Specifications of IT systems checking and validating

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Agenda

- Potential problems with requirement specifications
- Reviews
- Inspections
- Walkthroughs

EESSI project

- http://ec.europa.eu/social/main.jsp?catId=869
- 25 => 40 mill DKK (60% increase!!!)
- "The original estimate has proved inadequate. Deliveries from the supplier has not happened after the agreed timetable. Supplier has underestimated the task. Critical skills were missing from the supplier. The organizational prerequisites for the project has changed. There is uncertainty about the technical solution maturity. Unforeseen technical problems affecting the project. "
- "The project scope has changed. The original estimate has proved inadequate. Requirements for functionality in the system has changed. Dependencies to other projects affect the project. Unforeseen technical problems affecting the project."

See http://www.digst.dk/Styring/Statens-projektmodel/~/media/Files/Statens%20projektmodel/Statusrapportering/St%C3%B8rre%20statslige%20it-projekter.ashx

A good requirement specification

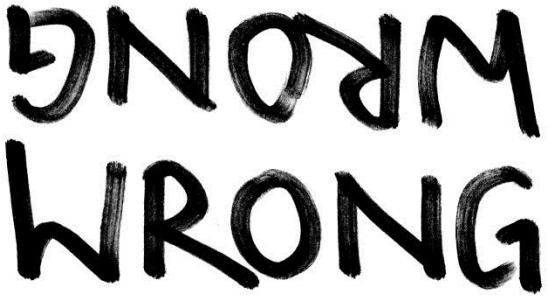
- **Correct** – specifying something actually needed
- **Unambiguous** – only one interpretation
- **Complete** – includes all *significant* requirements
- **Consistent** – no requirements conflict
- **Verifiable** – all requirements can be verified
- **Modifiable** – changes can easily be made to the requirements
- **Traceable** – the origin of each requirement is clear

Task

- In you group for the next 15 minutes create concrete elements of a checklist in order to check that a SRS is ”good”. Write it on the course wiki (on the predefined page)

Categories of defects of SRSs

- Omission defect
  - Missing functionality
  - Missing environment
  - Missing performance
  - Missing interfaces
  - Missing …
- Commission defects
  - Ambiguous information
  - Inconsistent information
  - Incorrect fact

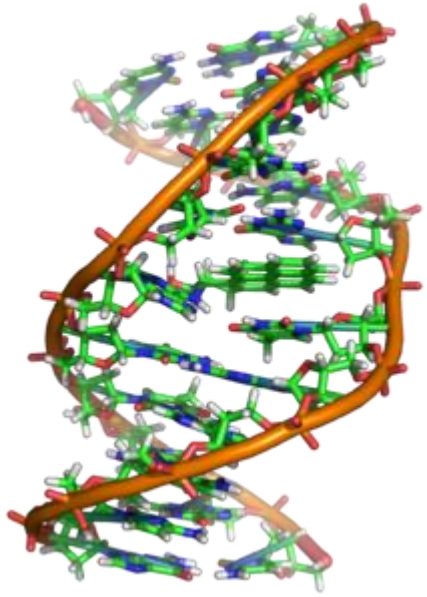


Contents Check

Does the spec contain:

- Customer, sponsor, background
- Business goals + evidence of tracing
- Data requirements (database, i/o formats, comm. state, initialize)
- System boundaries & interfaces
- Domain-level requirements
- Product-level requirements
- Design-level requirements
- Specification of non-trivial functions
- Stress cases & special events & task failures
- Quality reqs (performance, usability, security . . .)
- Other deliverables (documentation, training . . .)
- Glossary (definition of domain terms . . .)

Structure Check

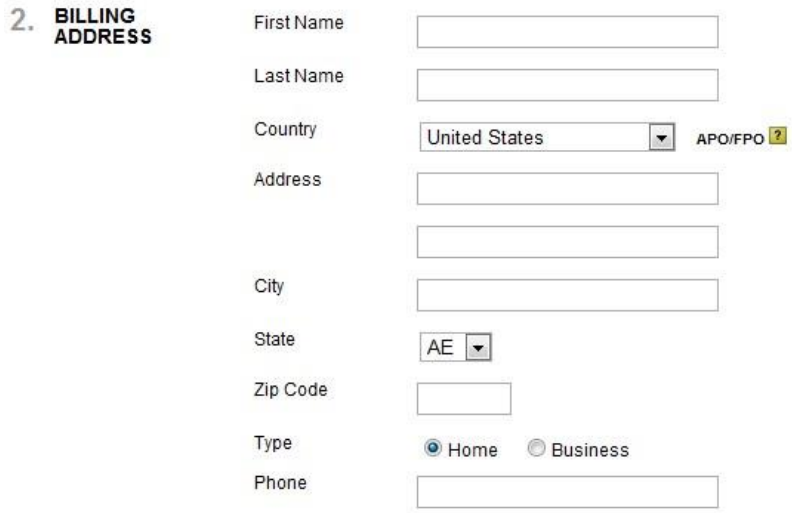


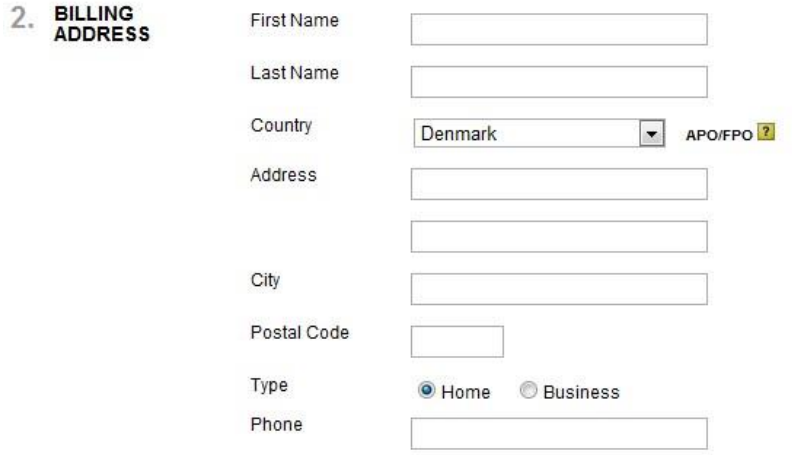
Does the spec contain:

- Number or Id for each requirement
- Verifiable requirements
- Purpose of each requirement
- Examples of ways to meet requirement
- Plain-text explanation of diagrams, etc.
- Importance and stability for each requirement
- Cross refs rather than duplicate information
- Index

CRUDO

- **C**reate
- **R**ead
- **U**pdate
- **D**elete
- **O**verview

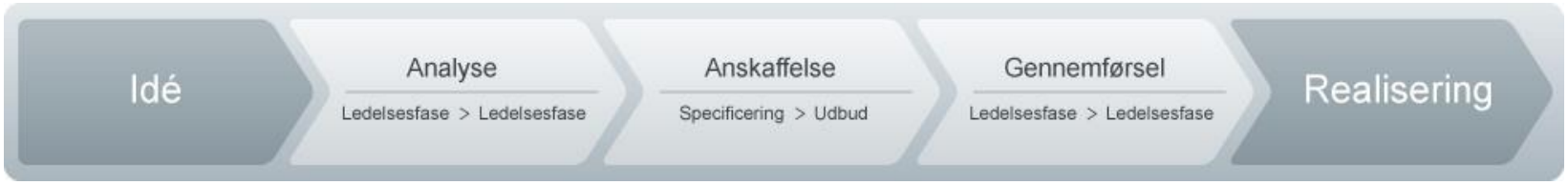




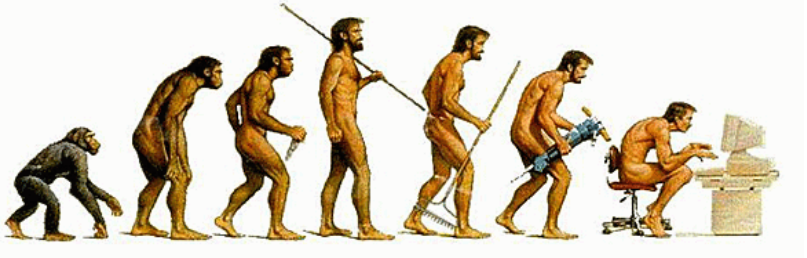
Create, Read, Update, Delete + Overview

Task	Guest	Stay	Room	Room State	Service	Service Type
Book	CUO	C	O	UO		
CheckInBooked	RU	UO	O	UO		
CheckInNonBkd	CUO	C	O	UO		
CheckOut	U	UO	R	U		
ChangeRoom	R	R	O	UO		
RecordService			O		C	R
PriceChange			CUDO			CUDO
Missing?	D	D		CD	RUD	

Danish goverment 5 phase model for buying it-products



Formål	Idé kvalificeres og beskrives i et projektoplæg	Grundlaget for projektet analyseres og defineres i en række styrings og beslutnings dokumenter (fx PID og BC)	Behov og krav til it-system beskrives, og anskaffelse gennemføres	Kontrakt underskrives og design, udvikling test, idriftsættelse og implementering gennemføres	Produkt driftes og gevinster realiseres i henhold til business case og gevinst-realiseringsplan
Output	Godkendt projektoplæg Projektejer udpeget	Godkendte styrings og beslutnings dokumenter Projektleder udpeget	Kravspecifikation udarbejdet Kontrakt klar til underskrift	Produkt klar til drift Godkendt projekt-afslutningsrapport	Godkendt gevinstrealiserings-rapport



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Checklist for each phase

Idé	Analyse	Anskaffelse	Gennemførsel	Realisering
1. Er behovet tilstede og er det reelt eller blot båret af en entusiastisk idégiver? 2. Er der fokus på det forretningsmæssige potentiale og ikke blot på en teknologisk ide? 3. Er teknologien uafprøvet, og kan risikoen accepteres? 4. Hvordan understøtter idéen organisationens strategi? 5. Hvem skal involveres for at kvalificere ideen? 6. Hvem er den rigtige projektejer? 7. Skal processer ændres, og har vi tilstrækkelig viden om hvordan? 8. Hvad vil de største risikofaktorer være, og hvordan kan vi minimere dem i analysefasen?	1. Er gevinsterne tænkt hele vejen rundt? Og er de blevet udfordret? 2. Er gevinster forankret hos en gevinstejer? 3. Er ALT tænkt ind i omkostningerne, inkl. forandringsledelse? 4. Er modtager-organisationen klar og bevidst om udfordringerne ved forankring? 5. Står projektlederen inde for PIDen? 6. Tager styregruppen ejerskab til risici? 7. Er reducerende handlinger indarbejdet i tidsplanen? 8. Hvordan får jeg de rigtige ressourcer? 9. Har driftsfolk været involveret i fasen? 10. Er udrulningsstra-tegien gennemtænkt?	1. Hvad er tidsplanen frem til FiU godkendelse? 2. Er der tænkt hele vejen rundt om udbudsstrategi og er relevante eksperter inddraget? 3. Er opgjorte behov realistiske og ikke overambitiøse? 4. Er det en fordel at specificere krav meget detaljeret? 5. Er ikke funktionelle krav tænkt ind? 6. Hvordan bliver kontrakten win-win for kunde og leverandør? 7. Er budgettet realistisk – og er der en buffer? 8. Er samarbejds-organisationen optimal?	1. Udarbejder leverandøren realistiske tidsplaner, som du kan gennemskue? 2. Kan kravopfølgning dokumenteres? 3. Er interessenterne informeret og tilslutter de sig stadig projektet? 4. Hvordan sikres fortsat godt samarbejde med leverandør – selv i krisesituationer? 5. Performer alle dine projektdeltagere? 6. Hvordan følger du fremdrift: Milepæle, tidsforbrug ift. plan, økonomiforbrug, leverancer og test? 7. Er modtager-organisationen klar til transition? 8. Sikrer du dig råderum til handling og rettidig beslutningstagen samtidig?	1. Er projektet klar til at overgå til drift? 2. Er al dokumentation journaliseret? 3. Hvordan sikres ejerskab til gevinster og kan du måle dem løbende? 4. Hvordan kommunikeres opfølgning på gevinstrealisering? 5. Hvilke erfaringer af det samlede projekt inkl. gevinst-realisering kan høstes? 6. Hvis projektet skulle starte forfra, hvad ville vi gøre anderledes? 7. Har du skrevet den gode artikel om projektet?

Agenda

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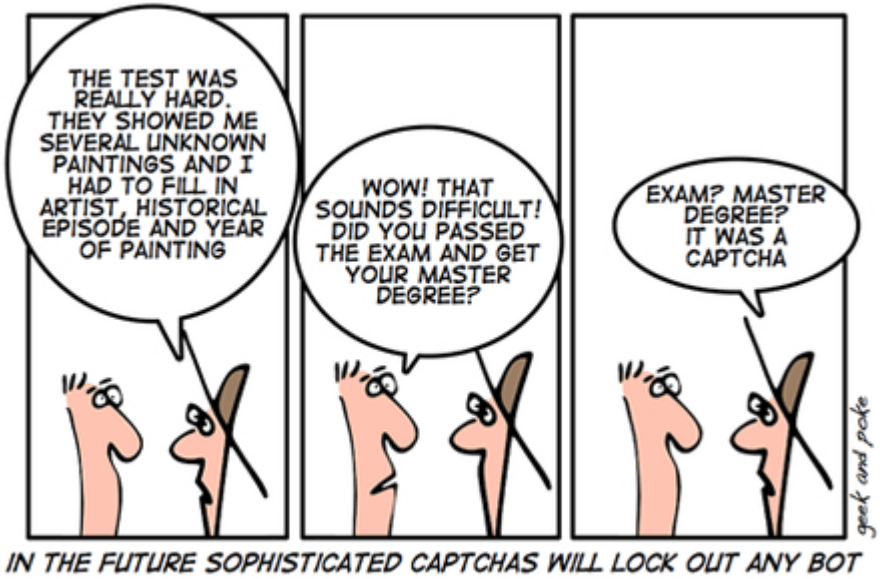
- ➢ Reviews
- Inspections
- Walkthroughs

Who uses SRSs?

- What are the uses of a software requirement specification?
  - For customers it is a specification of the product that will be delivered, ***a contract***
  - For managers it can be used as a basis ***for scheduling and measuring progress***
  - For the software designers it provides a specification of ***what to design***
  - For coders it defines the range of ***acceptable implementations*** and the ***outputs that must be produced***
  - For quality assurance personnel it is used for ***validation, test planning, and verification***

Verification techniques

- Review
- Inspection
  - Add-hoc
  - Checklist
  - Scenario
- Walkthrough



Review versus Inspection

- Review:
  - Presentation to the Group in each Development Phase
  - Discussion and Coordination with other stakeholders
  - Goal:
    Clarification and Accept/Reject Decision
- Inspection:
  - Quality Improvement Process to the software project
  - Goal:
    Defect Detection & Defect Prevention

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Inspection

- Inspections are moderated meetings in which reviewers list all issues and defects they have found in the document and log them so that they can be addressed by the author.
- The goal of the inspection is to repair all of the defects so that everyone on the inspection team can approve the work product.
- Commonly inspected work products include software requirements specifications and test plans.

The inspection team

- Inspection leader
  - Plans for the inspection, sets the date, invites the participants, distributes the required documents
  - Runs the inspection meeting
- A recorder
  - Records the results of the inspection
- Group of inspectors
  - 3 to 10 inspectors
  - Each should ideally represent a different perspective of the work product

Running an inspection meeting

1. Each inspector prepares for the meeting by reading the work product and noting each defect.
   - A defect is any part of the work product that will keep an inspector from approving it.
2. Discussion is focused on each defect, and coming up with a specific resolution.
   - It is the job of the inspection team to do more than just identify the problems; they must also come up with the solutions.
3. The recorder compiles all of the defect resolutions into an inspection log

Inspection log example

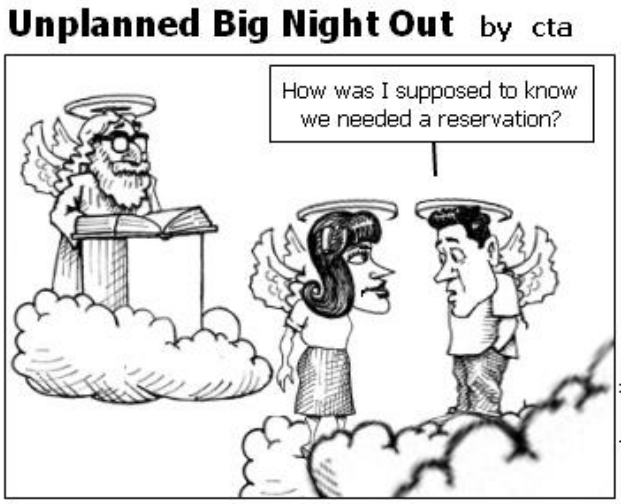
Document:	Contract Royalty Subsystem, vision and scope doc.
Version::	1.3
# of Issues:	16
Review Date:	March 16, 2003

Attendees	**Read Document**	**Time Spent Preparing**
Mike (project manager)	Y	Author
Barbara (VP)	Y	1.0 hours
Quentin (requirements analyst)	Y	2.0 hours
Sophie (senior QA engineer)	Y	3.0 hours
Jill (senior programmer)	Y	0.5 hours

Issue No.	**Section / Page**	**Identified By**	**Issue**
1	Global	Quentin	The term "standard contract" should be replaced with "pro-forma contract"
2	Section 3.1.1 Line 165	Sophie	The contents of the cells in the table are out of order. It looks like some cells were moved down.
3	Section 3.1.2 Line 190	Jill	Specify the look up is by contract number and artist name.
4	Section 3.3b Line 623	Sophie	Tile of the section needs to be changed to "Deletion File (Maintenance). To be consistent with section 3.2.1 #1

Ad-hoc Inspection

- Based on existing skills with inspection team
- Looking for omission defects
  - Missing functionality
  - Missing environment
  - Missing performance
  - Missing interfaces
- Looking for commission defects
  - Ambiguous information
  - Inconsistent information
  - Incorrect fact
  - Wrong section



Checklist based Inspection

- Standard list of questions to look for
- Such lists can for example be found at http://www.opfro.org/index.html?Components/WorkProducts/RequirementsSet/SystemRequirementsSpecification/SystemRequirementsSpecificationInspectionChecklist.html~Contents
- Detect the same kind of defects as ad hoc inspection
- More systematic
- Typically checklists are specialized to the application domain in which a company work

Scenario based Inspection

- Considering different perspectives after each other
- Data type consistency scenario
  - Identify data objects
  - Determine data type information
  - Data involved in functional requirements

- Incorrect functionality scenario
  - Identify input and output for all functional requirements
  - Identify system events for all functional requirements
  - Determine any invariant properties
- Ambiguities and missing functionality scenario
  - Identify precision and response time requirements
  - Identify monitored events per requirement and mode

Agenda

- ✓ What did we look at last week
- ✓ Potential problems with requirement specifications
- ✓ Reviews
- ✓ Inspections
- ➢ Walkthroughs

Walkthrough

- An informal way of presenting a technical document
  - The author runs the walkthrough: calling the meeting, inviting the reviewers, soliciting comments and ensuring that everyone present understands the work product
  - Walkthroughs are used when the author of a work product needs to take into account the perspective of someone who does not have the technical expertise to review the document
  - After the meeting, the author should follow up with individual attendees who may have had additional information or insights. The document should then be corrected to reflect any issues that were raised

Summary

- What have I presented today?
  - Review defect categories
  - Reviews
  - Inspections
  - Walkthroughs
- What do you need to do now?
  - Conduct formal inspection of other groups specification
  - Document findings with reference to use of relevant articles etc.
  - Prepare and deliver inspection report + conduct inspection meeting
  - Email wishes for subjects for last lecture (to JBB, jbb@iha.dk)

Quote of the day

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 … No other part of the work so cripples the resulting system if done wrong. No other part is as difficult to rectify later.

By Fred Brooks

In the ”No Silver Bullet” paper