77% of requirements errors were nonclerical

49% incorrect facts
31% omission
5% ambiguity
13% inconsistency
2% misplacement

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What is RE?

Types of Errors

Jet Propulsion Laboratory (JPL) [Kelly92]

Role of Requirements

Support for system evolution

Support for verification and validation

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What is RE?
What is RE?

What are requirements?

"... Requirements definition is a careful assessment of why a system is needed, what system features will serve and satisfy this context, and how the system is to be constructed and function."

*(Ross77)*

Enterprise requirements

- **why** is the system to be created.
- constraints on the environment in which the system is to function.
  - e.g. Why is it for BPR, organizational structure, goals.
  - e.g. Why is the reason why the system is to be created.

(System) non-functional requirements

- constraints on how the system is to be constructed and function.
  - e.g. ‘ilities and ‘ities (global).

(System) functional requirements

- a description of what the system is to do.
  - what needs to be processed?
  - what information needs to be maintained?

(System) non-functional requirements

- the meaning of system requirements.
  - symbols, relationship, ontology, vocabulary.

What is RE?
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What is RE?

Not all RE projects are similar

Customer-driven projects

Market-driven projects

Examples are hypothetical

Customer

Developer

Product

Requirements Engineering is the branch of Systems engineering concerned with real-world goals for, constraints on, services provided by, and software systems concerned with real-world goals for, services provided by, and the relationships of these factors to precise specifications of system behavior.

The Relationships of these factors

Requirements Engineering is also concerned with software systems constraints on...
What is RE? Really about?

Not all RE projects are similar.

A field study involving 10 organizations.

No such thing as the "problem" => Requirements must deal with the environment (E., EM)

Requirements "evolution" a major concern

Requirements "traceability" a major concern

For economic and technological reasons, organizations are changing much faster today.

Securing customer interaction always hard but critical

"Requirements" important (e.g., from military to commercial, often smaller requirements produced in-house)

Market-driven projects

More definition, completeness through communication

Concept of "superdesigner" for interpretation, filling gaps

Despite their size, these are often sketchy, ill-defined

Usually given large monolithic statements of requirements

Customer-driven projects

Lubars93

 Fey

Privacy

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What is RE?

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49% incorrect facts
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How to do RE?

Jet Propulsion Laboratory (JPL) [Kelly92]
nearly 2/3 requirements defects are due to omission of key information
=> techniques of completeness
=> setting the scope
=> identifying goals/objectives
=> identifying system operations

The Naval Research Laboratory
Navy A-7E aircraft’s operational flight program [Boehm, DeMarco, et al.]
go ong research since the mid-70’s

33% of requirements errors were detected by manual review
automated tools can detect a significant number of errors

Types of Errors

Error detection and removal
A requirements engineer should:

<table>
<thead>
<tr>
<th>defects</th>
<th>defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>specific</td>
<td>customer/users</td>
</tr>
<tr>
<td>modelers</td>
<td>Sem-formal notations</td>
</tr>
<tr>
<td>forms</td>
<td>Natural language</td>
</tr>
</tbody>
</table>

Conceptuality

Major themes of the course

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How to do RE?

Why, What & How
in defining

Error detection and removal

A requirements engineer should:

understanding the problem
express/translate the needs
through interaction

be knowledgeable in relevant technologies toward possible solutions

express/translate the needs

be knowledgeable in relevant technologies toward possible solutions

express/translate the needs

understanding the problem

Express/translate the needs

be knowledgeable in relevant technologies toward possible solutions

understanding the problem

Express/translate the needs
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How to do RE?

Major themes of the course

- Introduction to RE
  Chap 1 of Davis

- Processes in RE
  Chap 2 of LK

- Requirements Elicitation
  Chap 3 of LK

- Scenarios
  Chap 28 of OO Methods: Foundation [Martin, Odell]

- Requirements Analysis, Modelling & Specification
  Chap 3 of LK

- System Functional Requirements: Structural Reqs
  Chap 4 of Davis

- System Functional Requirements: Behavioral Reqs
  Chap 5 of LK, Chap 6 of Davis

- Sec 4.5 of LK, Chap 3 & 5 of Davis

- Non-Functional Requirements
  Sec 4.4 of LK, Chap 2 of Davis

- Enterprise Requirements
  Sec 4.3 of LK

- Sections 4.1 & 4.2 of LK

- Non-Functional Requirements
  Chap 28 of OO Methods: Foundation [Martin, Odell]

- Requirements Elicitation
  Chap 3 of LK

- Processes in RE
  Chap 2 of LK

- CASE Technology
  Chap 6 of LK

- Requirements Validation
  Chap 5 of LK, Chap 6 of Davis

- Sec 4.5 of LK, Chap 3 & 5 of Davis

- (System) Functional Requirements: Behavioral Reqs
  Chap 4 of Davis

- (System) Functional Requirements: Structural Reqs
  Chap 5 of LK, Chap 6 of Davis

- Sec 4.4 of LK, Chap 2 of Davis