicsCD.com Web Shop]

[Secure Payment method.]

[Easy Browsing for available titles]

[Ability to check the status of an order]

[E-mail notification for customers when new titles are added that may be of interest to them.]

[Highly Scaleable to include many titles and effective searching through those titles.]

[Customer should be able to customize the web site

]

[Customer should be able to register as a user for future purchases without needing to re-enter personal information.]

4.2 [ClassicsCD Administration System]

[Ability to add/remove offerings.]

[Ability to check on customer orders.]

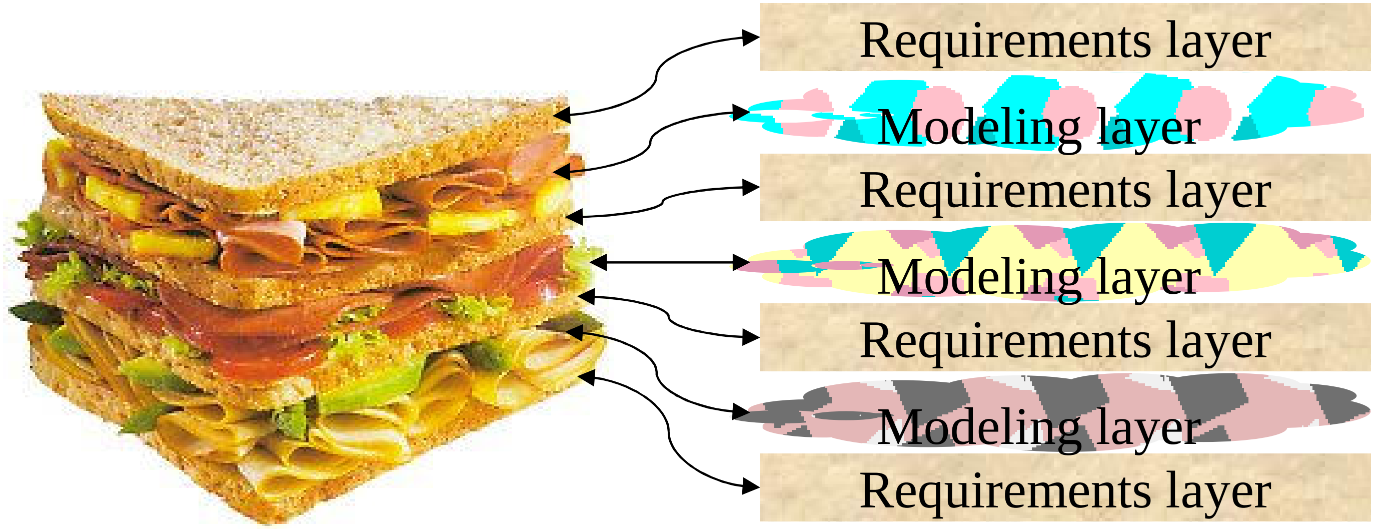
[Maintain customer information.]

[Generate reports]

5. Other Product Requirements

5.1 Applicable Standards

Good practice 6: Understand the role of modelling



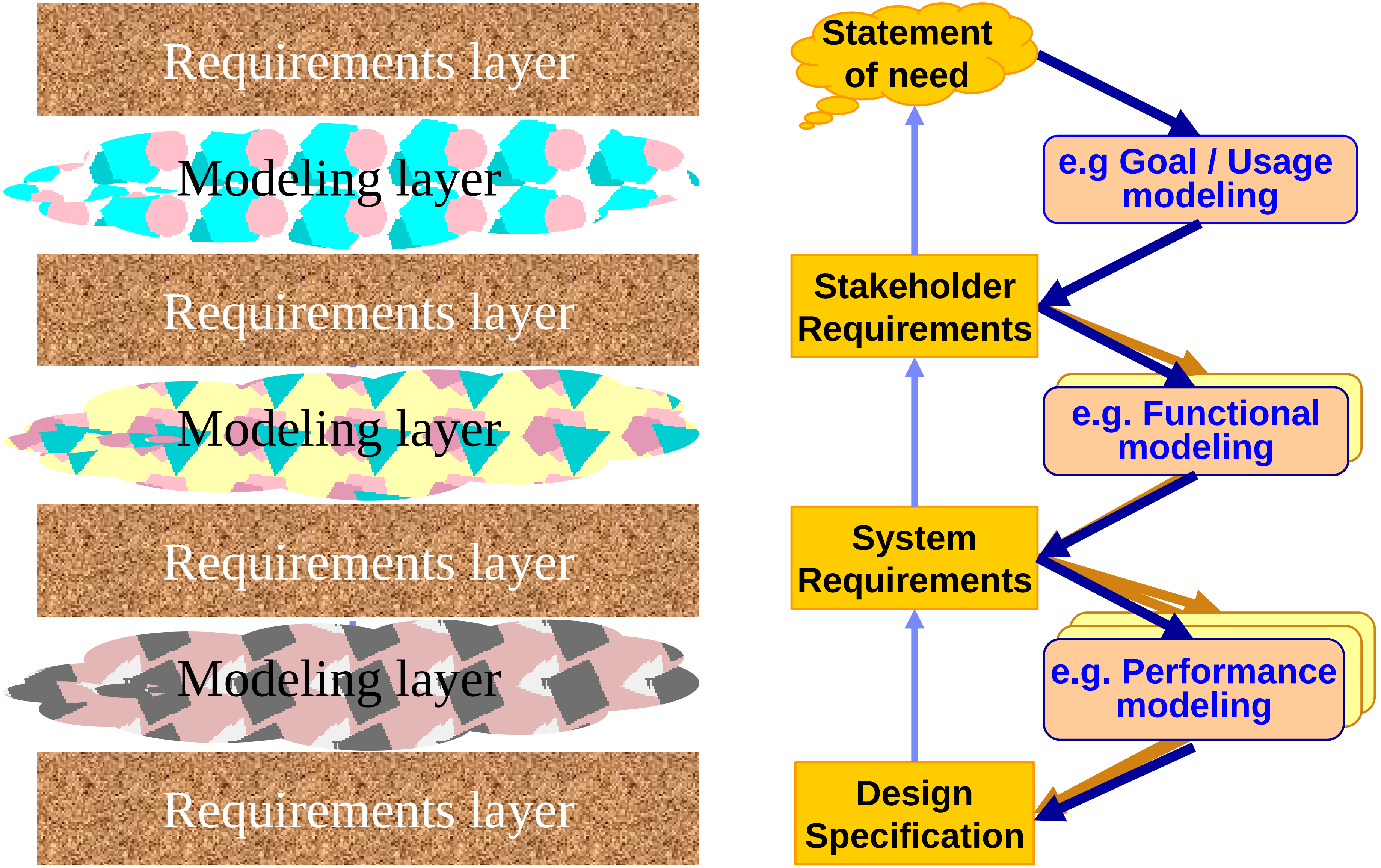
- The requirements are the “bread and butter” of development.
- What is a sandwich without the bread?
- Requirements alone are a little dry.
- Modeling is what makes the whole rather more interesting.
- The filling holds the bread together.
- It is the bread and the filling together that make a sandwich.

Complementary techniques

- Requirements management:
  - capture of and traceability between individual textual requirements
- Modelling:
  - multiple views of structured information
  - consistency can be checked across the system using the model data dictionary
  - allows animation to be used as a validation technique
  - means of communication with stakeholders…
- The model is not the requirement
  - non-functional requirements are typically not captured in a model
  - a graphical model is generally insufficient as a contractual basis

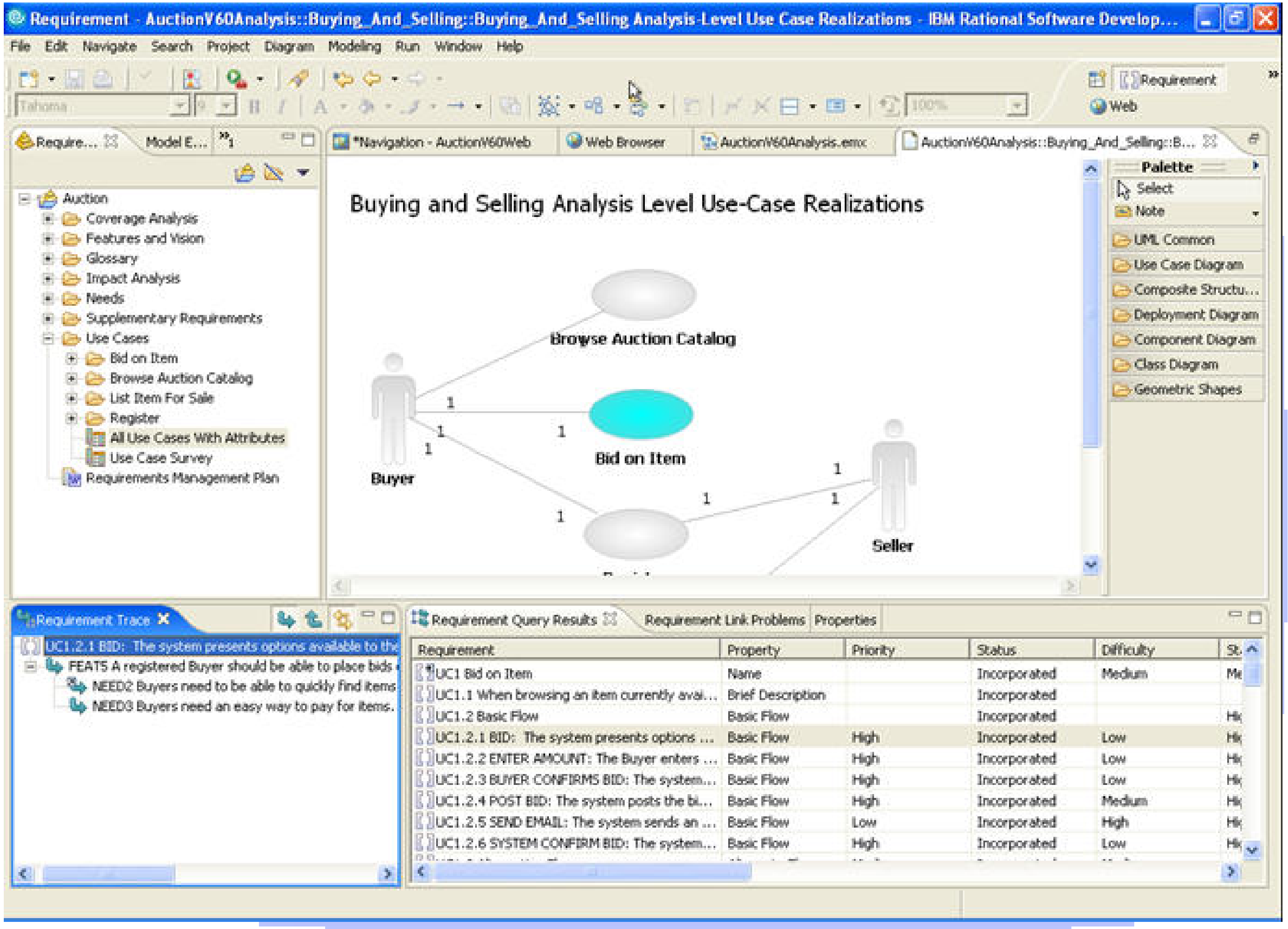
Good practice: Understand

Models Bridge Layers of Requirements



Modeling Support from Rational

(look out for an big collaborative modeling announcement next week!)



Requirement - AuctionV60Analysis::Buying_And_Selling::Buying_And_Selling Analysis-Level Use Case Realizations - IBM Rational Software Develop...

- Auction
  - Coverage Analysis
  - Features and Vision
  - Glossary
  - Impact Analysis
  - Needs
  - Supplementary Requirements
  - Use Cases
    - Bid on Item
    - Browse Auction Catalog
    - List Item For Sale
    - Register
    - All Use Cases With Attributes
    - Use Case Survey
  - Requirements Management Plan

Buying and Selling Analysis Level Use-Case Realizations

Requirement Trace

- UC1.2.1 BID: The system presents options available to the
  - FEAT5 A registered Buyer should be able to place bids
    - NEED2 Buyers need to be able to quickly find items
    - NEED3 Buyers need an easy way to pay for items.

Requirement Query Results | Requirement Link Problems | Properties

Requirement	Property	Priority	Status	Difficulty	St
UC1 Bid on Item	Name		Incorporated	Medium	Me
UC1.1 When browsing an item currently avai...	Brief Description		Incorporated		
UC1.2 Basic Flow	Basic Flow		Incorporated		Hi
UC1.2.1 BID: The system presents options ...	Basic Flow	High	Incorporated	Low	Hi
UC1.2.2 ENTER AMOUNT: The Buyer enters ...	Basic Flow	High	Incorporated	Low	Hi
UC1.2.3 BUYER CONFIRMS BID: The system...	Basic Flow	High	Incorporated	Low	Hi
UC1.2.4 POST BID: The system posts the bi...	Basic Flow	High	Incorporated	Medium	Hi
UC1.2.5 SEND EMAIL: The system sends an ...	Basic Flow	Low	Incorporated	High	Hi
UC1.2.6 SYSTEM CONFIRM BID: The system...	Basic Flow	High	Incorporated	Low	Hi

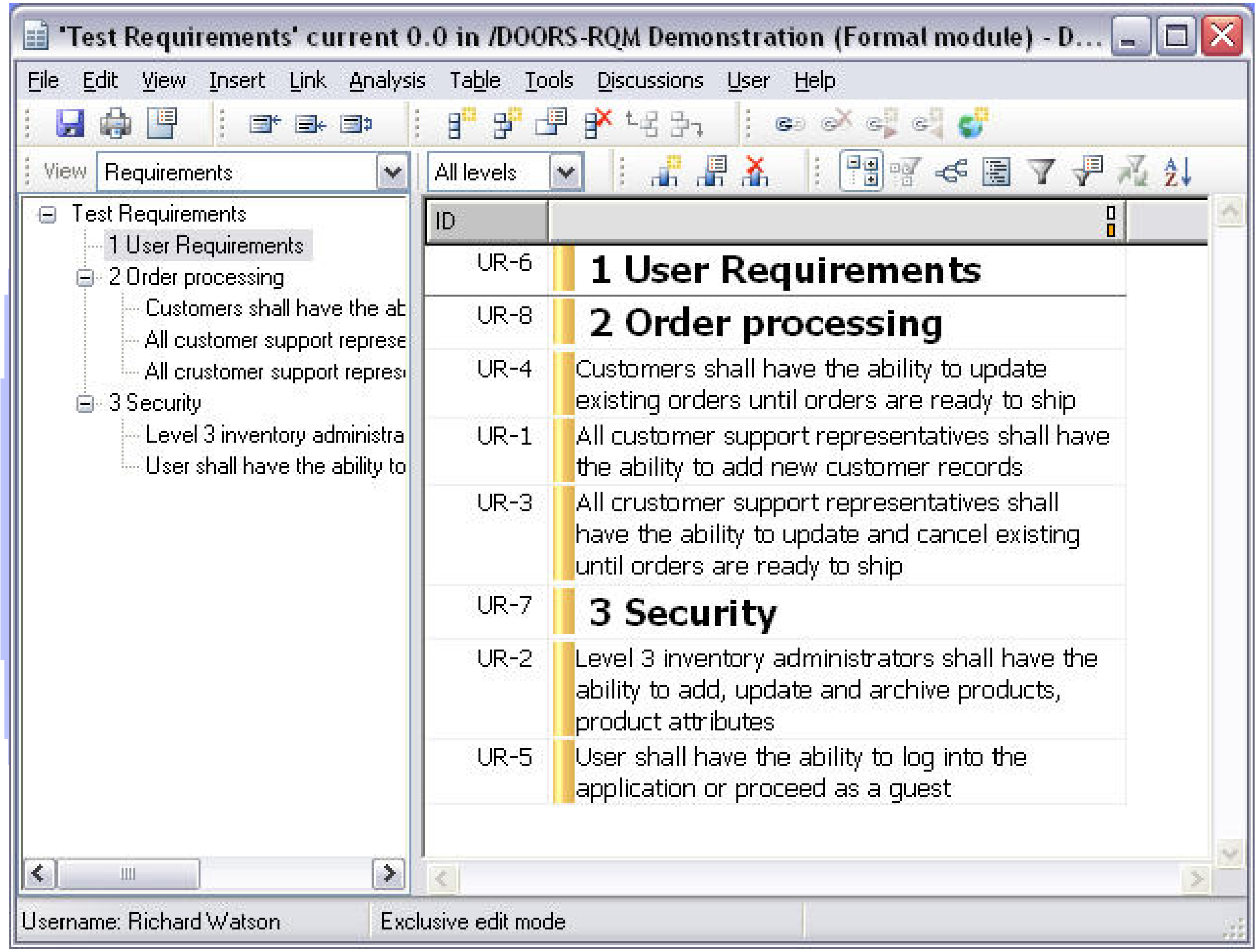
Good Practice 7: Drive Testing from Requirements

- Of every requirement statement, ask:
  - “How will you know if the need has been met?”
- Improves the way the requirement is expressed
  - Is it quantified?
  - What are the success criteria?
  - Add requirements to make system testable
- Plan the tests now, not later:
  - What kind of tests will be used?
  - When will the tests be performed?
- Preparing the tests may take months or years:
  - Collect requirements for test facilities
- Trace tests to requirements
  - Include tests in impact analysis

Principles of Requirements-Driven Testing

- Plan Tests Early
  - To understand the requirements better
- Conduct Tests Early
  - Phase injection vs. phase detection
- Relate Tests to Requirements
  - Assurance requirements are met
- Relate Defects to Requirements
  - Understand impact of defects
- Measure Progress against Requirements

The Analyst Captures Requirements



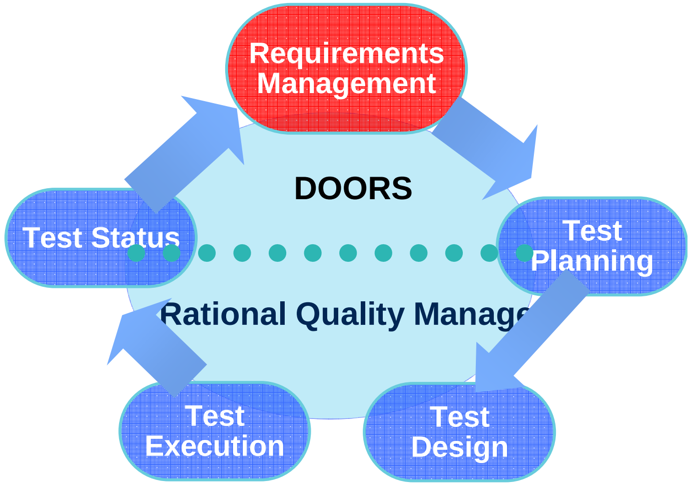
'Test Requirements' current 0.0 in /DOORS-RQM Demonstration (Formal module) - D...

- Test Requirements
  - 1 User Requirements
  - 2 Order processing
    - Customers shall have the ab
    - All customer support represe
    - All crustomer support repres
  - 3 Security
    - Level 3 inventory administra
    - User shall have the ability to

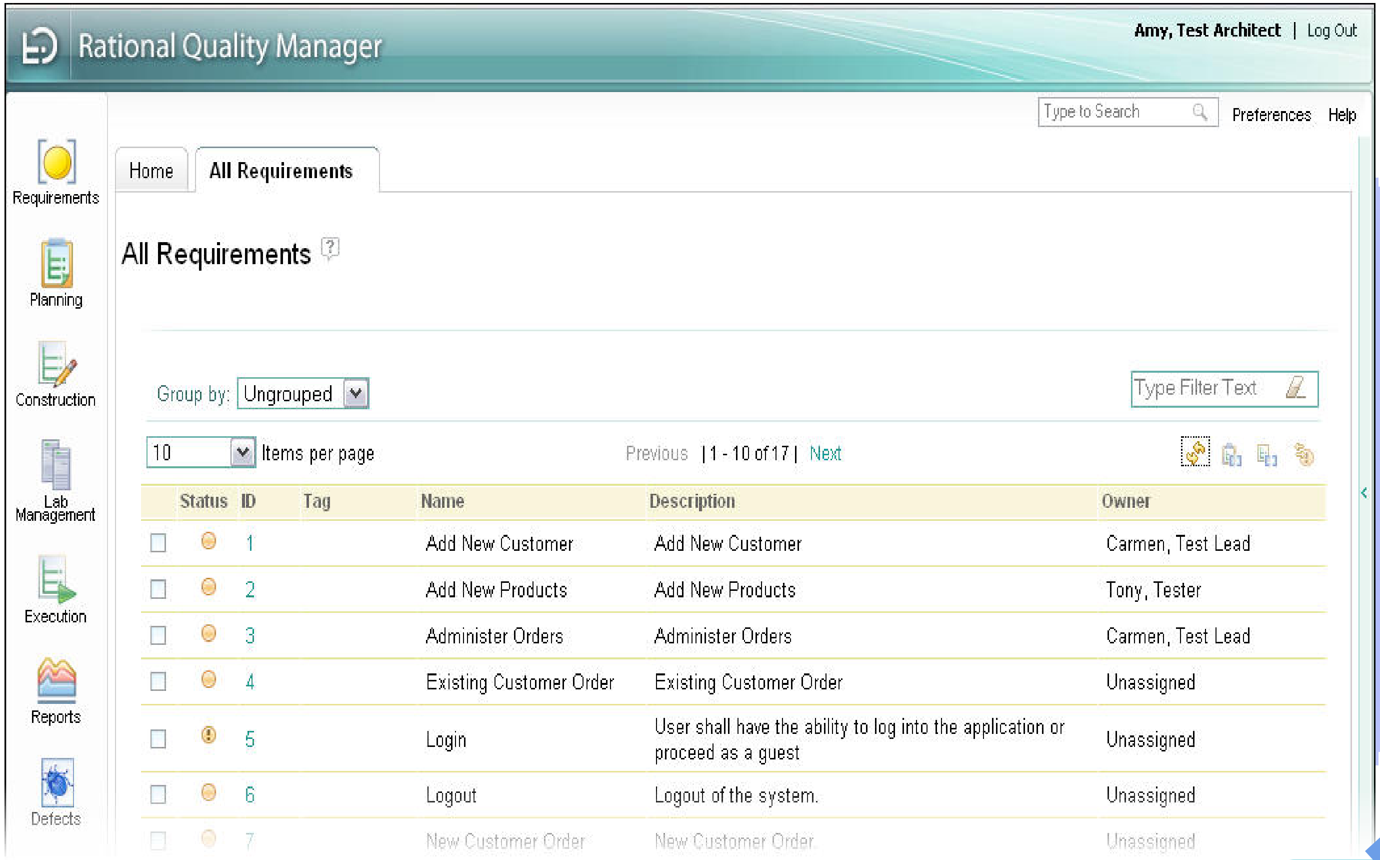
ID	
UR-6	**1 User Requirements**
UR-8	**2 Order processing**
UR-4	Customers shall have the ability to update existing orders until orders are ready to ship
UR-1	All customer support representatives shall have the ability to add new customer records
UR-3	All crustomer support representatives shall have the ability to update and cancel existing until orders are ready to ship
UR-7	**3 Security**
UR-2	Level 3 inventory administrators shall have the ability to add, update and archive products, product attributes
UR-5	User shall have the ability to log into the application or proceed as a guest

Username: Richard Watson

Exclusive edit mode



The QA Manager/Tester Sees Requirements in RQM



Rational Quality Manager

Amy, Test Architect | Log Out

Type to Search

All Requirements

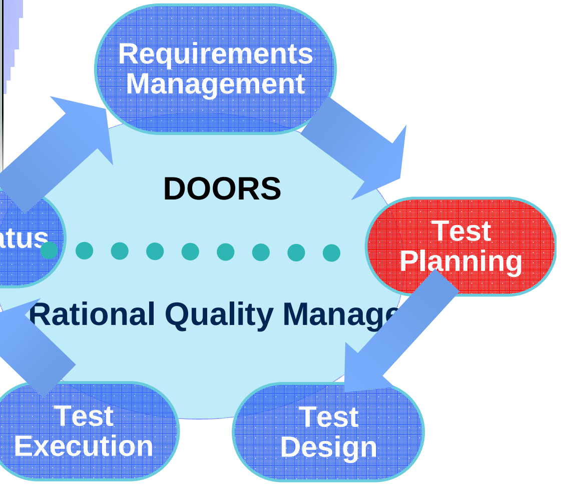
Group by: Ungrouped

Type Filter Text

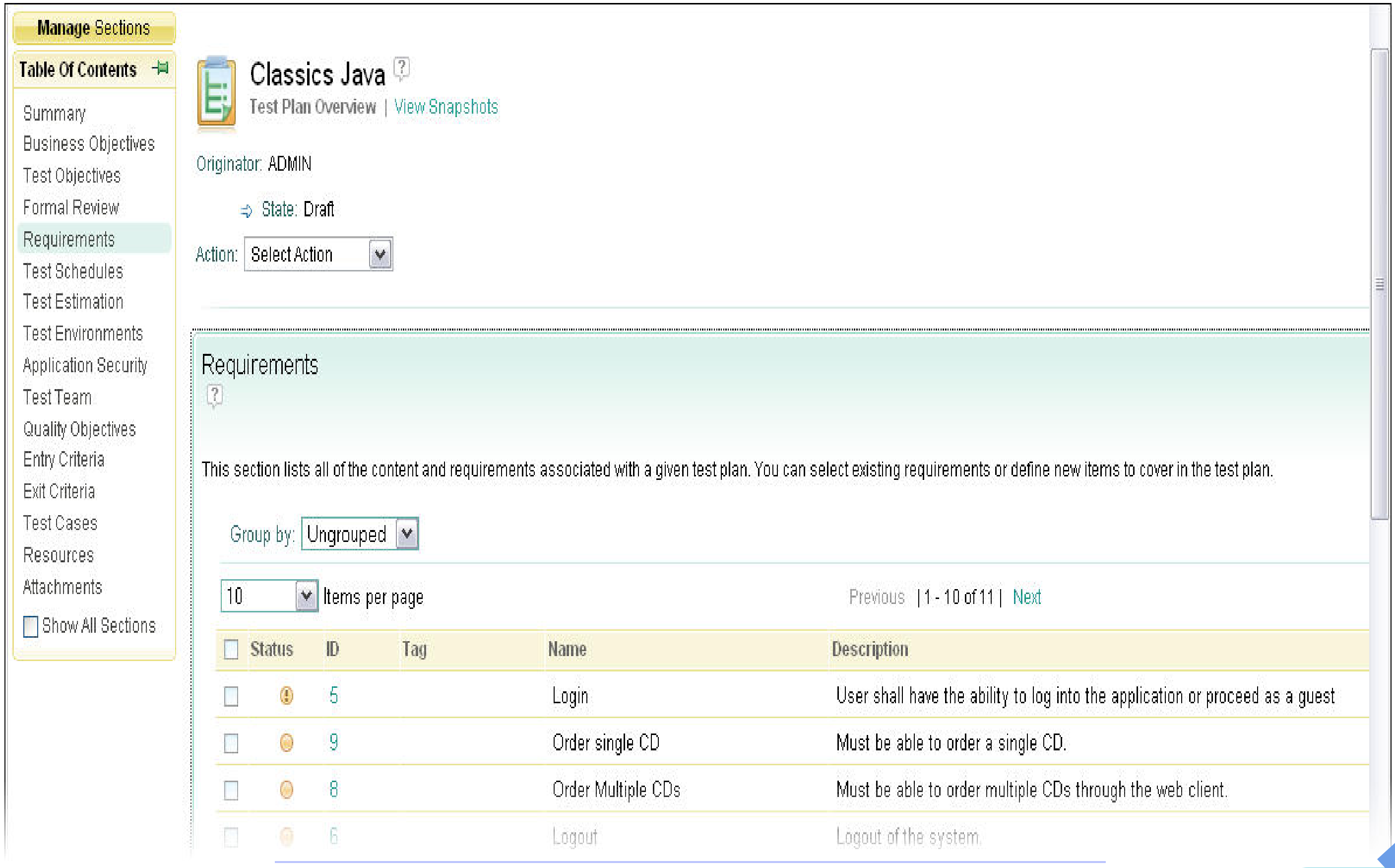
10 Items per page

Previous |1 - 10 of 17| Next

	Status	ID	Tag	Name	Description	Owner
□	●	1		Add New Customer	Add New Customer	Carmen, Test Lead
□	●	2		Add New Products	Add New Products	Tony, Tester
□	●	3		Administer Orders	Administer Orders	Carmen, Test Lead
□	●	4		Existing Customer Order	Existing Customer Order	Unassigned
□	!	5		Login	User shall have the ability to log into the application or proceed as a guest	Unassigned
□	●	6		Logout	Logout of the system.	Unassigned
□	●	7		New Customer Order	New Customer Order	Unassigned



The QA Manager/Tester Develops Test Cases to Test the Requirements



Manage Sections

Table Of Contents

- Summary
- Business Objectives
- Test Objectives
- Formal Review
- Requirements
- Test Schedules
- Test Estimation
- Test Environments
- Application Security
- Test Team
- Quality Objectives
- Entry Criteria
- Exit Criteria
- Test Cases
- Resources
- Attachments

□ Show All Sections

Classics Java ?

Test Plan Overview | View Snapshots

Originator: ADMIN

State: Draft

Action: Select Action

Requirements ?

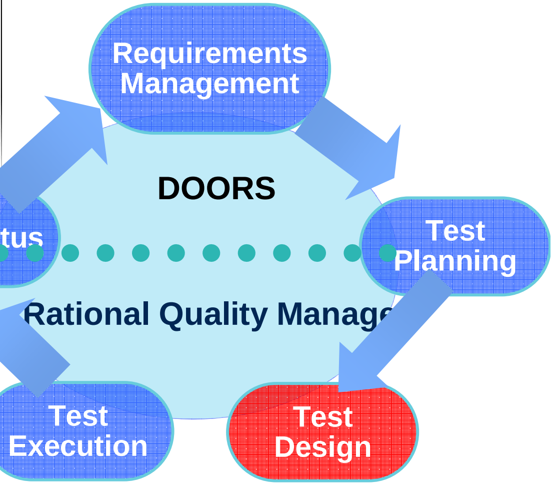
This section lists all of the content and requirements associated with a given test plan. You can select existing requirements or define new items to cover in the test plan.

Group by: Ungrouped

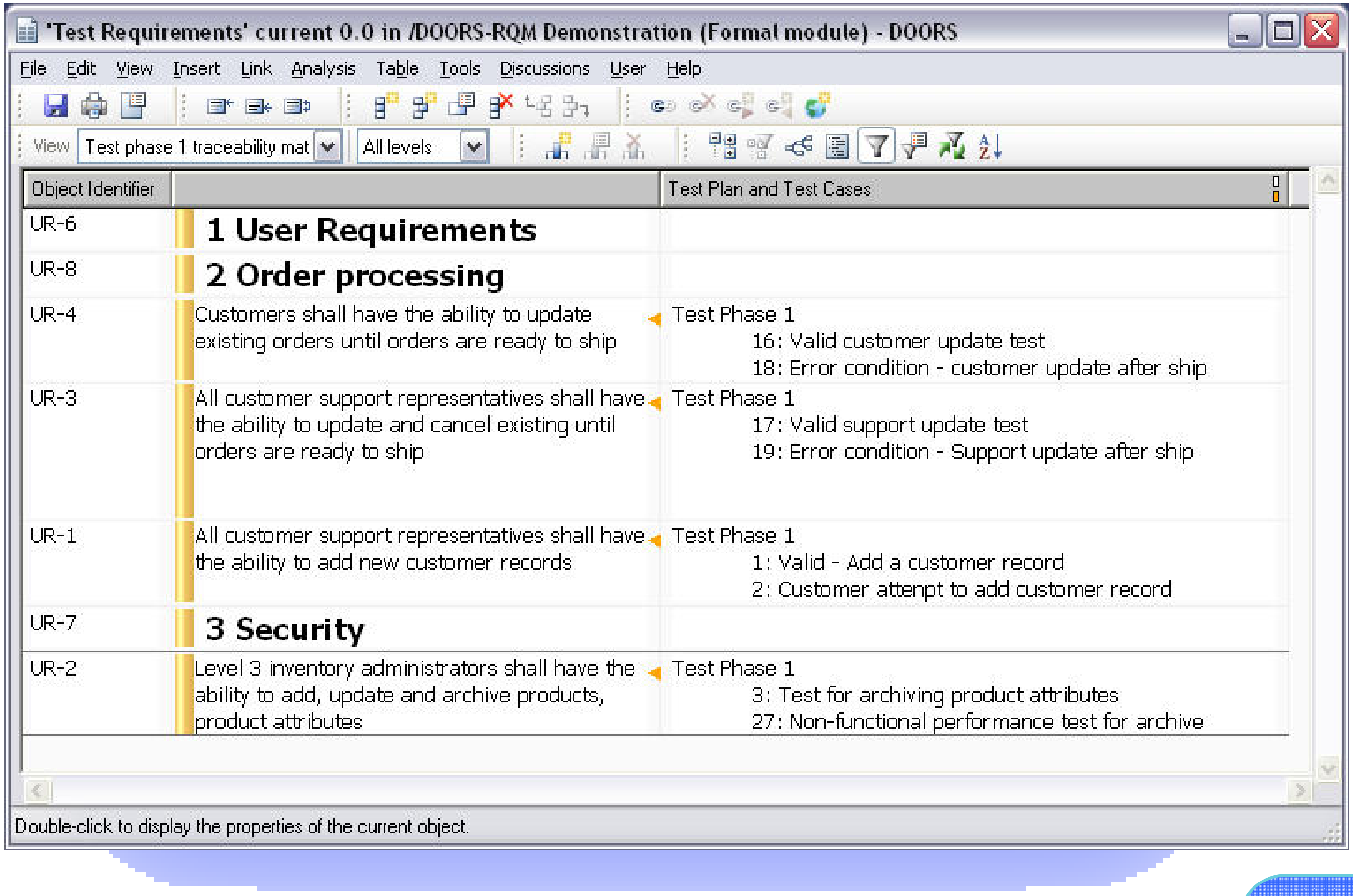
10 Items per page

Previous | 1 - 10 of 11 | Next

□	Status	ID	Tag	Name	Description
□	●	5		Login	User shall have the ability to log into the application or proceed as a guest
□	●	9		Order single CD	Must be able to order a single CD.
□	●	8		Order Multiple CDs	Must be able to order multiple CDs through the web client.
□	●	6		Logout	Logout of the system.



The Analyst Checks Test Coverage

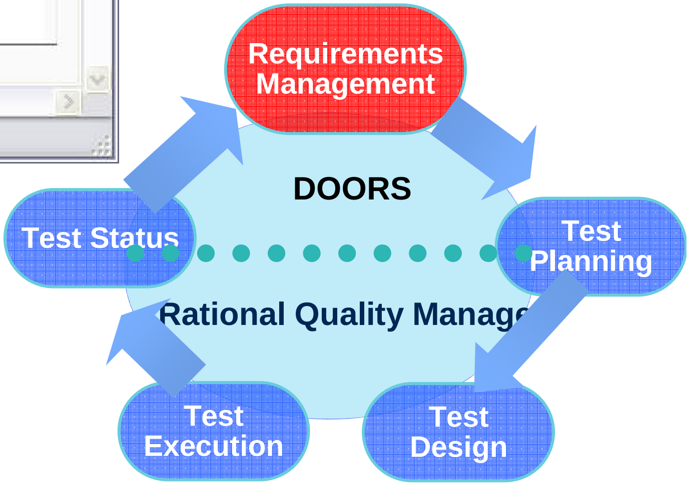


'Test Requirements' current 0.0 in /DOORS-RQM Demonstration (Formal module) - DOORS

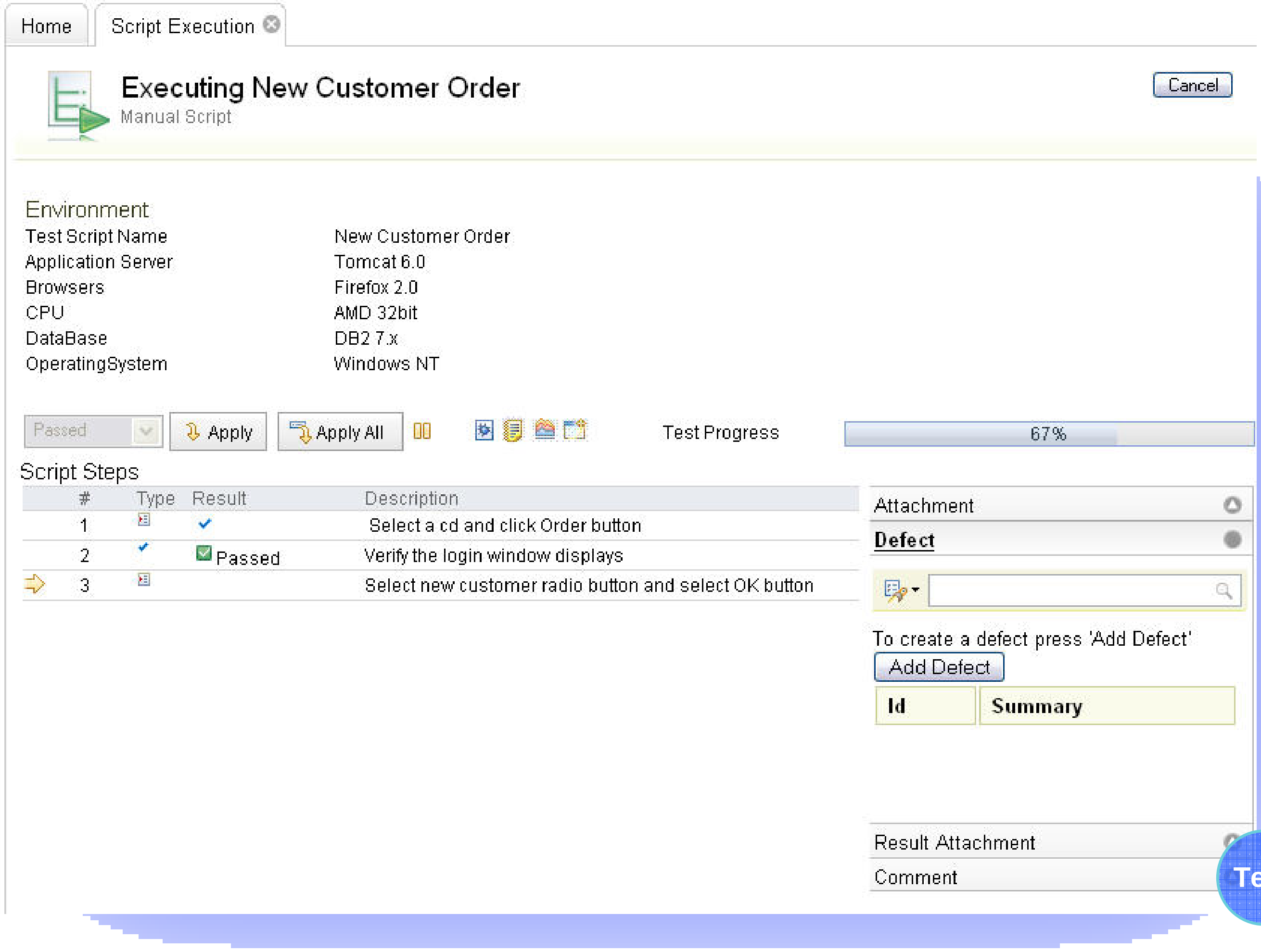
File Edit View Insert Link Analysis Table Tools Discussions User Help
View Test phase 1 traceability mat
All levels

Object Identifier		Test Plan and Test Cases
UR-6	**1 User Requirements**	
UR-8	**2 Order processing**	
UR-4	Customers shall have the ability to update existing orders until orders are ready to ship	Test Phase 1 16: Valid customer update test 18: Error condition - customer update after ship
UR-3	All customer support representatives shall have the ability to update and cancel existing until orders are ready to ship	Test Phase 1 17: Valid support update test 19: Error condition - Support update after ship
UR-1	All customer support representatives shall have the ability to add new customer records	Test Phase 1 1: Valid - Add a customer record 2: Customer attempt to add customer record
UR-7	**3 Security**	
UR-2	Level 3 inventory administrators shall have the ability to add, update and archive products, product attributes	Test Phase 1 3: Test for archiving product attributes 27: Non-functional performance test for archive

Double-click to display the properties of the current object.



The QA Manager/Tester Executes Test Cases



Executing New Customer Order

Manual Script

Environment

Test Script Name	New Customer Order
Application Server	Tomcat 6.0
Browsers	Firefox 2.0
CPU	AMD 32bit
DataBase	DB2 7.x
OperatingSystem	Windows NT

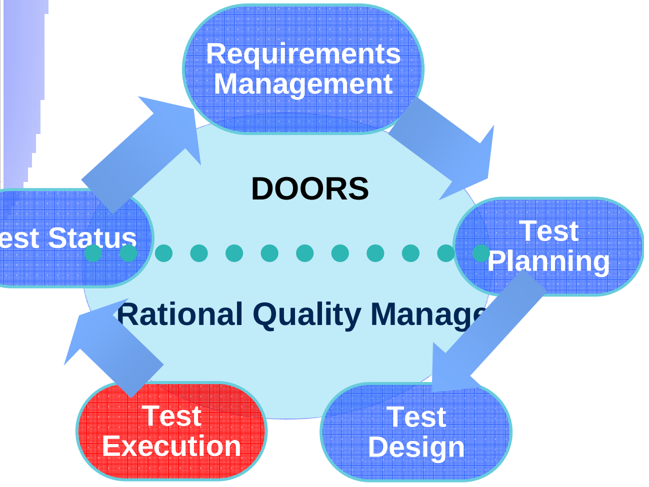
Test Progress 67%

Script Steps

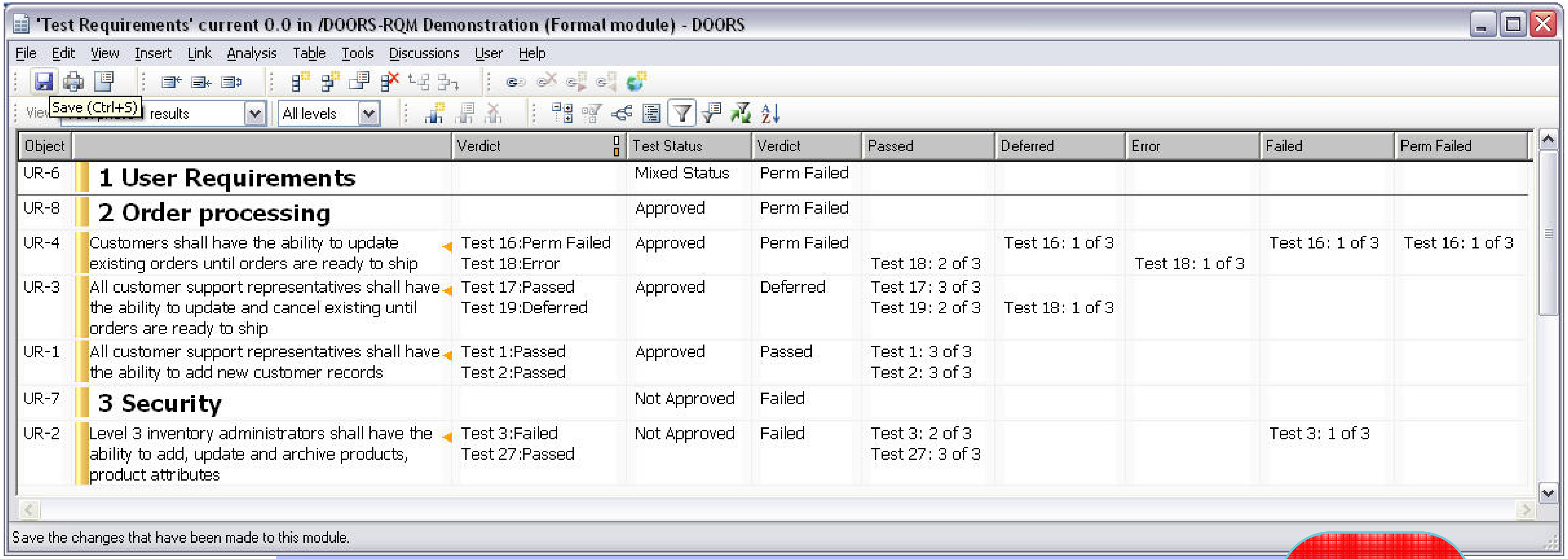
#	Type	Result	Description
1		✓	Select a cd and click Order button
2	✓	☑ Passed	Verify the login window displays
3			Select new customer radio button and select OK button

To create a defect press 'Add Defect'

Id	Summary



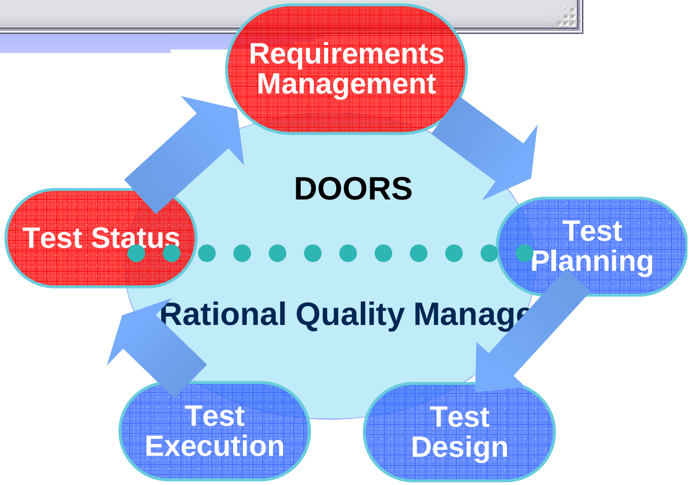
The Analyst Checks QA Status



'Test Requirements' current 0.0 in /DOORS-RQM Demonstration (Formal module) - DOORS

Object		Verdict	Test Status	Verdict	Passed	Deferred	Error	Failed	Perm Failed
UR-6	1 User Requirements		Mixed Status	Perm Failed					
UR-8	2 Order processing		Approved	Perm Failed					
UR-4	Customers shall have the ability to update existing orders until orders are ready to ship	Test 16:Perm Failed Test 18:Error	Approved	Perm Failed	Test 18: 2 of 3	Test 16: 1 of 3	Test 18: 1 of 3	Test 16: 1 of 3	Test 16: 1 of 3
UR-3	All customer support representatives shall have the ability to update and cancel existing until orders are ready to ship	Test 17:Passed Test 19:Deferred	Approved	Deferred	Test 17: 3 of 3 Test 19: 2 of 3	Test 18: 1 of 3			
UR-1	All customer support representatives shall have the ability to add new customer records	Test 1:Passed Test 2:Passed	Approved	Passed	Test 1: 3 of 3 Test 2: 3 of 3				
UR-7	3 Security		Not Approved	Failed					
UR-2	Level 3 inventory administrators shall have the ability to add, update and archive products, product attributes	Test 3:Failed Test 27:Passed	Not Approved	Failed	Test 3: 2 of 3 Test 27: 3 of 3			Test 3: 1 of 3	

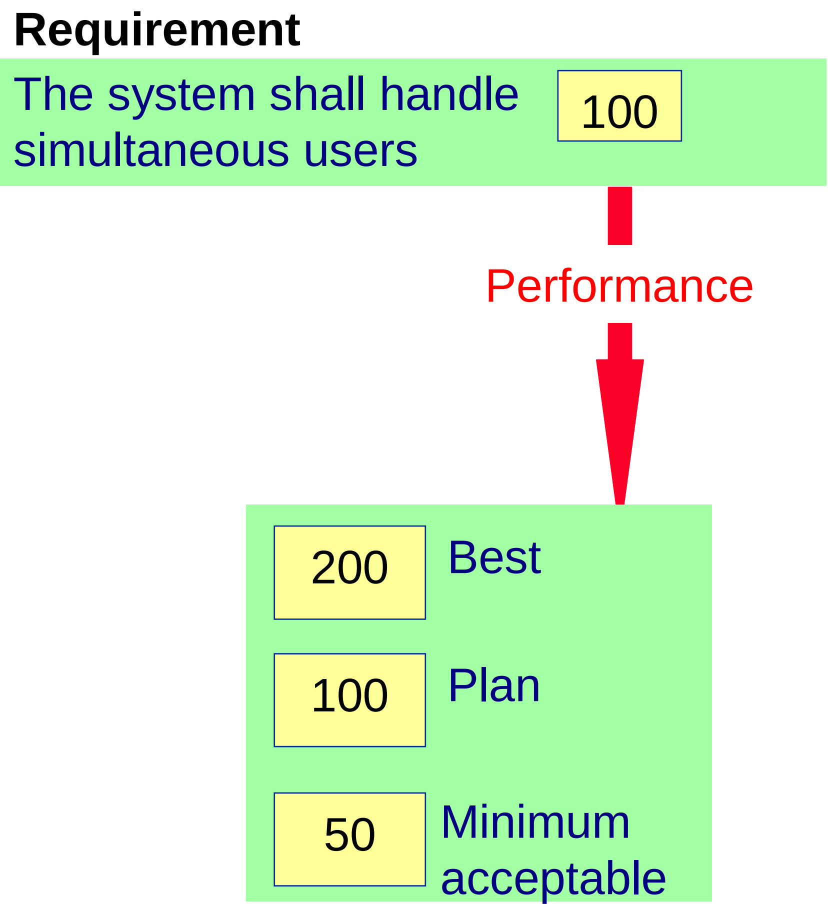
Save the changes that have been made to this module.



Quantifying Requirements for testing

- Quantities relate to availability, coverage, timeliness, readiness...
- May be related to capabilities, functions or constraints
  - sometimes maximum or minimum level set as constraint
- Defines the trade-off space
  - by indicating the scope for negotiation between conflicting goals
- Gives requirements test criteria

Quantification Example



Requirement

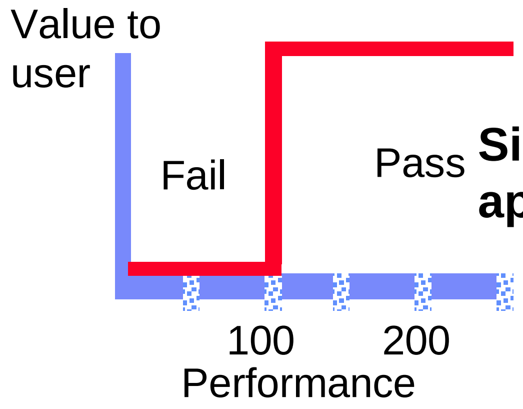
The system shall handle 100 simultaneous users

Performance

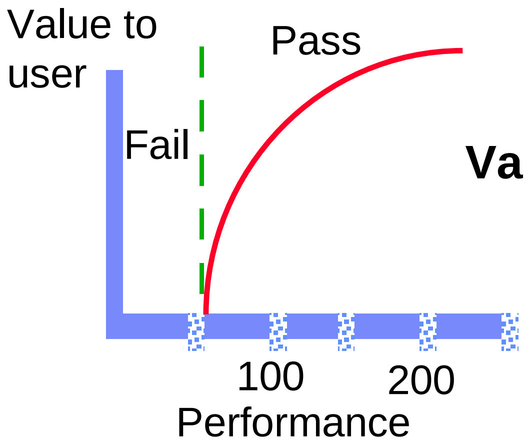
200 Best

100 Plan

50 Minimum acceptable



Simplistic approach



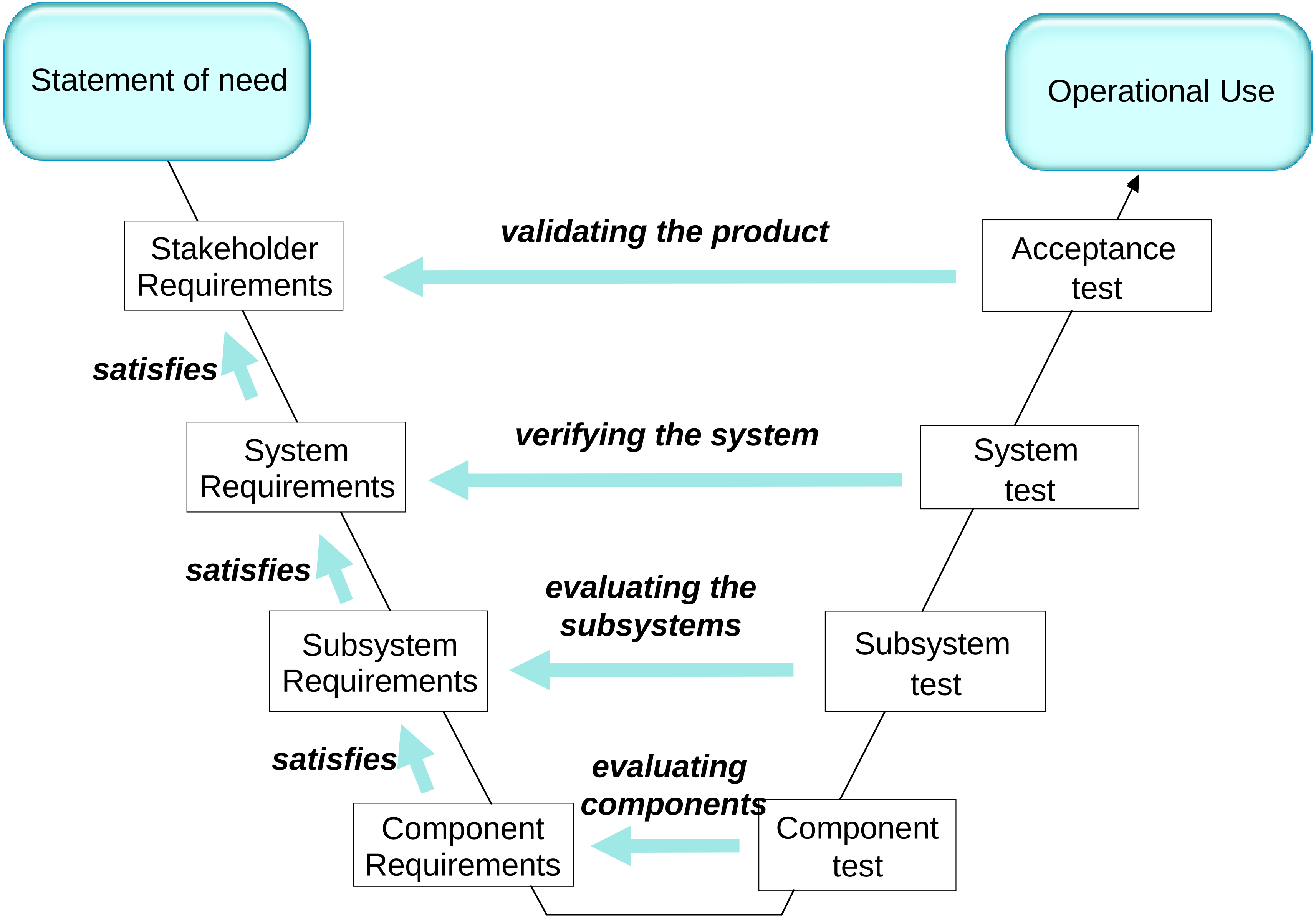
Value curve

Good Practice 8: Create, review and use traceability

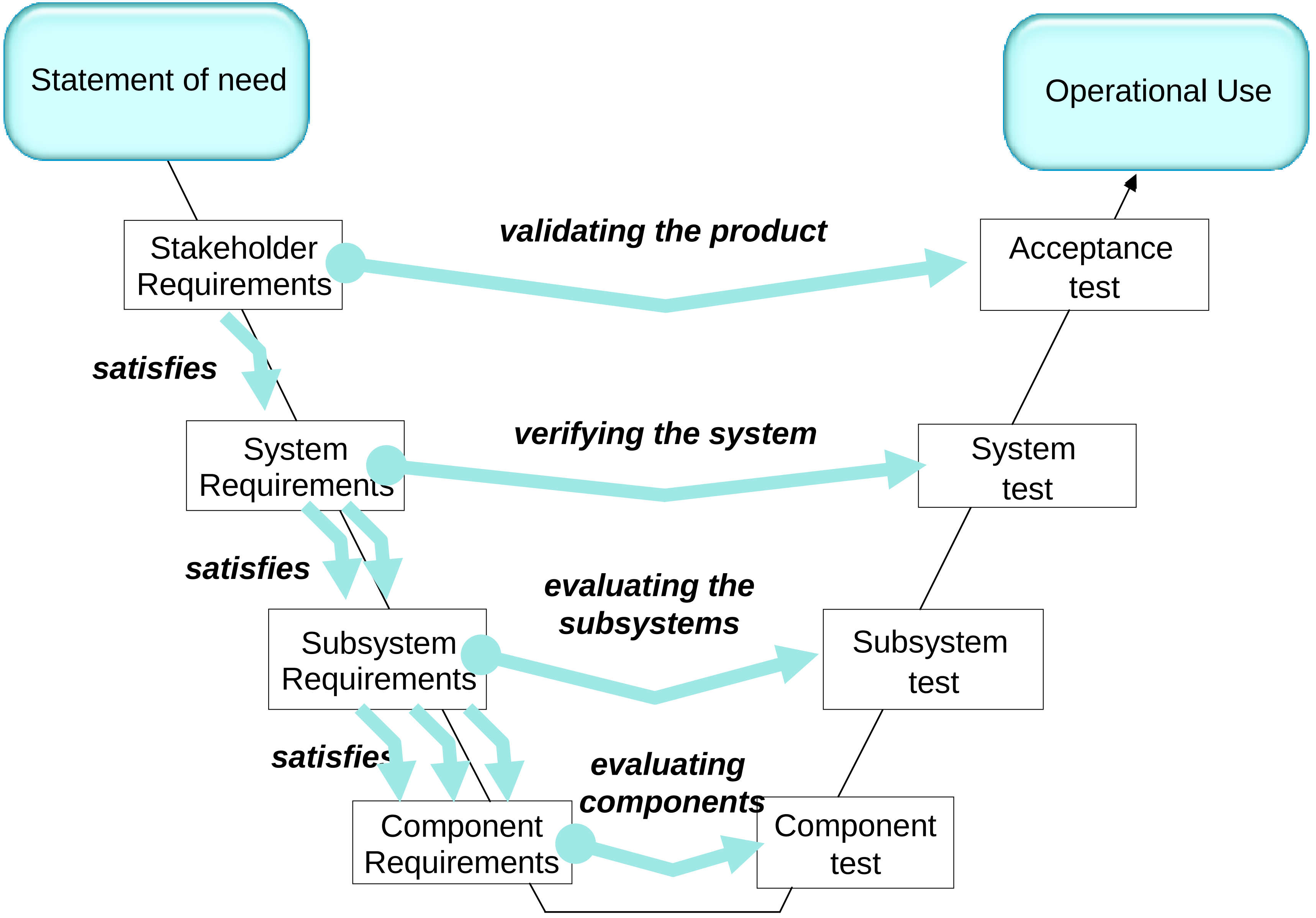
DEFINITION OF TRACEABILITY

- Documenting how high-level goals are transformed into low-level goals.
- Understanding how needs are satisfied
- Understand how requirements are qualified (tests, inspections, trials

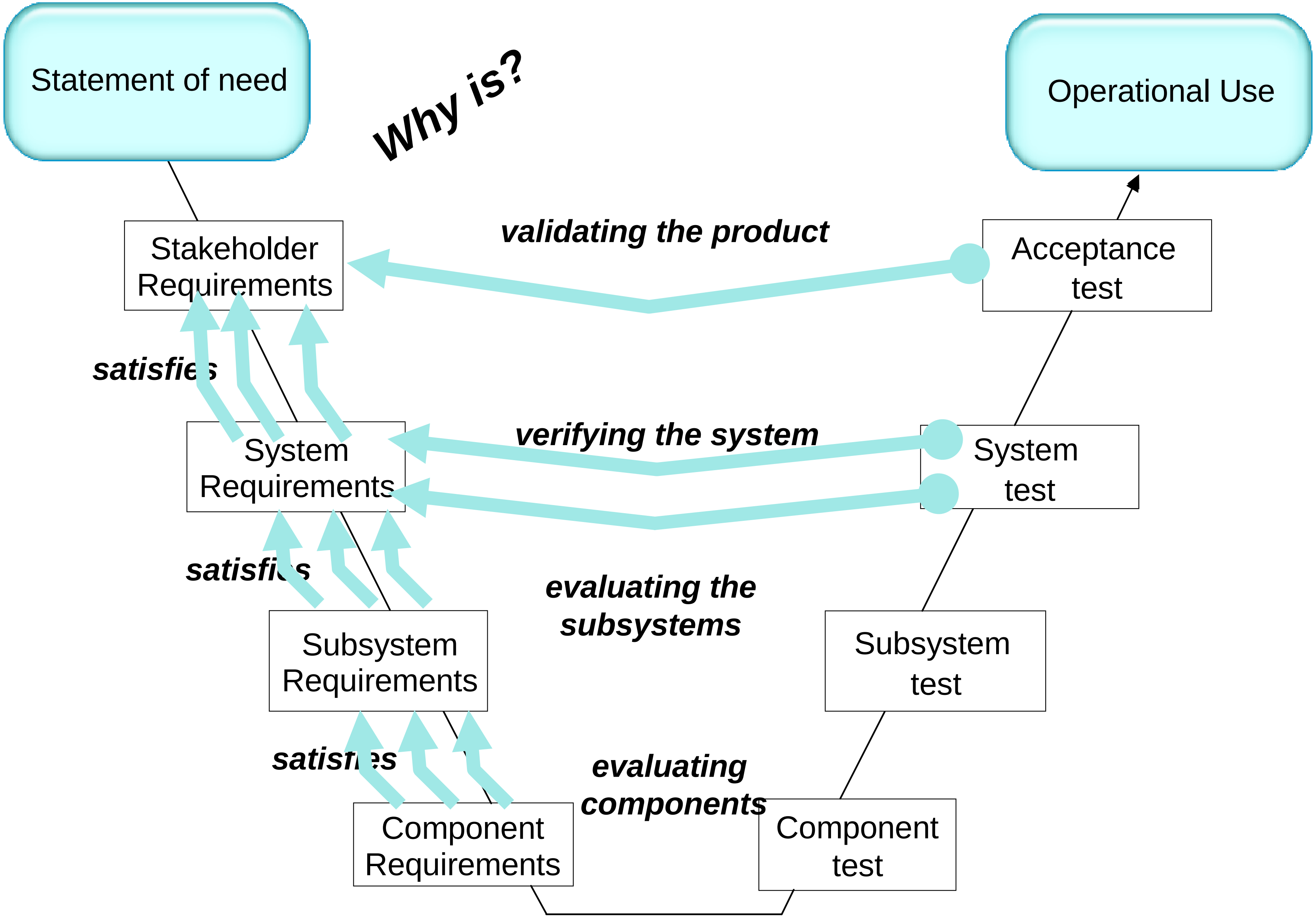
Traceability in the lifecycle



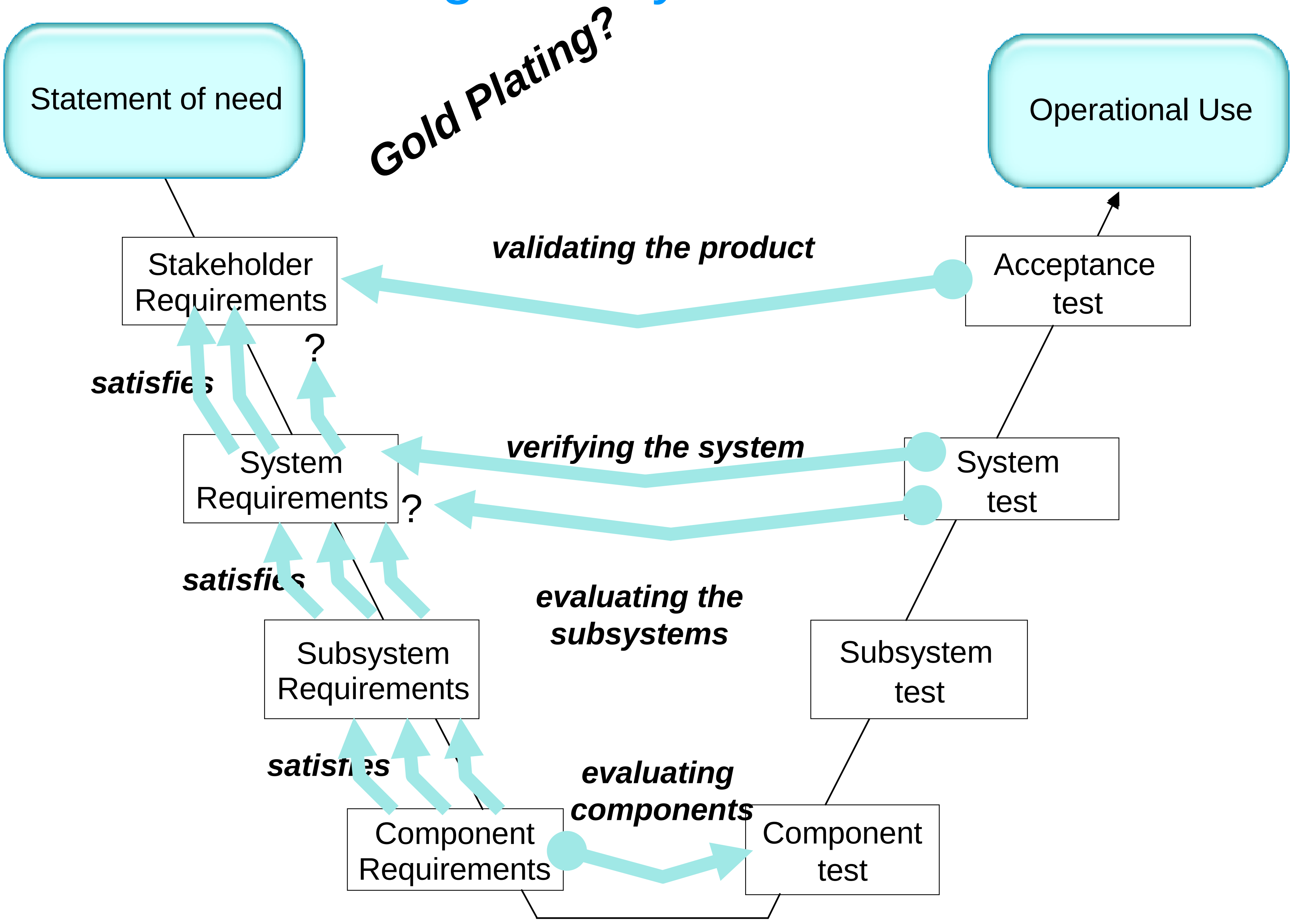
Impact Analysis



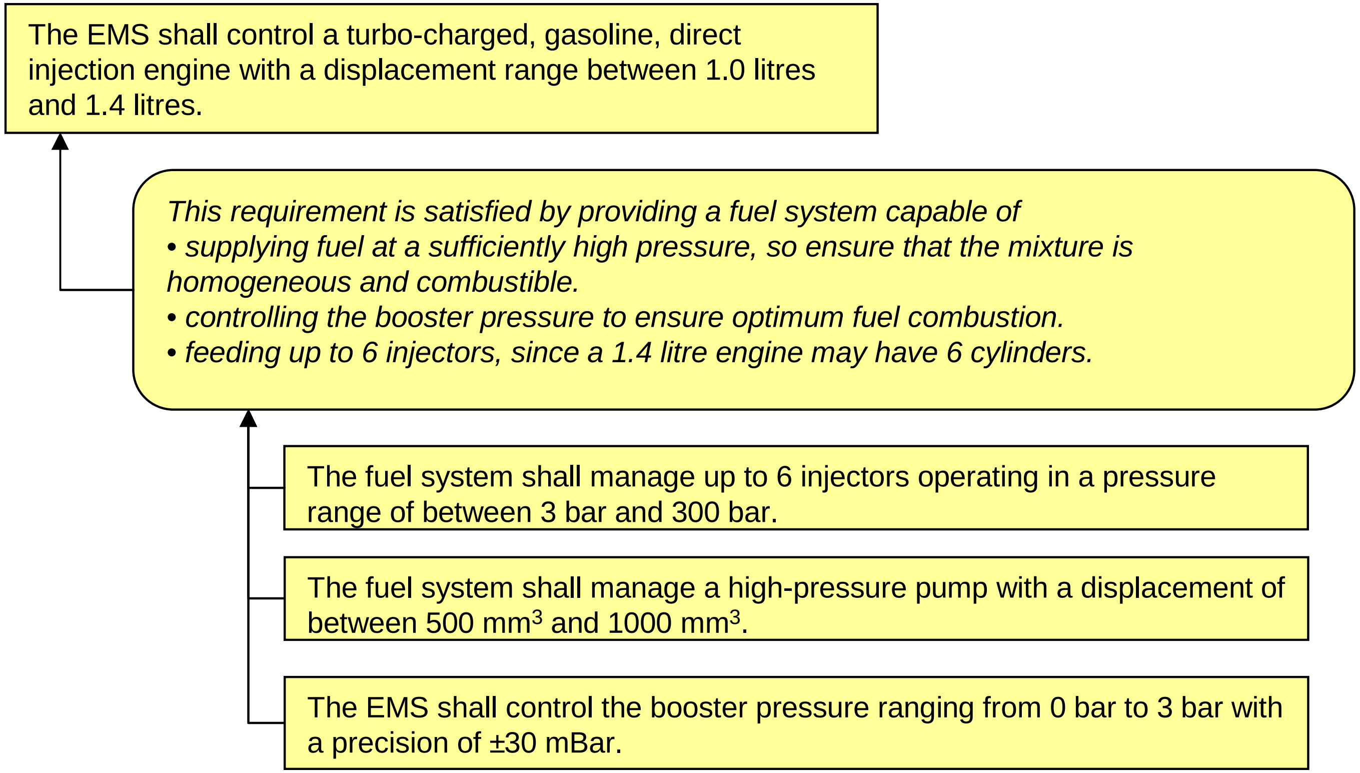
Derivation Analysis



Derivation Coverage Analysis



Three Criteria for Reviewing Traceability



The EMS shall control a turbo-charged, gasoline, direct injection engine with a displacement range between 1.0 litres and 1.4 litres.

This requirement is satisfied by providing a fuel system capable of
- *supplying fuel at a sufficiently high pressure, so ensure that the mixture is homogeneous and combustible.*
- *controlling the booster pressure to ensure optimum fuel combustion.*
- *feeding up to 6 injectors, since a 1.4 litre engine may have 6 cylinders.*

The fuel system shall manage up to 6 injectors operating in a pressure range of between 3 bar and 300 bar.

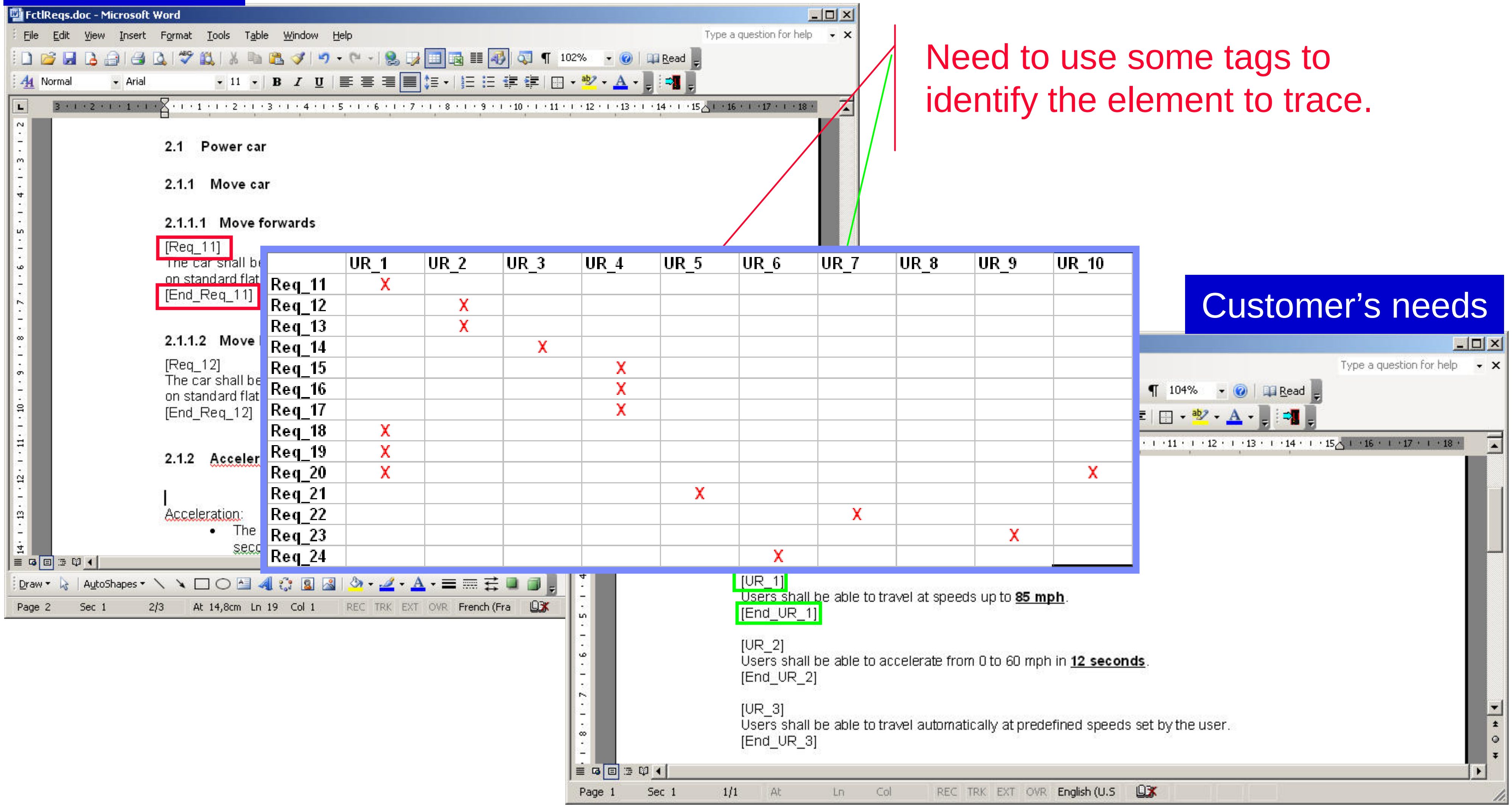
The fuel system shall manage a high-pressure pump with a displacement of between 500 mm^3 and 1000 mm^3.

The EMS shall control the booster pressure ranging from 0 bar to 3 bar with a precision of ±30 mBar.

1. ***Coverage:*** is every requirement traced?
2. ***Sufficiency***: are the traced lower-level requirements *sufficient* to satisfy the higher-level?
3. ***Necessity***: are all the traced lower-level requirements *necessary* to satisfy the higher-level?

Identify the element to trace

System Spec



FctlReqs.doc - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
102%
Read
Normal
Arial
11
Draw
AutoShapes
Page 2 Sec 1 2/3 At 14,8cm Ln 19 Col 1 REC TRK EXT OVR French (Fra
104%
Page 1 Sec 1 1/1 At Ln Col REC TRK EXT OVR English (U.S

2.1 Power car

2.1.1 Move car

2.1.1.1 Move forwards

[Req_11]
The car shall b
on standard flat
[End_Req_11]

2.1.1.2 Move

[Req_12]
The car shall be
on standard flat
[End_Req_12]

2.1.2 Acceler

Acceleration:

- The
  seco

	UR_1	UR_2	UR_3	UR_4	UR_5	UR_6	UR_7	UR_8	UR_9	UR_10
Req_11	X									
Req_12		X								
Req_13		X								
Req_14			X							
Req_15				X						
Req_16				X						
Req_17				X						
Req_18	X									
Req_19	X									
Req_20	X									X
Req_21					X					
Req_22							X			
Req_23									X	
Req_24						X				

Customer's needs

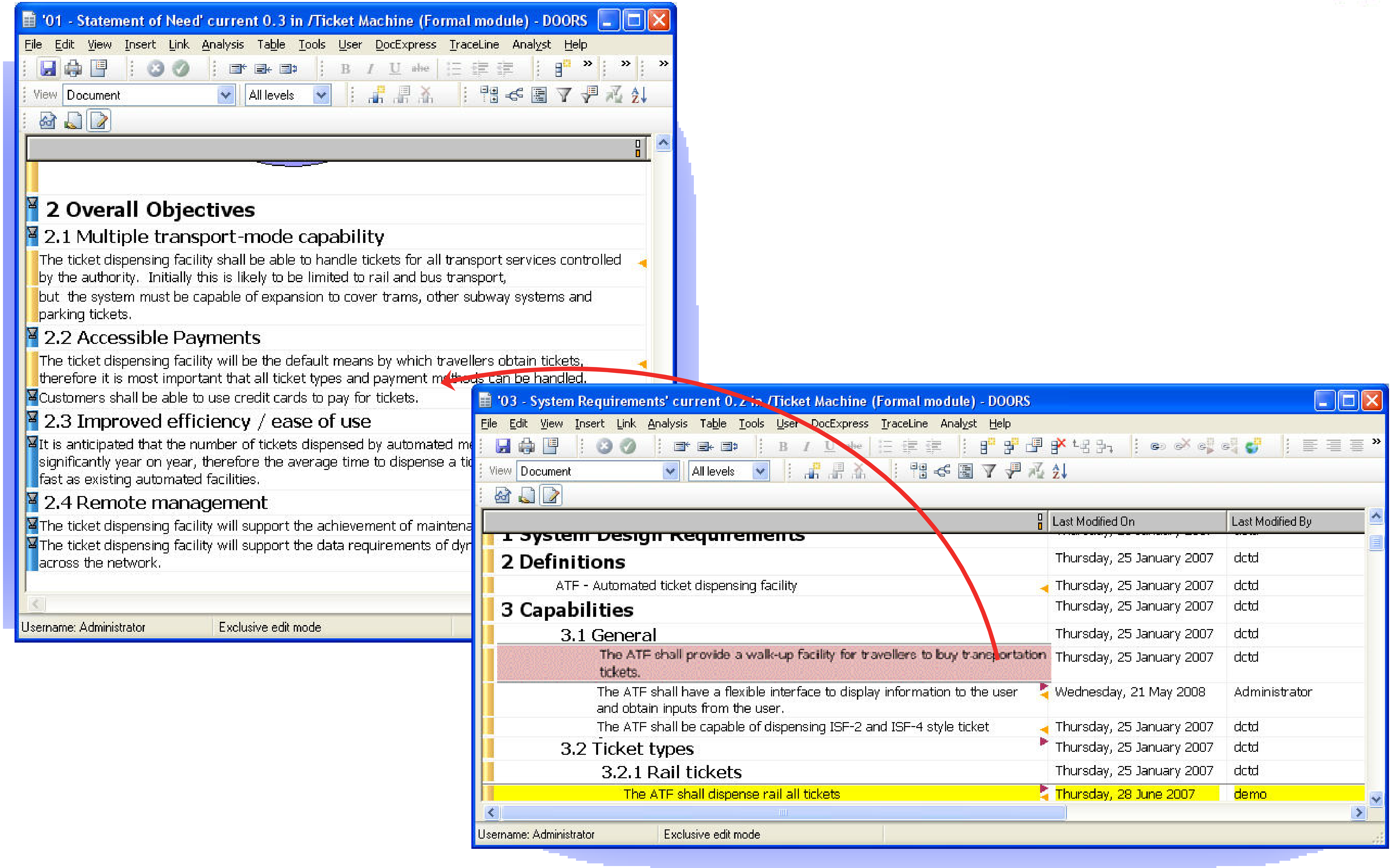
[UR_1]
Users shall be able to travel at speeds up to **85 mph**.
[End_UR_1]

[UR_2]
Users shall be able to accelerate from 0 to 60 mph in **12 seconds**.
[End_UR_2]

[UR_3]
Users shall be able to travel automatically at predefined speeds set by the user.
[End_UR_3]

Need to use some tags to identify the element to trace.

Traceability; drag-and-drop linking


'01 - Statement of Need' current 0.3 in /Ticket Machine (Formal module) - DOORS
File Edit View Insert Link Analysis Table Tools User DocExpress TraceLine Analyst Help
View Document
All levels
Username: Administrator
Exclusive edit mode

2 Overall Objectives

2.1 Multiple transport-mode capability

The ticket dispensing facility shall be able to handle tickets for all transport services controlled by the authority. Initially this is likely to be limited to rail and bus transport,

but the system must be capable of expansion to cover trams, other subway systems and parking tickets.

2.2 Accessible Payments

The ticket dispensing facility will be the default means by which travellers obtain tickets, therefore it is most important that all ticket types and payment methods can be handled.

Customers shall be able to use credit cards to pay for tickets.

2.3 Improved efficiency / ease of use

It is anticipated that the number of tickets dispensed by automated me significantly year on year, therefore the average time to dispense a tic fast as existing automated facilities.

2.4 Remote management

The ticket dispensing facility will support the achievement of maintena

The ticket dispensing facility will support the data requirements of dyr across the network.

'03 - System Requirements' current 0.2 in /Ticket Machine (Formal module) - DOORS
File Edit View Insert Link Analysis Table Tools User DocExpress TraceLine Analyst Help
View Document
All levels
Username: Administrator
Exclusive edit mode

	Last Modified On	Last Modified By
1 System Design Requirements	Thursday, 25 January 2007	dctd
2 Definitions	Thursday, 25 January 2007	dctd
ATF - Automated ticket dispensing facility	Thursday, 25 January 2007	dctd
3 Capabilities	Thursday, 25 January 2007	dctd
3.1 General	Thursday, 25 January 2007	dctd
The ATF shall provide a walk-up facility for travellers to buy transportation tickets.	Thursday, 25 January 2007	dctd
The ATF shall have a flexible interface to display information to the user and obtain inputs from the user.	Wednesday, 21 May 2008	Administrator
The ATF shall be capable of dispensing ISF-2 and ISF-4 style ticket	Thursday, 25 January 2007	dctd
3.2 Ticket types	Thursday, 25 January 2007	dctd
3.2.1 Rail tickets	Thursday, 25 January 2007	dctd
The ATF shall dispense rail all tickets	Thursday, 28 June 2007	demo

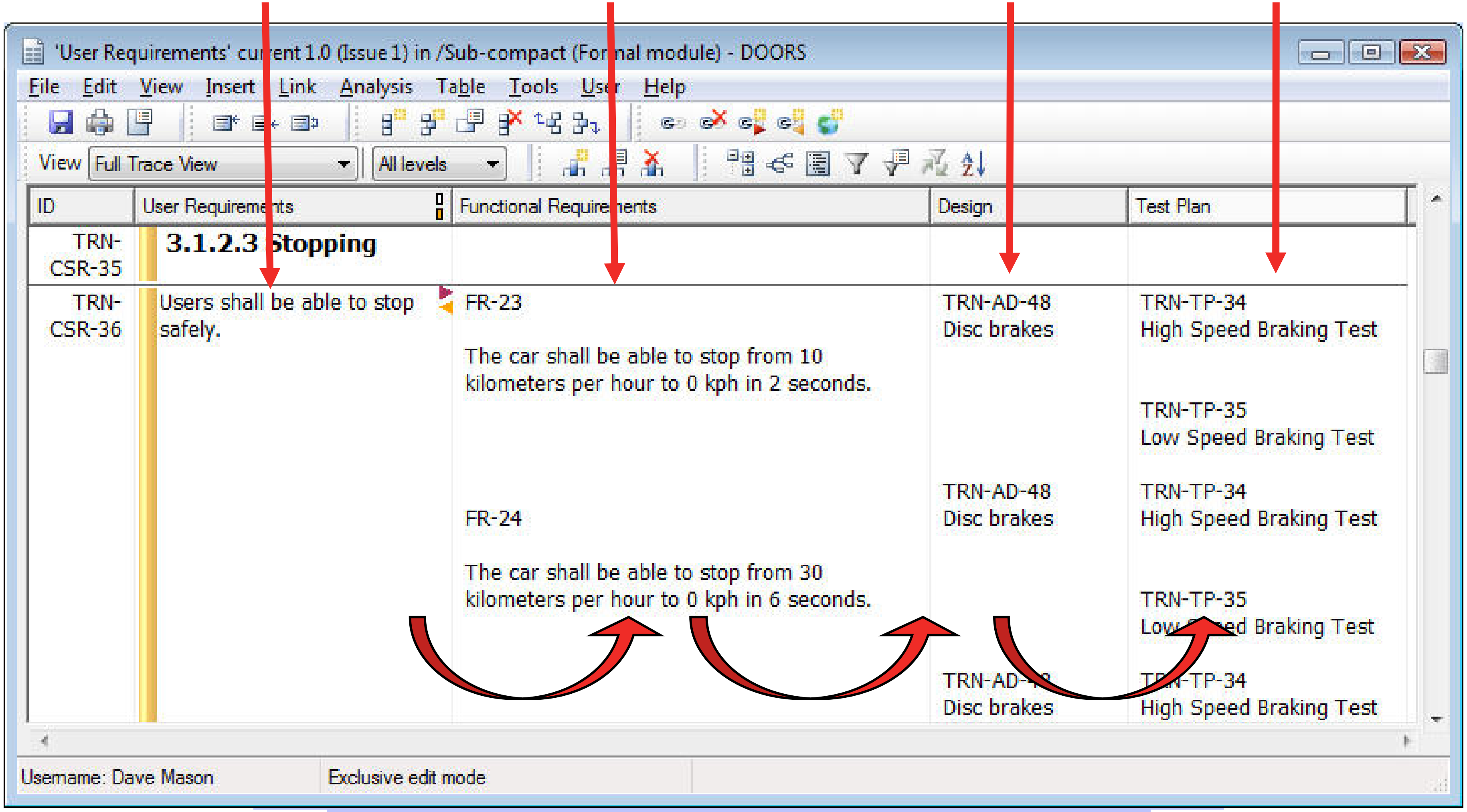
Traceability view

User Reqts

Technical Reqts

Design

Test Cases



'User Requirements' current 1.0 (Issue 1) in /Sub-compact (Formal module) - DOORS

View: Full Trace View

All levels

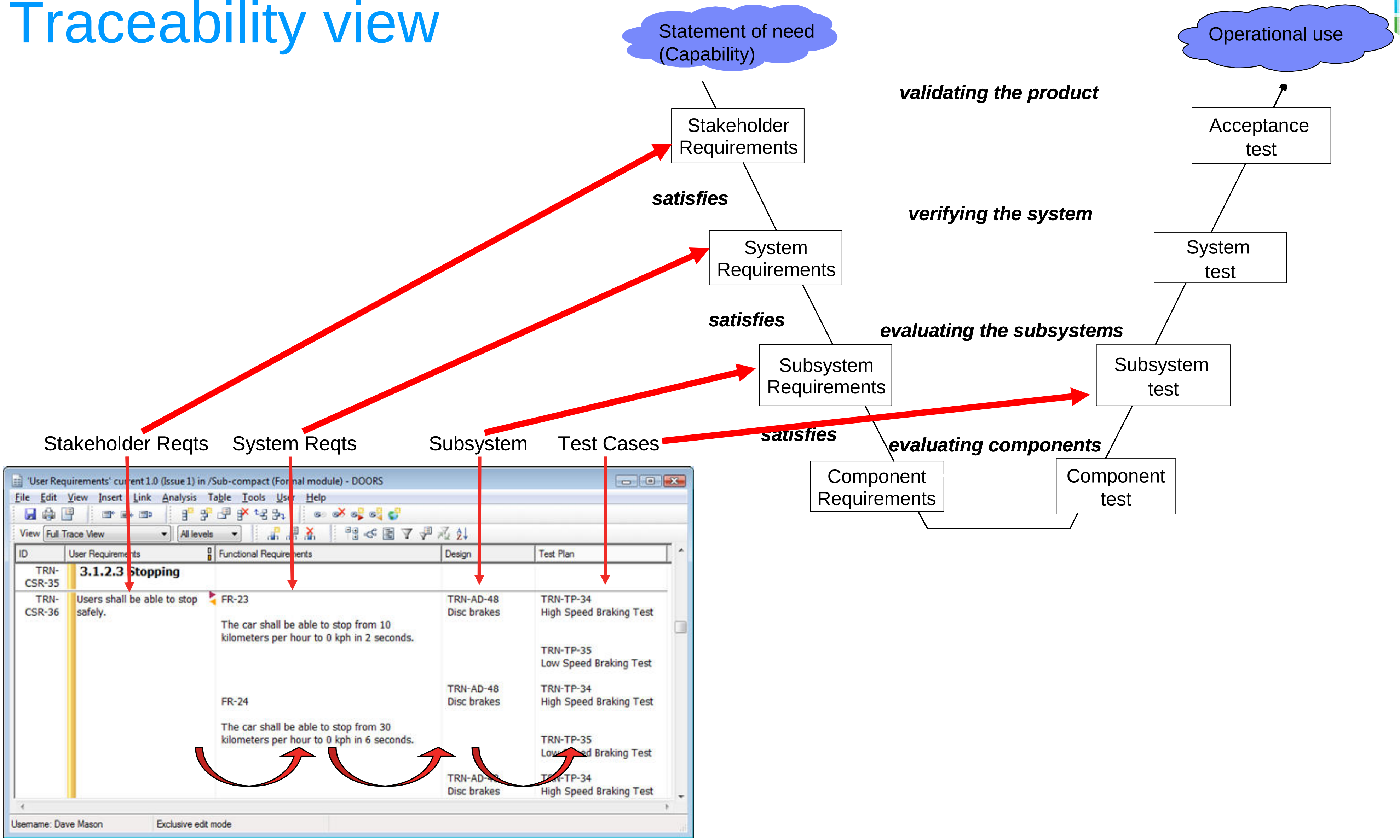
ID	User Requirements	Functional Requirements	Design	Test Plan
TRN-CSR-35	**3.1.2.3 Stopping**			
TRN-CSR-36	Users shall be able to stop safely.	FR-23 The car shall be able to stop from 10 kilometers per hour to 0 kph in 2 seconds.	TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test TRN-TP-35 Low Speed Braking Test
		FR-24 The car shall be able to stop from 30 kilometers per hour to 0 kph in 6 seconds.	TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test TRN-TP-35 Low Speed Braking Test
			TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test

Username: Dave Mason

Exclusive edit mode

“End-to-end visual validation in a single view”

Traceability view



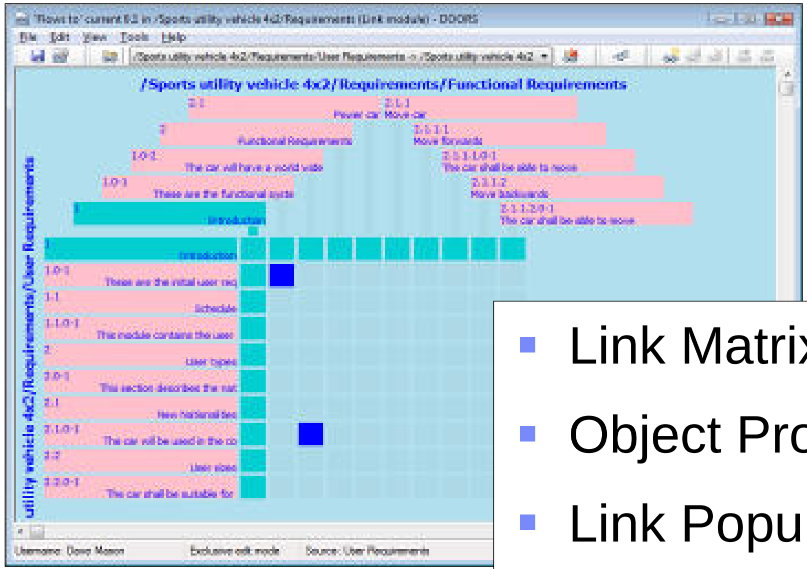
'User Requirements' current 1.0 (Issue 1) in /Sub-compact (Formal module) - DOORS

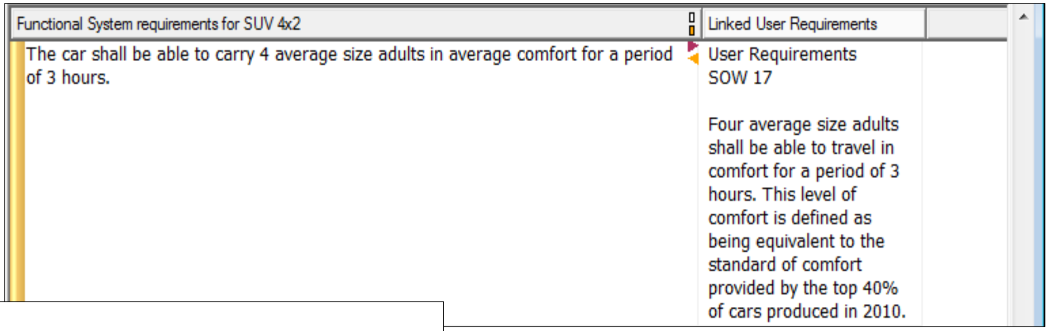
ID	User Requirements	Functional Requirements	Design	Test Plan
TRN-CSR-35	**3.1.2.3 Stopping**			
TRN-CSR-36	Users shall be able to stop safely.	FR-23 The car shall be able to stop from 10 kilometers per hour to 0 kph in 2 seconds.	TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test TRN-TP-35 Low Speed Braking Test
		FR-24 The car shall be able to stop from 30 kilometers per hour to 0 kph in 6 seconds.	TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test TRN-TP-35 Low Speed Braking Test
			TRN-AD-48 Disc brakes	TRN-TP-34 High Speed Braking Test

Username: Dave Mason   Exclusive edit mode

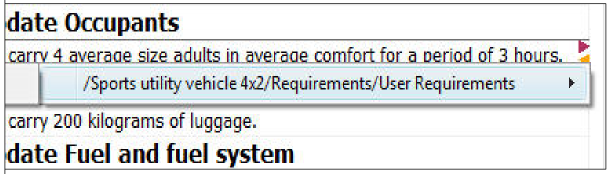
“End-to-end visual validation in a single view”

Standard DOORS Traceability Tools


'Flows to' current 6.2 in /Sports utility vehicle 4x2/Requirements (Link module) - DOORS
File Edit View Tools Help
/Sports utility vehicle 4x2/Requirements/User Requirements -> /Sports utility vehicle 4x2
/Sports utility vehicle 4x2/Requirements/Functional Requirements
2.1 Power car
2.1.1 Move car
2 Functional Requirements
2.1.1.1 Move forwards
1.0-1 The car will have a world wide
2.1.1.1.0-1 The car shall be able to move
1.0-1 These are the functional syste
2.1.1.2 Move backwards
1 Introduction
2.1.1.2.0-1 The car shall be able to move
utility vehicle 4x2/Requirements/User Requirements
1 Introduction
1.0-1 These are the initial user req
1.1 Schedule
1.1.0-1 This module contains the user
2 User types
2.0-1 This section describes the nat
2.1 New national bas
2.1.0-1 The car will be used in the co
2.2 User sizes
2.2.0-1 The car shall be suitable for
Username: Dave Mason
Exclusive edit mode
Source: User Requirements



Functional System requirements for SUV 4x2	Linked User Requirements
The car shall be able to carry 4 average size adults in average comfort for a period of 3 hours.	User Requirements SOW 17 Four average size adults shall be able to travel in comfort for a period of 3 hours. This level of comfort is defined as being equivalent to the standard of comfort provided by the top 40% of cars produced in 2010.



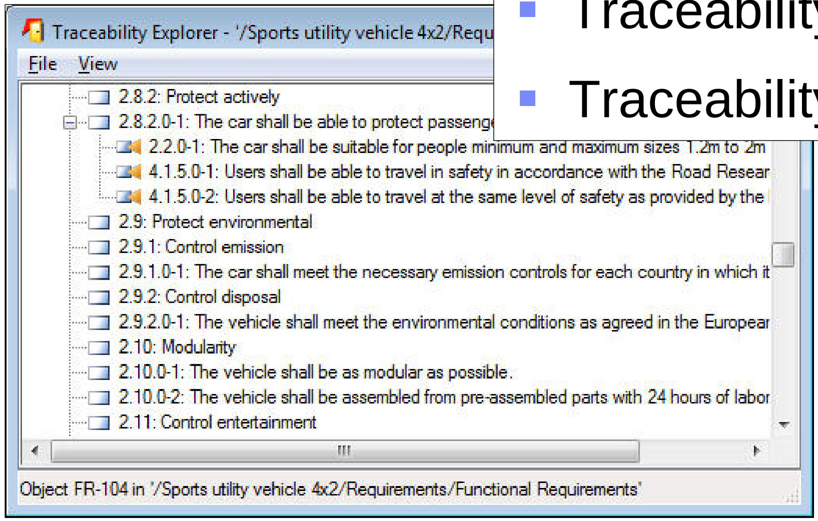
date Occupants

carry 4 average size adults in average comfort for a period of 3 hours.

carry 200 kilograms of luggage.

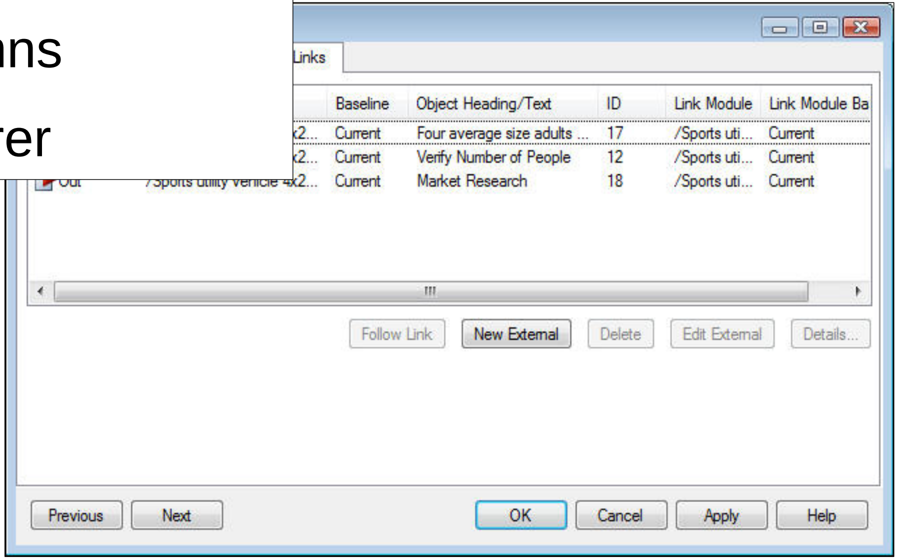
date Fuel and fuel system

- Link Matrix
- Object Properties
- Link Popups
- Traceability Columns
- Traceability Explorer



- 2.8.2: Protect actively
- 2.8.2.0-1: The car shall be able to protect passenge
  - 2.2.0-1: The car shall be suitable for people minimum and maximum sizes 1.2m to 2m
  - 4.1.5.0-1: Users shall be able to travel in safety in accordance with the Road Resear
  - 4.1.5.0-2: Users shall be able to travel at the same level of safety as provided by the
- 2.9: Protect environmental
- 2.9.1: Control emission
- 2.9.1.0-1: The car shall meet the necessary emission controls for each country in which it
- 2.9.2: Control disposal
- 2.9.2.0-1: The vehicle shall meet the environmental conditions as agreed in the Europear
- 2.10: Modularity
- 2.10.0-1: The vehicle shall be as modular as possible.
- 2.10.0-2: The vehicle shall be assembled from pre-assembled parts with 24 hours of labor
- 2.11: Control entertainment

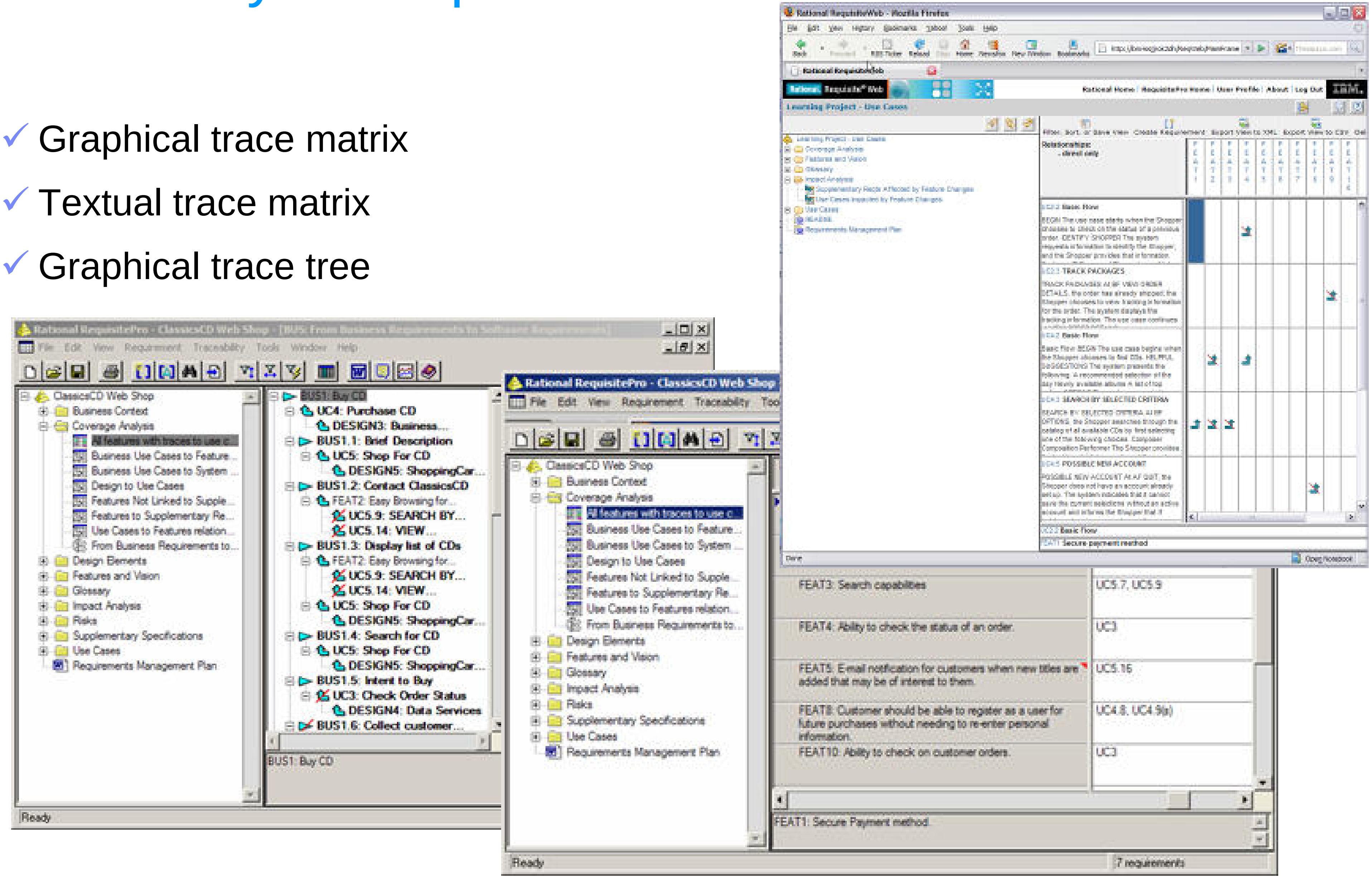
Object FR-104 in '/Sports utility vehicle 4x2/Requirements/Functional Requirements'



		Baseline	Object Heading/Text	ID	Link Module	Link Module Ba
	x2...	Current	Four average size adults ...	17	/Sports uti...	Current
	x2...	Current	Verify Number of People	12	/Sports uti...	Current
Out	/Sports utility vehicle 4x2...	Current	Market Research	18	/Sports uti...	Current

Traceability in ReqPro

- ✓ Graphical trace matrix
- ✓ Textual trace matrix
- ✓ Graphical trace tree



Rational RequisiteWeb - Mozilla Firefox

Learning Project - Use Cases

- Learning Project - Use Cases
  - Coverage Analysis
  - Features and Vision
  - Glossary
  - Impact Analysis
    - Supplementary Reqts Affected by Feature Changes
    - Use Cases Impacted by Feature Changes
  - Use Cases
  - README
  - Requirements Management Plan

Relationships:
- direct only

UC2.2 Basic Flow

BEGIN The use case starts when the Shopper chooses to check on the status of a previous order. IDENTIFY SHOPPER The system requests information to identify the Shopper, and the Shopper provides that information.

UC2.3 TRACK PACKAGES

TRACK PACKAGES At BF VIEW ORDER DETAILS, the order has already shipped; the Shopper chooses to view tracking information for the order. The system displays the tracking information. The use case continues

UC4.2 Basic Flow

Basic Flow BEGIN The use case begins when the Shopper chooses to find CDs. HELPFUL SUGGESTIONS The system presents the following: A recommended selection of the day Newly available albums A list of top

UC4.3 SEARCH BY SELECTED CRITERIA

SEARCH BY SELECTED CRITERIA At BF OPTIONS, the Shopper searches through the catalog of all available CDs by first selecting one of the following choices: Composer Composition Performer The Shopper provides

UC4.5 POSSIBLE NEW ACCOUNT

POSSIBLE NEW ACCOUNT At AF QUIT, the Shopper does not have an account already set up. The system indicates that it cannot save the current selections without an active account and informs the Shopper that it

UC2.2 Basic Flow

FEAT1 Secure payment method

Rational RequisitePro - ClassicsCD Web Shop - [BUS: From Business Requirements to Software Requirements]

- ClassicsCD Web Shop
  - Business Context
  - Coverage Analysis
    - All features with traces to use c...
    - Business Use Cases to Feature...
    - Business Use Cases to System...
    - Design to Use Cases
    - Features Not Linked to Supple...
    - Features to Supplementary Re...
    - Use Cases to Features relation...
    - From Business Requirements to...
  - Design Elements
  - Features and Vision
  - Glossary
  - Impact Analysis
  - Risks
  - Supplementary Specifications
  - Use Cases
  - Requirements Management Plan

- BUS1: Buy CD
  - UC4: Purchase CD
    - DESIGN3: Business...
  - BUS1.1: Brief Description
    - UC5: Shop For CD
      - DESIGN5: ShoppingCar...
  - BUS1.2: Contact ClassicsCD
    - FEAT2: Easy Browsing for...
      - UC5.9: SEARCH BY...
      - UC5.14: VIEW...
  - BUS1.3: Display list of CDs
    - FEAT2: Easy Browsing for...
      - UC5.9: SEARCH BY...
      - UC5.14: VIEW...
    - UC5: Shop For CD
      - DESIGN5: ShoppingCar...
  - BUS1.4: Search for CD
    - UC5: Shop For CD
      - DESIGN5: ShoppingCar...
  - BUS1.5: Intent to Buy
    - UC3: Check Order Status
      - DESIGN4: Data Services
  - BUS1.6: Collect customer...

BUS1: Buy CD

Ready

Rational RequisitePro - ClassicsCD Web Shop

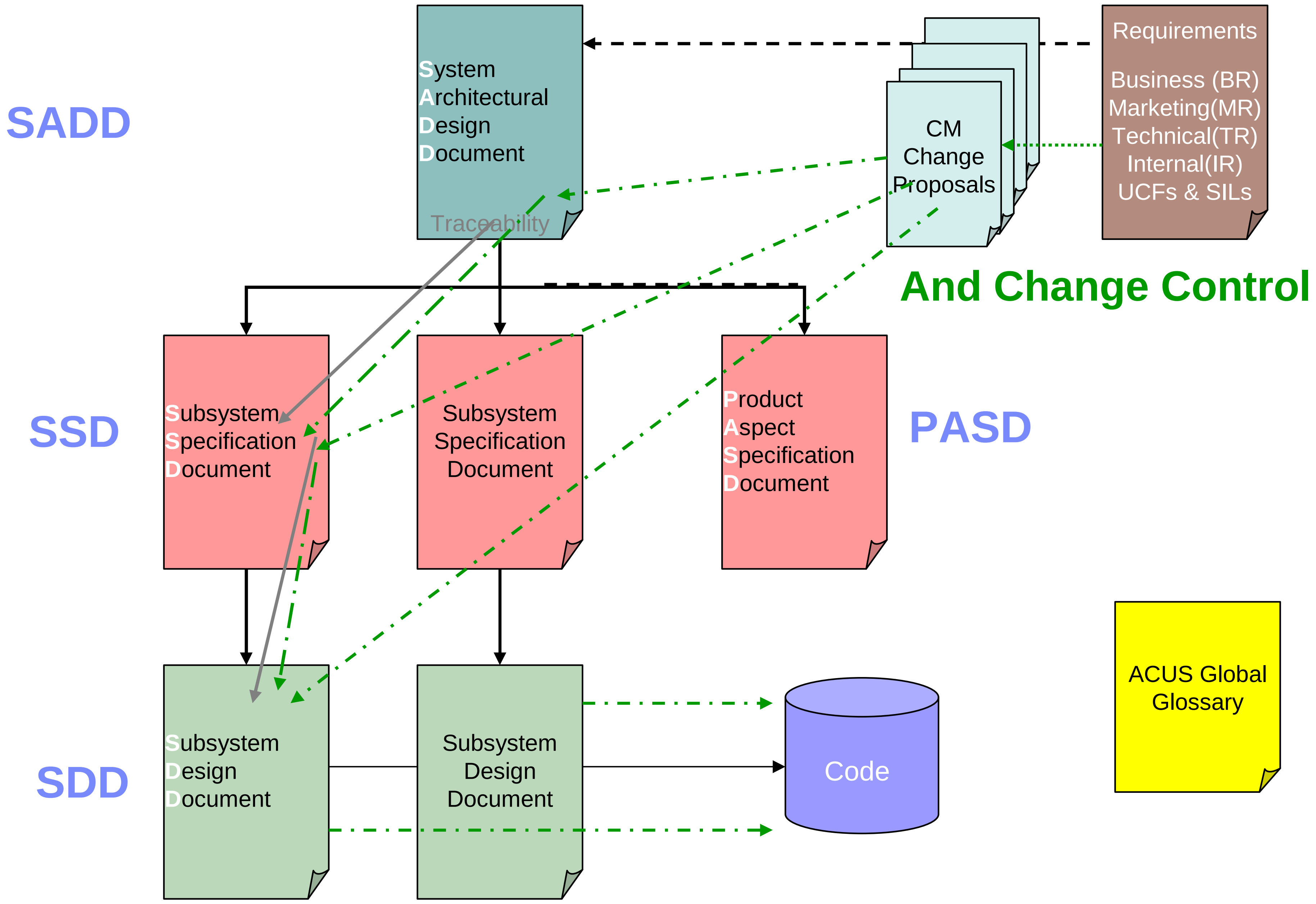
FEAT3: Search capabilities	UC5.7, UC5.9
FEAT4: Ability to check the status of an order.	UC3
FEAT5: E-mail notification for customers when new titles are added that may be of interest to them.	UC5.16
FEAT8: Customer should be able to register as a user for future purchases without needing to re-enter personal information.	UC4.8, UC4.9(a)
FEAT10: Ability to check on customer orders.	UC3

FEAT1: Secure Payment method

Ready

7 requirements

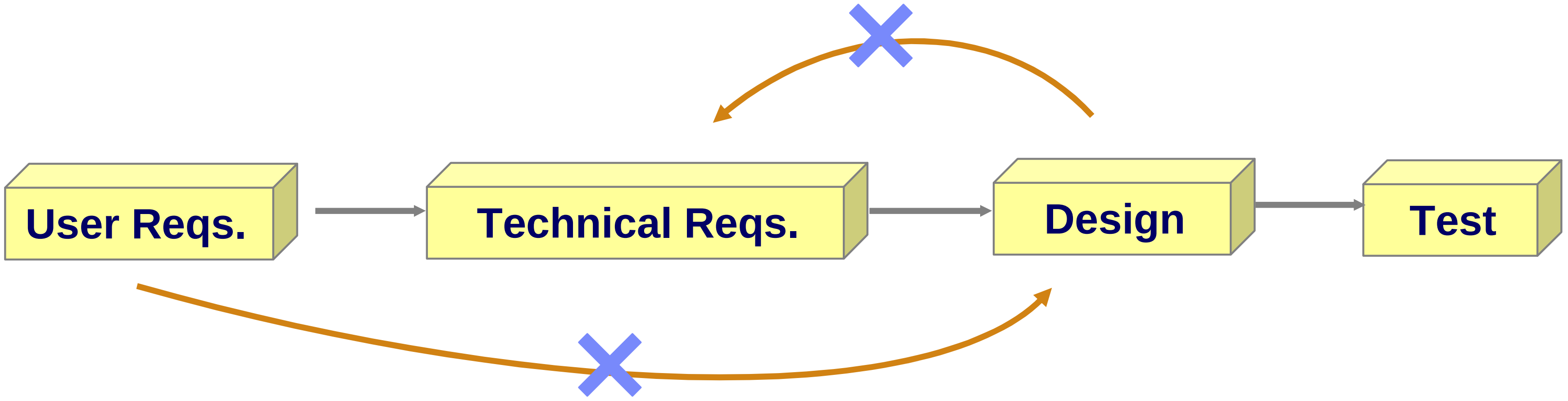
The Unisys Documentation Set



Good Practice 9: Use a tool-supported process

- Elements of process:
- User roles and responsibilities
- Types of information to manage
- Layers of information to manage
- Documents and reports to generate
- Change management
- Life-cycle of statement types (status information)
- Relationships between statement types (traceability)
- Process goals
- Activities and tasks
- Process conformance (CMMI, ISO 9000, etc.)
- Key process measures

Define your process using enforced relationships



1. Define the legal relationships for your process

2. Make other links illegal; don’t miss steps in the process

3. Prevent tracing in the wrong direction

   - Enforce standards, ensure consistency

Questions

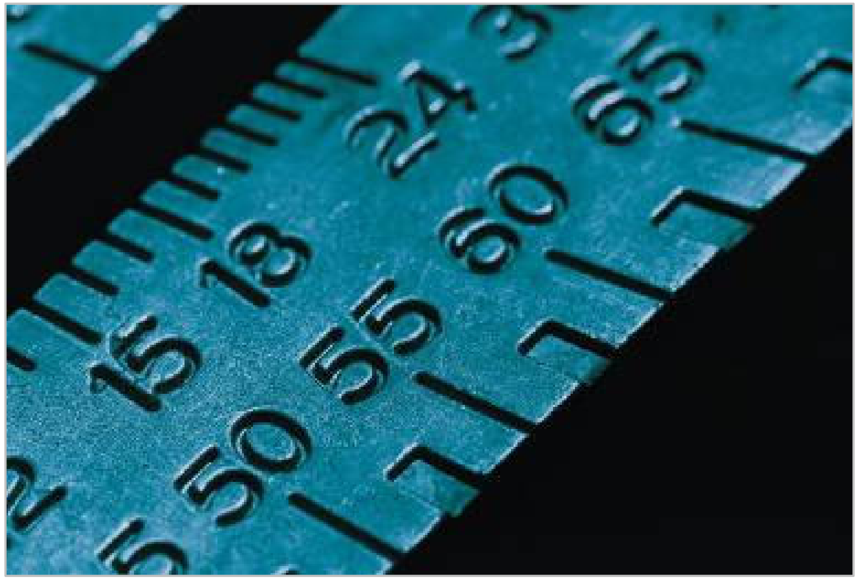
- **Can you quantify the improvement of your organisation’s software development process over the past 5 years?**

- **Do you know if projects where you spend more relative effort in testing result in relatively fewer defects? How about projects where you spend more in requirements analysis?**

- **Based on what quantifiable information do you select development technologies for a project (modeling method, development environment, coding language, etc)?**

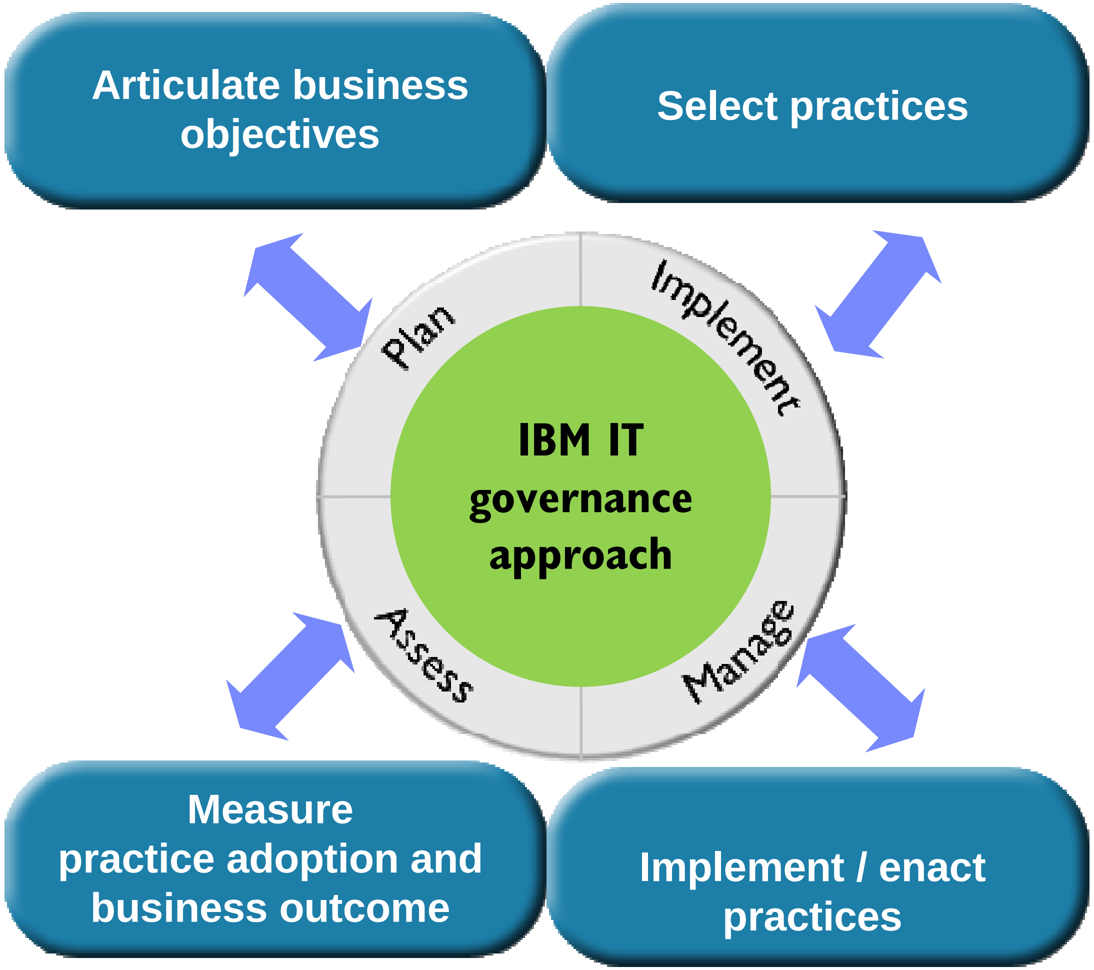
Measurement & Process Improvement

- You can’t improve what you don’t measure
- Keeping the metrics burden low
  - Automation of metrics gathering
  - Higher Quality
  - Better Productivity



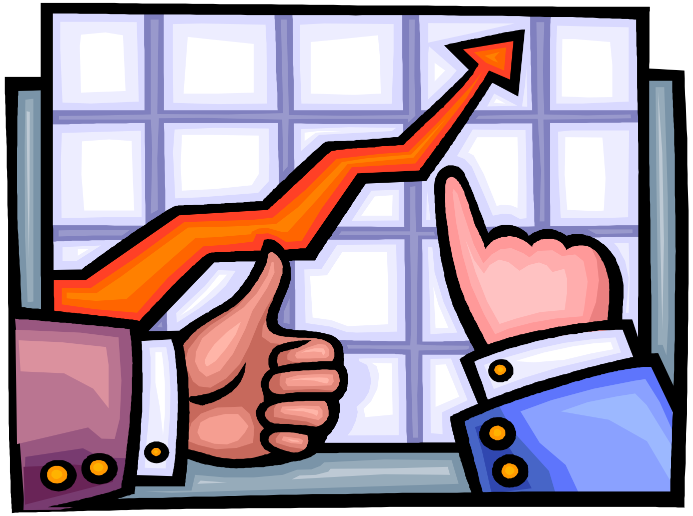
Measured Capability Improvement Framework (MCIF)

- Identify desired business objectives
  - Reduce time to market
  - Improve quality
  - Increase innovation
- Select target practices and tooling to drive desired business objectives
- Effectively deploy well-governed practices
  - Process guidance, training courses. enablement material…
  - Manage tool deployment to effectively adopt practices
- Measure results, take corrective actions
  - Are target practices successfully adopted?
  - Are desired business outcomes achieved?

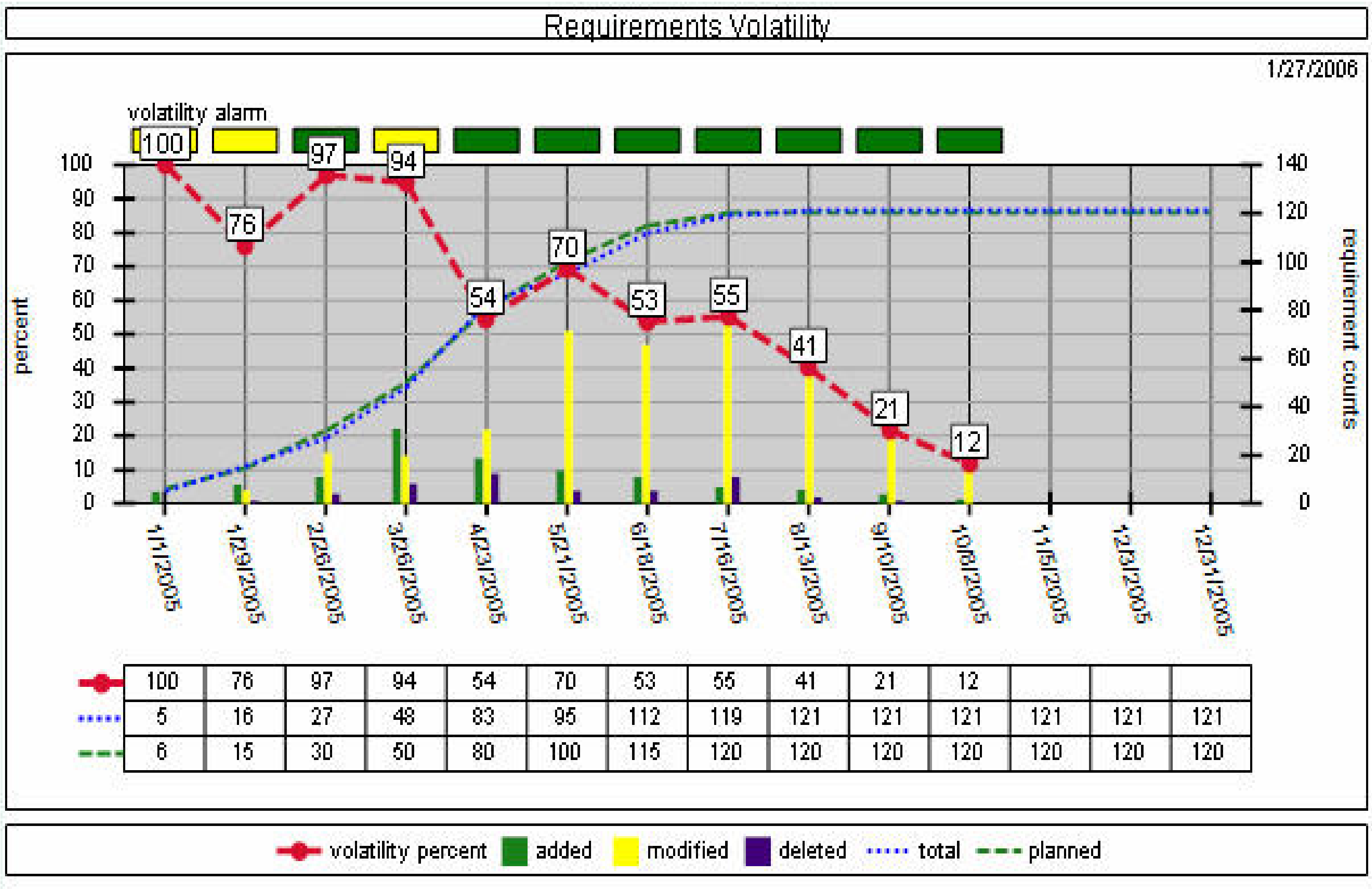

Articulate business objectives
Select practices
Plan
Implement
IBM IT governance approach
Assess
Manage
Measure practice adoption and business outcome
Implement / enact practices

Monitoring Progress based on requirements state

- Number (or %) of input requirements agreed
- Number (or %) of input requirements that have derived requirements linked to them
- Number (or %) of derived requirements in each requirement state (e.g. Draft, Proposed, Reviewed, Rejected)
- Number (or %) of derived requirements that have qualification activities linked to them
- Number (or %) of derived requirements in each qualification state (e.g. No qualification agreed, Qualification agreed, Qualification suspect)
- Number (or %) of input requirements with a change pending



Insight - Visibility Across the Development Lifecycle



Requirements Volatility

1/27/2006

●	100	76	97	94	54	70	53	55	41	21	12			
⋯	5	16	27	48	83	95	112	119	121	121	121	121	121	121
---	6	15	30	50	80	100	115	120	120	120	120	120	120	120

Good Practice 10: Use attributes to support your process

- A requirement is more than just a textual statement.
- It has other attributes.

e.g.

[SH234] The ambulance control system shall be able to handle up to 100 simultaneous emergency calls.

Source:	R. Thomas
Priority:	Mandatory
Release:	1
Review status:	Accepted
Can be evaluated:	Yes
Evaluation:	By simulation, then by system test.

Categories of Attribute – 1

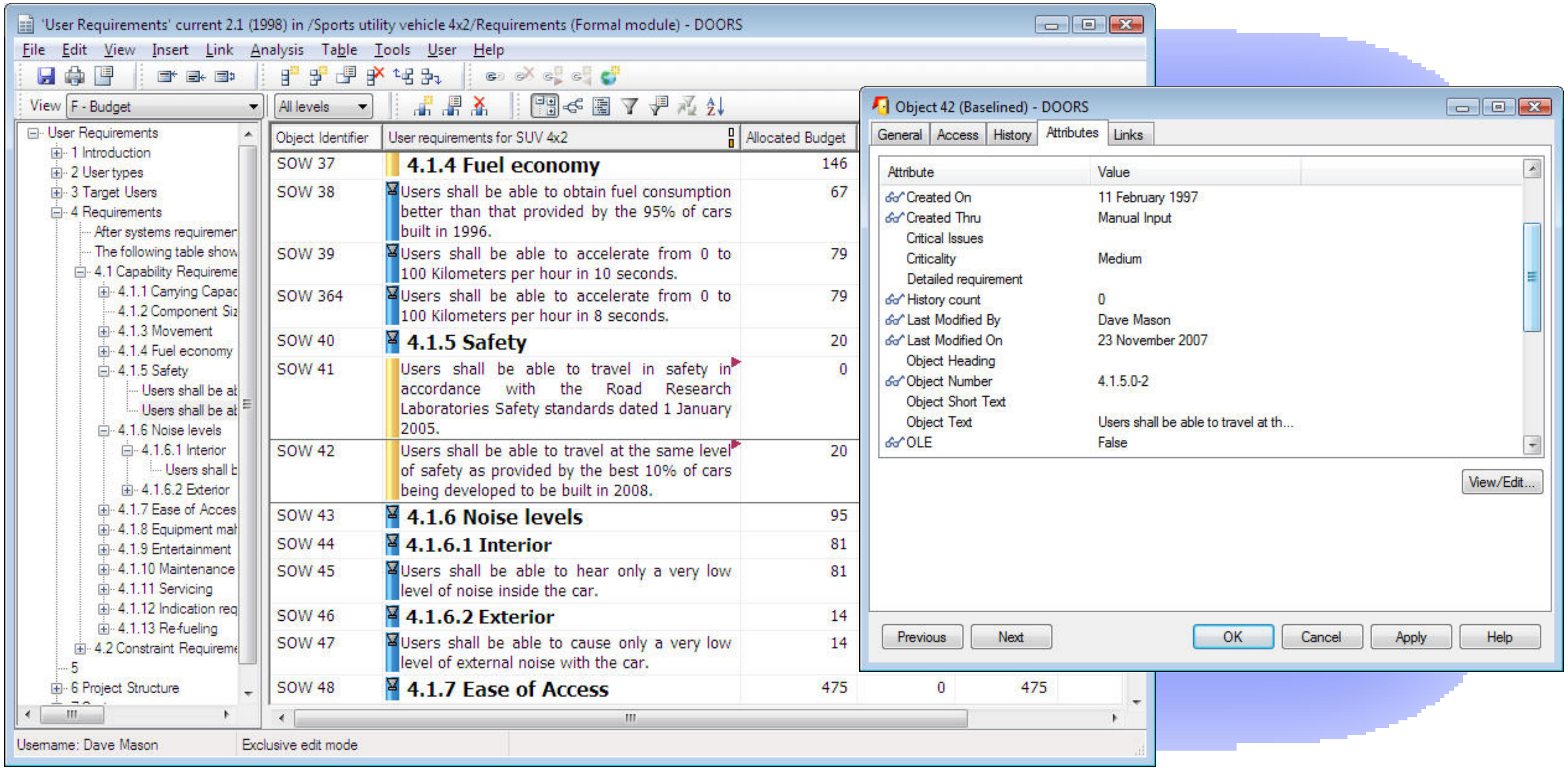
- Attributes are used for:
- Identifying, e.g.
  - Unique number or name
  - Source
- Classifying, e.g.
  - Type of requirement (operational/safety/performance)
  - Applicable phase (development/production/disposal)
  - Allocation to release
  - Priority (mandatory/optional/desirable)
  - Type of object in document (Requirement, Descriptive, Heading)

Categories of Attribute – 2

- Attributes can be used for:
- Recording status (processing), e.g.
  - Maturity status
  - Agreement status
  - Satisfaction status
- Abstracting Information
  - Time Constraints
  - Performance Measures

Unlimited user defined attributes

- Unlimited number of attributes in a spreadsheet-like view
- Values can be calculated for metrics collection
- Any value or attribute may be displayed in any column


'User Requirements' current 2.1 (1998) in /Sports utility vehicle 4x2/Requirements (Formal module) - DOORS
File Edit View Insert Link Analysis Table Tools User Help
View F - Budget
All levels
Object 42 (Baselined) - DOORS
General Access History Attributes Links
View/Edit...
Previous Next OK Cancel Apply Help

- User Requirements
  - 1 Introduction
  - 2 User types
  - 3 Target Users
  - 4 Requirements
    - After systems requiremer
    - The following table show
    - 4.1 Capability Requireme
      - 4.1.1 Carrying Capac
      - 4.1.2 Component Siz
      - 4.1.3 Movement
      - 4.1.4 Fuel economy
      - 4.1.5 Safety
        - Users shall be al
        - Users shall be al
      - 4.1.6 Noise levels
        - 4.1.6.1 Interior
          - Users shall b
        - 4.1.6.2 Exterior
      - 4.1.7 Ease of Acces
      - 4.1.8 Equipment mai
      - 4.1.9 Entertainment
      - 4.1.10 Maintenance
      - 4.1.11 Servicing
      - 4.1.12 Indication req
      - 4.1.13 Re-fueling
    - 4.2 Constraint Requireme
  - 5
  - 6 Project Structure

Object Identifier	User requirements for SUV 4x2	Allocated Budget		
SOW 37	**4.1.4 Fuel economy**	146		
SOW 38	Users shall be able to obtain fuel consumption better than that provided by the 95% of cars built in 1996.	67		
SOW 39	Users shall be able to accelerate from 0 to 100 Kilometers per hour in 10 seconds.	79		
SOW 364	Users shall be able to accelerate from 0 to 100 Kilometers per hour in 8 seconds.	79		
SOW 40	**4.1.5 Safety**	20		
SOW 41	Users shall be able to travel in safety in accordance with the Road Research Laboratories Safety standards dated 1 January 2005.	0		
SOW 42	Users shall be able to travel at the same level of safety as provided by the best 10% of cars being developed to be built in 2008.	20		
SOW 43	**4.1.6 Noise levels**	95		
SOW 44	**4.1.6.1 Interior**	81		
SOW 45	Users shall be able to hear only a very low level of noise inside the car.	81		
SOW 46	**4.1.6.2 Exterior**	14		
SOW 47	Users shall be able to cause only a very low level of external noise with the car.	14		
SOW 48	**4.1.7 Ease of Access**	475	0	475

Attribute	Value
Created On	11 February 1997
Created Thru	Manual Input
Critical Issues	
Criticality	Medium
Detailed requirement	
History count	0
Last Modified By	Dave Mason
Last Modified On	23 November 2007
Object Heading	
Object Number	4.1.5.0-2
Object Short Text	
Object Text	Users shall be able to travel at th...
OLE	False

Username: Dave Mason Exclusive edit mode

GOOD PRACTICES

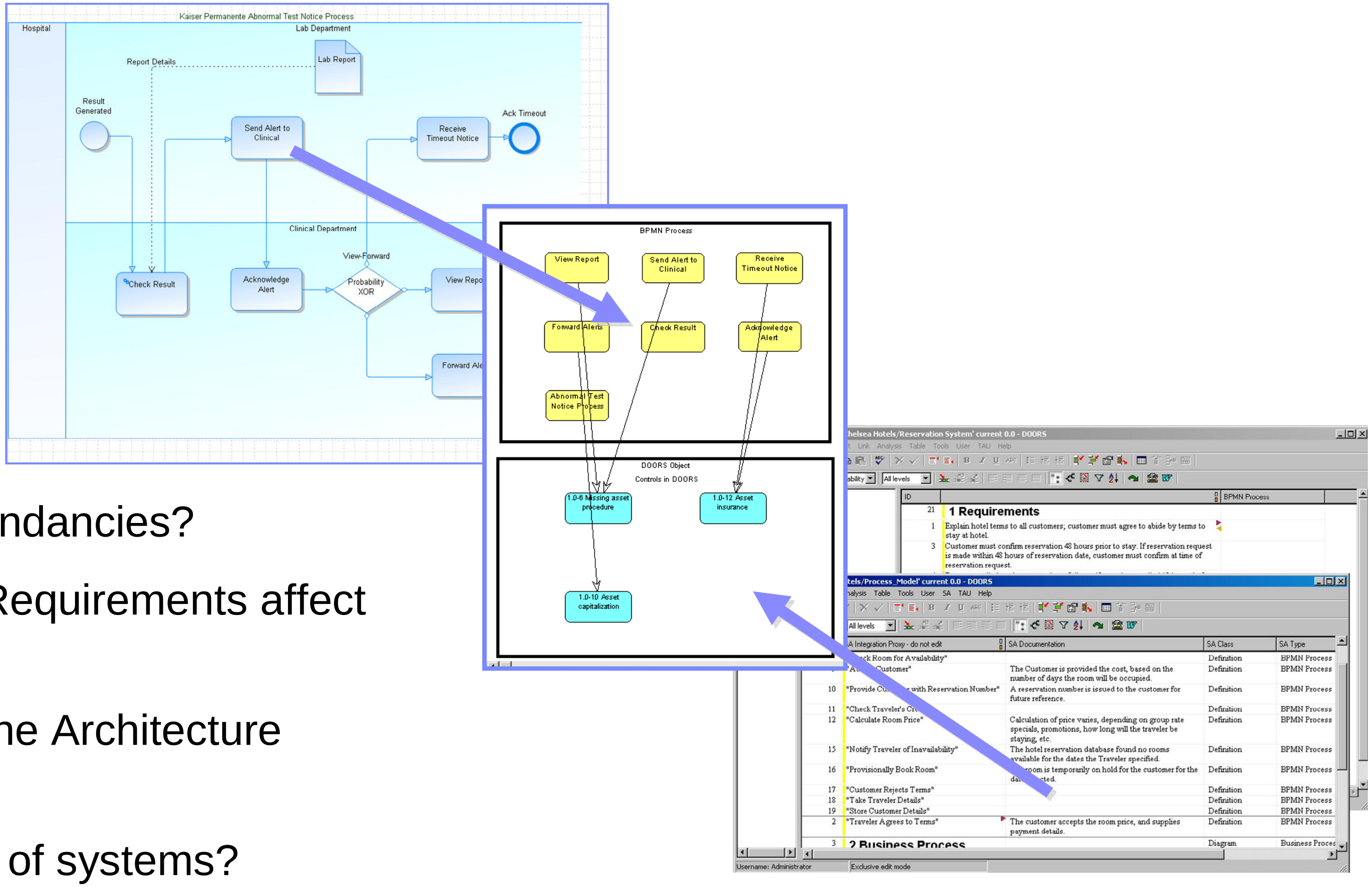
- Know where RM fits
- Distinguish between problem and solution
- Understand the business value of requirements
- Use concise, clear, consistent language in statements
- Focus on documents as well statements
- Understand the role of modelling
- Employ quantification for testing
- Create, review and use traceability
- Use a tool-supported process
- Use attributes to support your process

Development Challenges

- Waterfall Challenges
  - Staying focused on user needs
  - Objectively measure project progress
  - Managing distributed teams
  - Impact analysis
- Agile at Scale
  - Stay in control
  - Scope management
  - Managing distributed teams
  - Team communication
  - Documentation
  - Change management
  - Build management
  - Continual (re)prioritisation

Derive Requirements and Establish Traceability

- **What** is tied to Requirements?
- **What** is driving Requirements?
- **Where** may we have inconsistencies?
- **Where** do we have redundancies?
- **How** does a change in Requirements affect Enterprise Architecture
- **How** does a change in the Architecture affect Requirements
- **What About** my system of systems?



helsea Hotels/Reservation System' current 0.0 - DOORS

ID		BPMN Process
21	1 Requirements	
1	Explain hotel terms to all customers; customer must agree to abide by terms to stay at hotel.	
3	Customer must confirm reservation 48 hours prior to stay. If reservation request is made within 48 hours of reservation date, customer must confirm at time of reservation request.	

tels/Process_Model' current 0.0 - DOORS

	A Integration Proxy - do not edit	SA Documentation	SA Class	SA Type
	ck Room for Availability"		Definition	BPMN Process
	"A Customer"	The Customer is provided the cost, based on the number of days the room will be occupied.	Definition	BPMN Process
10	"Provide Cu with Reservation Number"	A reservation number is issued to the customer for future reference.	Definition	BPMN Process
11	"Check Traveler's Cr		Definition	BPMN Process
12	"Calculate Room Price"	Calculation of price varies, depending on group rate specials, promotions, how long will the traveler be staying, etc.	Definition	BPMN Process
15	"Notify Traveler of Inavailability"	The hotel reservation database found no rooms available for the dates the Traveler specified.	Definition	BPMN Process
16	"Provisionally Book Room"	room is temporarily on hold for the customer for the da cted.	Definition	BPMN Process
17	"Customer Rejects Terms"		Definition	BPMN Process
18	"Take Traveler Details"		Definition	BPMN Process
19	"Store Customer Details"		Definition	BPMN Process
2	"Traveler Agrees to Terms"	The customer accepts the room price, and supplies payment details.	Definition	BPMN Process
3	2 Business Process		Diagram	Business Proces

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Case Study
Great American Insurance Group

- A large, financially strong US insurance group
- Established in 1872
- Provide tailored insurance products and services
- Engaged primarily in:
  - Property and casualty insurance, with a focus on specialty commercial products for businesses
  - Sale of annuities, life and supplemental health insurance products

Great American Insurance Group

- Senior executives identified requirements as a critical “pain point” and a top priority for improvement:
  - Growing concern with its products and delivery practices
  - Established Requirements Engineering function
- IT Services had a largely ad-hoc approach to requirements:
  - No standard process, techniques, or terminology
  - Incomplete, inconsistent, and inaccurate requirements
  - Less than satisfactory results on projects
    - Over cost, behind schedule, missing functionality
    - Stuck in uncontrolled spiral of constantly changing requirements, and could not be delivered at all.
- New function to establish a Requirements Competency:
  - Improve consistency, completeness, & accuracy
  - Pragmatic and non-disruptive manner

GREAT AMERICAN

The Challenge

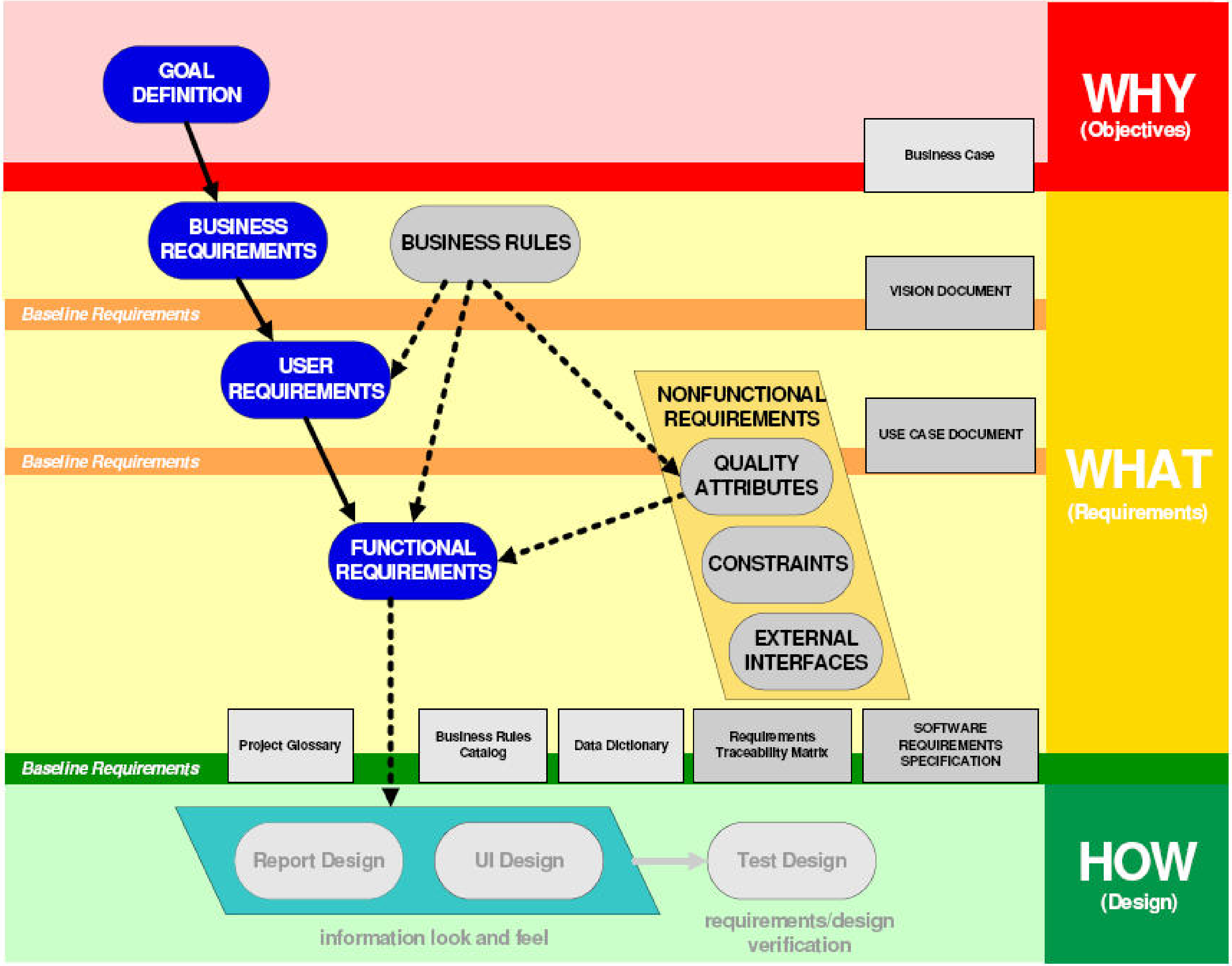
- Establish a Requirements Competency with:
  - Little or no formal requirements processes, standards, or rigour
  - Entrepreneurial culture resistant to anything that may constrain the flexibility of individual business units
  - Failed to include adequate time for critical requirements activities
- Compounding the challenge:
  - Minimal staffing to support approximately 450 personnel
  - Most BAs not trained in formal requirements engineering techniques/ concepts
  - Mix of business, user, and technical requirements, with a smattering of business rules and data element definitions
  - Requirements were being captured using primarily Microsoft Office products (Word, Excel, and Access)

Solution
10 Step Program

1. Develop a Strategic Requirements Roadmap
2. Establish a Requirements Committee
3. Inventory Current Requirements Processes, Practices, and Assets
4. Select an Existing Requirements Approach* as a Foundation
5. Assess Organization against Selected Approach
6. Tailor Approach and Fill Remaining Gaps
7. Select and Implement a “Best of Breed” RM Tool
8. Implement a Requirements Engineering Training Program
9. Rewrite Business Analyst Role Profile to reflect New Process and Tools
10. Coaching and Mentoring to Develop Skills and Institutionalize Practices

*Software Requirements, 2nd Edition, Karl Wiegers

GAI Requirements Roadmap



Results

- Common "language" and process around requirements
- DOORS made an IT Services standard
- Over 100 projects use DOORS
- Over 300 DOORS users and counting
- Growth of appreciation of such basic practices as:
  - Upfront stakeholder analysis
  - Requirements peer reviews
  - Non-functional requirements
  - Requirements management and the benefits from DOORS
- Requirements continue to improve
  - Higher quality
  - More consistent
  - More complete
- Growing customer satisfaction, both internal and external

Excuses!

- We’re too busy fighting fires to do requirements management
- We’re too busy delivering projects to do more requirements management
- We don’t need another tool
- Our people are not skilled enough
- We’re doing the process/method first, then we’ll look at tool support
- …

Agenda

- The case for requirements management
- 10 Good Requirements Management Practices
- Case study
- What next?

Ten Steps to Better Requirements Management

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