Quality improvement in software platform development

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Outline

I. Definition of platforms

II. Quality in software platform development

III. Results
Platforms in Product Development

Not a software specific concept!

Black & Decker
“Battery Pack, Motor Pack…”

Car industri
“Peugeot, Fiat, Toyota, etc…”
Software Platform Development

Versions 1... n of product family $P_A$

Platform release $A_k$

Platform Evolution

Versions 1... n of product family $P_A$

Platform release $A_{k+1}$
Physical & static view of the platform architecture

Design rules
Communications
Interfaces
Components
Considerations of quality

ISO-9126 Quality Model


1. Is there a difference in how various stakeholders prioritize quality requirements when developing a software platform?

2. Is there a difference in how various stakeholders prioritize quality requirements, that they want to be present when developing a new product?
Survey and results

Participants & systems:

- 34 participants - industrial professionals, architects, system design and marketing
- Prioritized the requirements for lead-time, cost and overall quality
- Two major companies
  - Embedded system for consumer market
  - Large enterprise system

Results:

- Difference between architects, system design and marketing
- Difference between users and developers
- Reliability important
Design rationale

- In most models (UML, SDL etc.) there is no answer to the question “But why is it built like this?”. 

- Results in degradation of original platform – it becomes more and more hard to change the system at hand.

- A DR is documentation that answers the “why?” question.
Experiment and results

Participants & systems:

- 17 participants - mainly industrial professionals
  - Distributed according to experience to work w/wo DR
- Two systems in SDL
  - PBX control software
  - Cruise control software for cars and test-driver (currently industrially operational)

Major results:

- Participants liked having access to a DR
- Sequence diagrams/MSCs were frequently asked for
Software tracking

Software organizations use tracking to promote efficiency in management and development of software. The tracking consists of monitoring and controlling that organizations stay within wanted cost, quality and lead-time boundaries.
Quality degradation in software platform

Causes:
- Lead-time
- Quality
- Cost
- Knowledge
Graphs denoting the architecture

If the new additions do not violate the wanted structure no degradation is occurred.

When all possible violations occurs the maximal degradation is achieved.

\[ m(P, DR) = \frac{\text{number of violations}(P, DR)}{\text{max number of violations}(P, DR)} \]
Case study and results

System and data-set:

- Product developed by Ericsson Mobile Communications AB
- Five different releases
- Only one type of design rules

Major results:

- Four properties stated by Fenton for tree structures are shown for the proposed measure
- The platform can be modelled in the proposed way
- A case study shows that the formula can be used practically more studies must be made
Benchmarking

“Capture valuable results to be used for input to an improvement program for software processes”

➢ Are they better than we are?

➢ Do they have a secret method?

➢ Can we use also it?
Benchmarking in four steps

Step 1. Planning
business function, companies carried out

Step 2. Analysis
comparison

Step 3. Integration
decision of how to use the findings

Step 4. Action
implement changes, monitoring
Benchmarking Process

ECS

Benchmarking Coordinator

ABB

Questionnaire

Description

Questionnaire

Description + Review Template

Description + Review Template

Comments

Comments

Comments

Comments

16 of 19
Participants and result

Major results:

- All major areas of the questionnaire were regarded as important by both organisations.

- In some questions organisation ECS gives a higher grade to ABB’s description of a specific question, and in some cases it is the other way around.
Main contributions

- Methods for improving the quality in software development
  - Design rationale
  - Tracking
  - Benchmarking

- There are threats against the validity of the result
  - Are the result valid for other environments than those studied?
  - Have I studied what I say I have?