

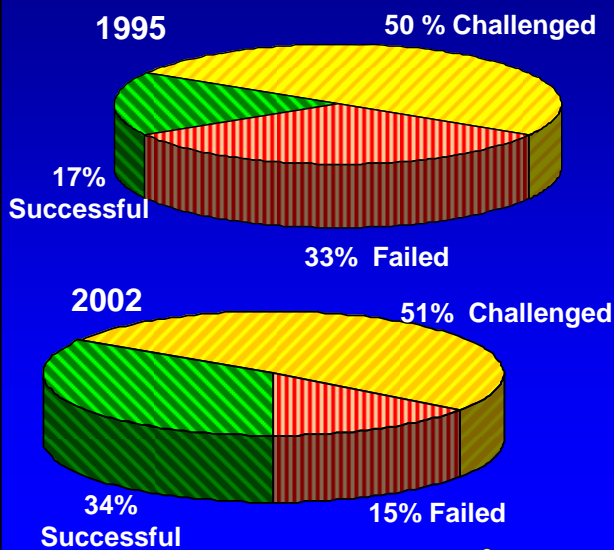
Writing Defect-Free Requirements

Compliance Automation, Inc.



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Standish Group



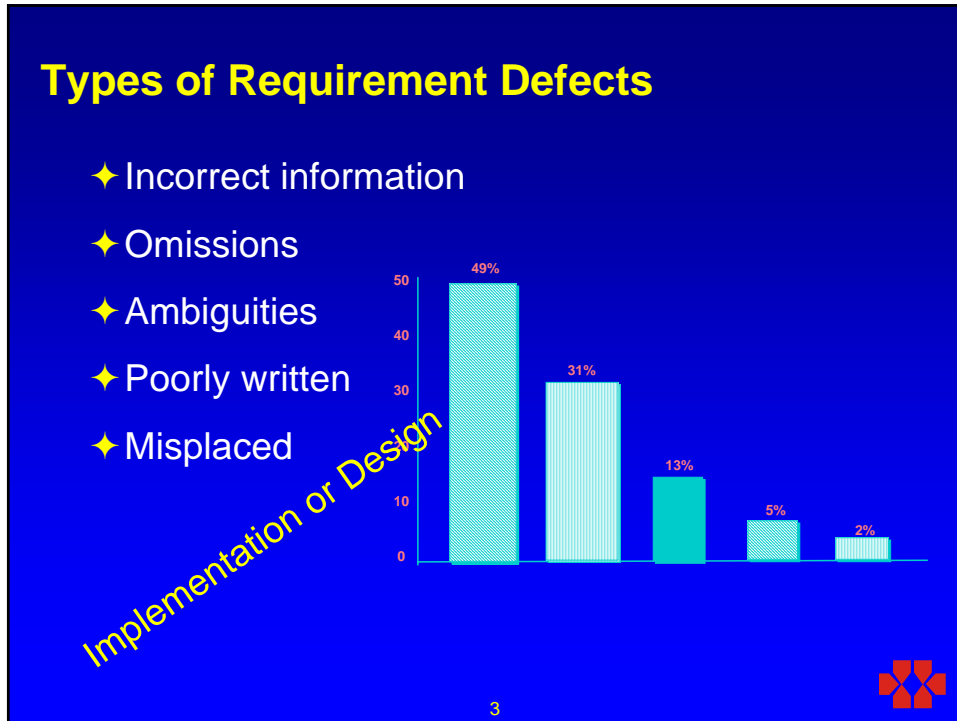
Losing sight of requirements is often the first step on the road to projects that come in over budget, are late, do not meet specifications or are canceled.

Standish Group
CHAOS Chronicles
2003 report



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Writing Defect-Free Requirements



How to prevent requirement defects

Requirement Defects	Methods of prevention
Incorrect Information	<ul style="list-style-type: none"> ▪ Complete scope ▪ Operational concepts ▪ Rationale ▪ Include stakeholders
Omissions	<ul style="list-style-type: none"> ▪ Ditto ▪ Standard outline/checklist
Ambiguities	<ul style="list-style-type: none"> ▪ Standards ▪ Validation
Poorly Written	<ul style="list-style-type: none"> ▪ Simple format ▪ Use editor
Misplaced	<ul style="list-style-type: none"> ▪ Standard outline (template)
Implementation or Operations	<ul style="list-style-type: none"> ▪ Ask "Why?" ▪ Ask "What do you want to verify?"

Customer-Centered Products, p. 249

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Writing Defect-Free Requirements

Writing Defect-Free Requirement Objectives

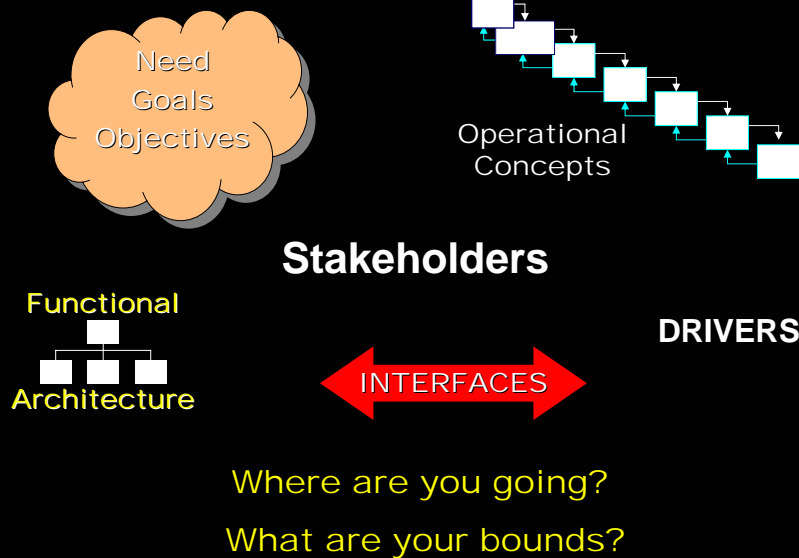
To provide you three tools to carry you toward defect-free requirements

- ✦ Tool #1: Scope
- ✦ Tool #2: Requirement Check List
- ✦ Tool #3: Rationale

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Tool #1 Product Scope



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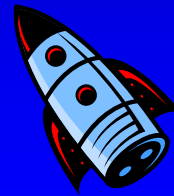


Writing Defect-Free Requirements



NEED – Example of defining a product

- ✦ NASA – new launch vehicle
- ✦ FAA – new computers and displays
- ✦ Commercial – voice activated thermostat
- ✦ Administrative – integrated payroll and accounting system
- ✦ Company X – web page



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Writing Defect-Free Requirements

NEED – Behind the defined product

- ✦ NASA – make access to space safer and cheaper
- ✦ FAA – to replace out-of-date equipment
- ✦ Commercial – increase product line –for sight impaired
- ✦ Administrative – to reduce the overhead associated with non-integrated programs
- ✦ Company X – to be competitive

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Need

- ✦ IS
 - derived from a problem assessment
 - why we are doing something
 - a way to ensure we stay on track
- ✦ IS NOT
 - the product
 - subject to change
- ✦ MUST BE
 - in writing
 - available to all



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Writing Defect-Free Requirements

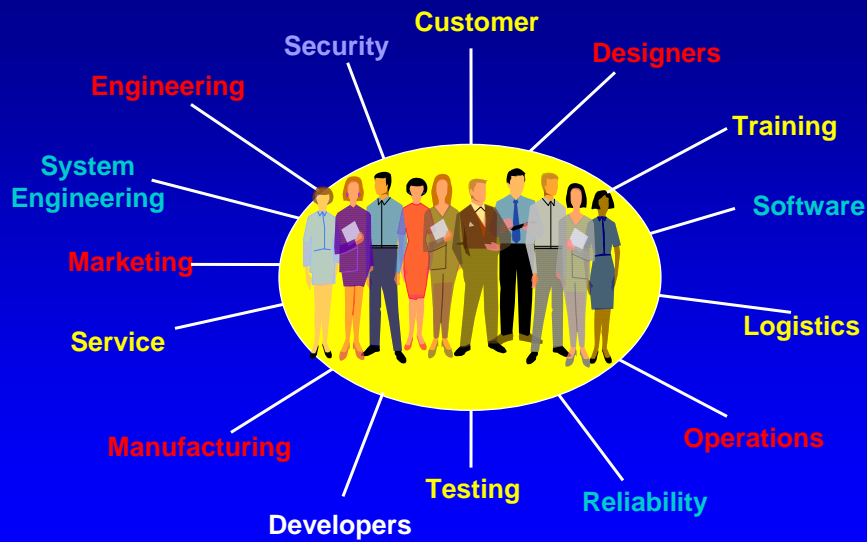
Goals and Objectives

- ◆ Goals
 - define specific things to accomplish to meet the need
- ◆ Objectives
 - define how we will know when we get there

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Stakeholders



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Why identify stakeholders?

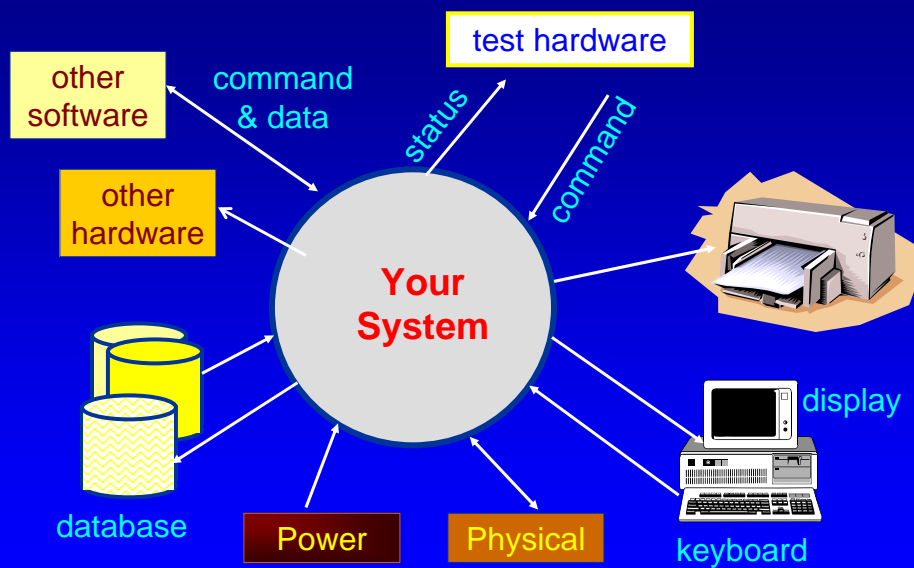
- ◆ Evolve a common vision
- ◆ Get their unique information and perspective
- ◆ Expose assumptions
- ◆ Understand their agenda, priorities, and drivers.
- ◆ Diffuse problems and resolve issues



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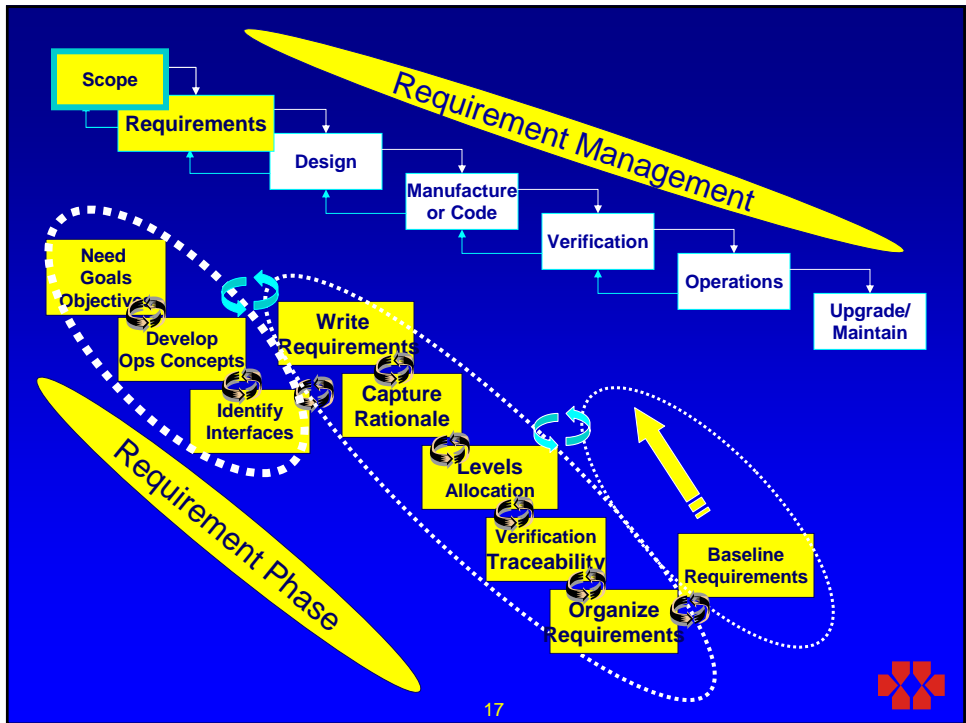
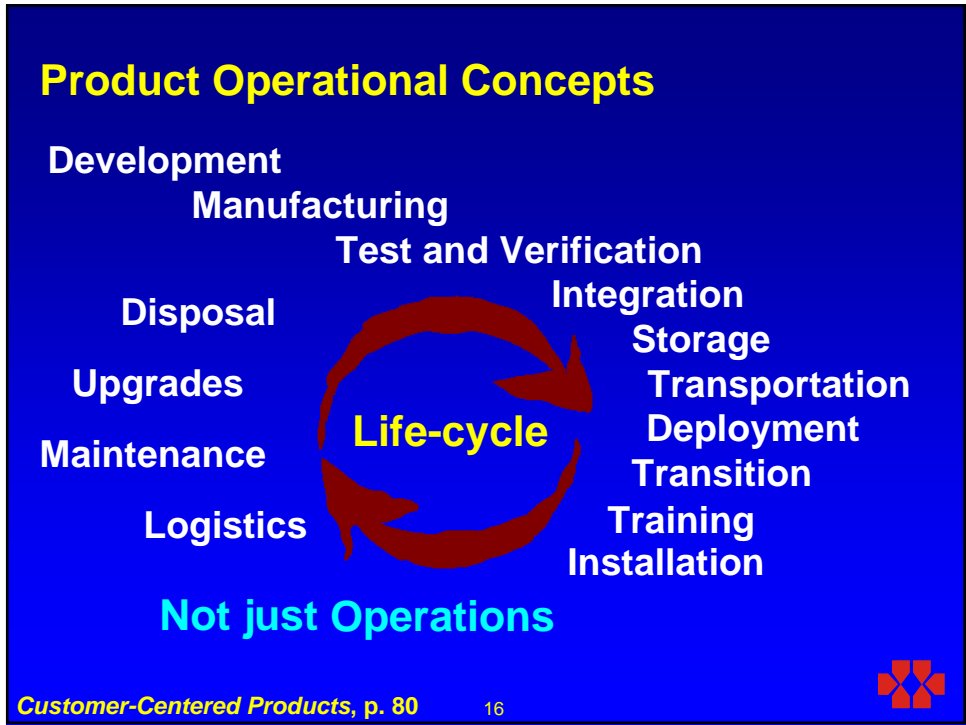
External Interfaces



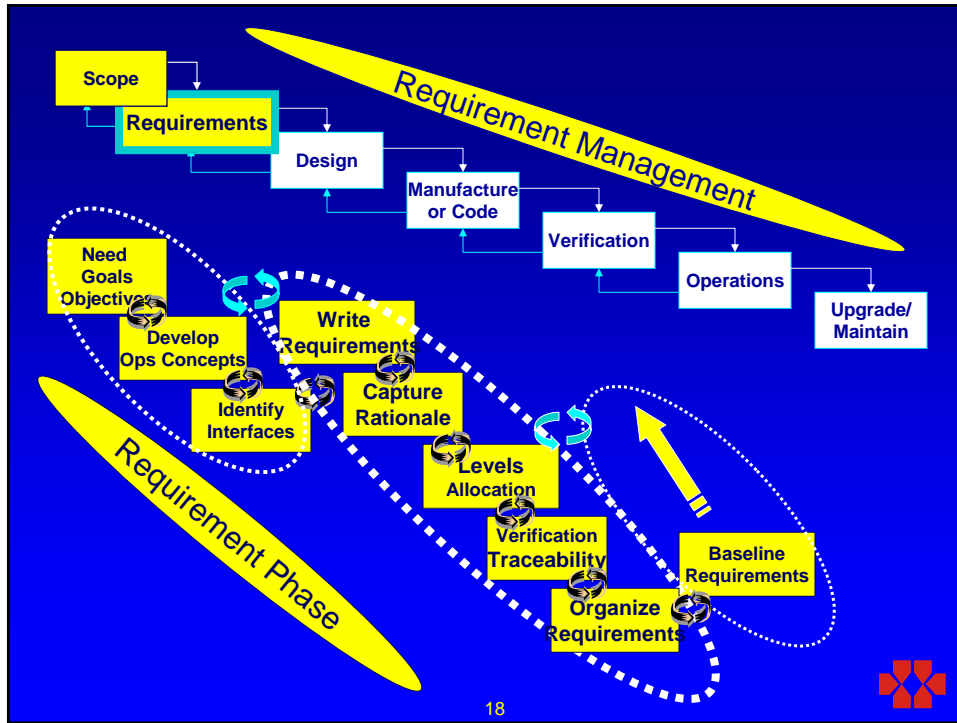
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Writing Defect-Free Requirements



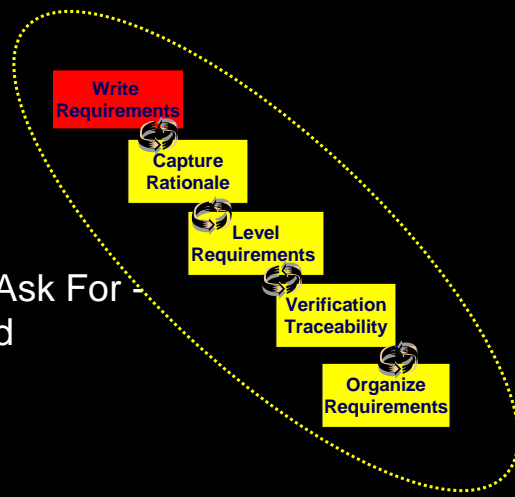
Writing Defect-Free Requirements



Tool #2: Requirements Checklist

✦ Be Careful What You Ask For - Characteristics of good requirements

- Requirement wording
- Ambiguities
- Implementation
- Operations



Writing Defect-Free Requirements

Product Requirement

- ✦ A product requirement is something the product must do or a quality that the product must have.

Examples

The RS shall operate on 112 VAC facility power as defined in facility ICD XYZ.

The RS shall have a lifetime of at least 3 years.

The RS shall use the matches described in ICD 2345.

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SOW requirement

A statement of a task that the provider needs to perform

Examples

The contractor shall provide a requirement specification for each deliverable item per standard xyz.

The contractor shall perform trade studies to determine...

The contractor shall provide cost and schedule data monthly.

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Writing Defect-Free Requirements

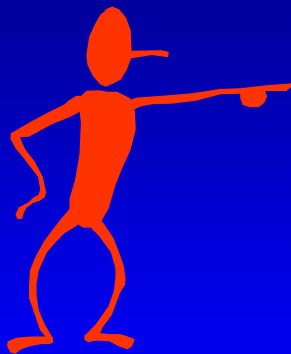
Where to Document

- ✦ Keep product and task requirements separate
- ✦ Put product requirements in
 - Requirement Document or
 - Requirement Specification
- ✦ Put task requirements in a
 - Statement of Work (SOW) or
 - Memorandum of Understanding (MOU)

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Good Requirements



Mandatory Characteristics

- ✦ Needed
- ✦ Verifiable
- ✦ Attainable
 - Technically
 - Cost
 - Schedule

Customer-Centered Products, p. 119

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Writing Defect-Free Requirements

Characteristics of Good Requirements

Improving Communications

- ✦ One Thought
- ✦ Concise
- ✦ Simple
- ✦ Stated Positively
- ✦ Grammatically Correct
- ✦ Can only be understood one way

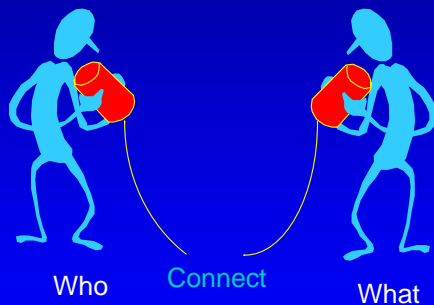


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What a requirement must state



Standard Format

- ✦ WHO is responsible
 - The system
 - The software
 - The database
- ✦ WHAT shall be done
 - operate at a power level of
 - acquire data from ...
 - provide a field for ...

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Writing Defect-Free Requirements

Use The Correct Terms

- ✦ Requirements are binding - Shall
- ✦ Facts or Declaration of Purpose - Will
- ✦ Goals are non-mandatory provisions - Should
- ✦ Don't use must



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Avoid Ambiguous Terms

- ✦ etc.
- ✦ Including, but not limited to

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Writing Defect-Free Requirements

Avoid Ambiguous Terms

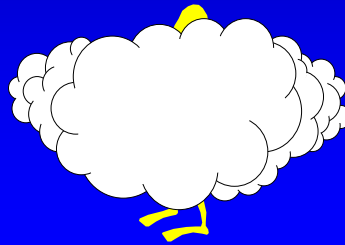
- ✦ Accommodate
- ✦ Support

Customer-Centered Products, p. 162-4 28



Avoid Ambiguous Terms

- ✦ Maximize
- ✦ Sufficient
- ✦ User-friendly
- ✦ Robust
- ✦ High speed
- ✦ Minimize
- ✦ Adequate
- ✦ Easy
- ✦ Ultra-low power
- ✦ TBD



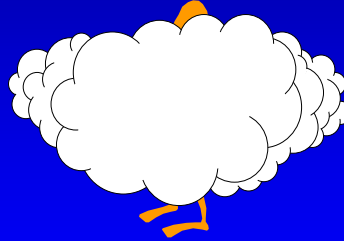
Customer-Centered Products, p. 162-4 29



Writing Defect-Free Requirements

Avoid Ambiguous Terms

- ◆ Indefinite pronouns
 - this
 - these
 - it
- ◆ And / Or
- ◆ Be able to/be capable of



Customer-Centered Products, p. 162-4 30



Implementation Versus Requirements

- ◆ *How*: The aircraft shall have three engines (DC-3 initial requirements).
- ◆ *What*: The aircraft shall meet the operation requirements with a single engine out.

The magic of "why"

- *How*: The System shall include flight performance instrumentation.
- *What*: The System shall measure its flight performance.

What do you want to verify?

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Writing Defect-Free Requirements

Operations Statements

Requirement

- ✦ The operator shall have the capability to change the given thread selection.

Rewrite

- ✦ The system shall allow a change of thread selection *during operations*.
- ✦ The system shall provide a user-interface for thread selection changes.



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Example of Operations

The operator shall be able to turn the machine on or off

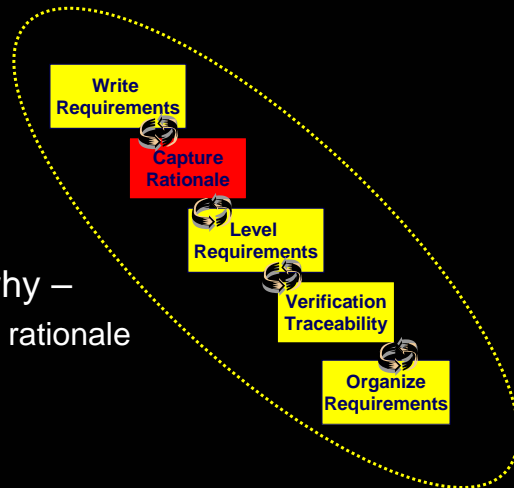


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Writing Defect-Free Requirements

Tool #3: Rationale

- ✦ Theirs but to reason why –
 - The value of capturing rationale



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Rationale - defines

- ✦ Why a requirement is needed
- ✦ What assumptions were made
- ✦ What design effort drove the requirement
- ✦ Other data that will be needed to maintain the requirement over time



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Writing Defect-Free Requirements

Rationale Rules

- ✦ Not a rewrite of the requirement
- ✦ Not stealth requirements
- ✦ Unique for each requirement
- ✦ Not a treatise – keep it short



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Example

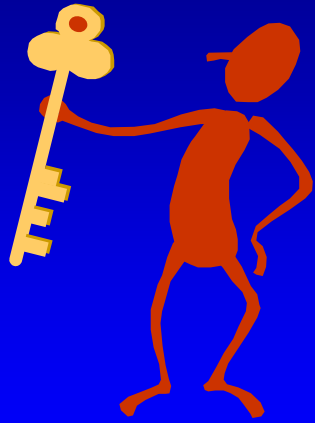
- ✦ Requirement: The truck shall have a height of no more than 14 feet.
- ✦ Rationale: *Ninety-nine percent of all U.S. interstate highway overpasses have a 14-foot or greater clearance. (Assumptions: The truck will be used primarily on U.S. interstate highways for long-haul, intercity freight in the US.)*



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Writing Defect-Free Requirements

Rationale Benefits



- ◆ Key to understanding
- ◆ Reduce interpretation problems
- ◆ Facilitate maintenance and upgrades
- ◆ Preserve corporate knowledge

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Wrap-up

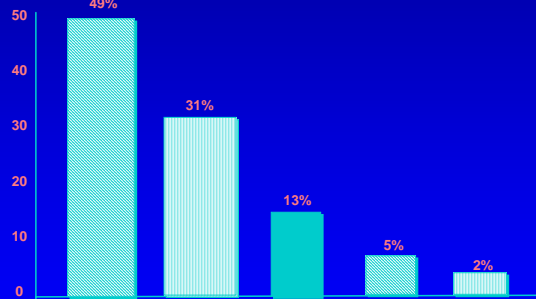
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Writing Defect-Free Requirements

Types of Requirement Defects

- ✦ Incorrect information
- ✦ Omissions
- ✦ Ambiguities
- ✦ Poorly written
- ✦ Misplaced



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Writing Defect-Free Requirements



 What squared with something that you already know?

 What did you learn that made all the pieces fall into place?

 What did you see from a new angle?

 What new direction will you go in?

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Contact Information

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