Expectations on quality work

Joint lecture for TDDD96 and TDDE46

LINKÖPING UNIVERSITY

Agenda:

- What is quality?
- Challenges for TDDD96
- Measurable quality requirements
- Process in focus
- Software quality plan
- Metric program
- The cooperation

What is quality?

- “Quality: The degree to which a product or process meets established requirements; however, quality depends upon the degree to which those established requirements accurately represent stakeholder needs, wants, and expectations..,”

- "IEEE Standard for Software Quality Assurance Processes," IEEE Std 730-2014 (Revision of IEEE Std 730-2002), 13 June 2014, doi: 10.1109/IEEESTD.2014.6835311.
- Downloadable for free within LiU”

What does Quality mean to you?

- TDDD96: Your own project
- TDDE46: You are a project manager of the BlaBla communication AB in Sweden. Your company develops networking products such as routers and switches. Your company also develops software for routers and switches to make it easy to use for customers. You are competing with five other companies to get the contract for 1 million devices for third world countries as part of United Nation campaign. This contract is very important for your financial planning otherwise you can go bankrupt.
- Go to https://www.menti.com/
- Enter code **9692 6597**
- Answer the question “My system has good quality because…”

What if we don’t have the right quality?

- Software disasters à la https://www.ponicode.com/blog/software-failures-in-recent-history
- In your projects:
  - Bugs
  - Slow execution
  - Complicated installation and use
  - Limited capacity
  - Ugly GUI
  - Hard to maintain
  - …

Quality factors in industry

- Security, privacy
- Usability, user experience
- Performance
- Energy consumption
- Simple and scalable solutions

Quality is everyone's responsibility!

What contributes to good quality?

- Understanding customer true needs
- Your technical competence, experience and knowledge of existing solutions
- Creating and evaluating good architecture and design
- Setting goals, technical, processes
- Coordinating activities, making them appear in right order
- Communication within the team
- Coding standards
- Different types software reviews
- Creating good and complete testing
- Communicate well with stakeholders
- Measure and assess products and processes
- Tools
- Handling changes
- Define, plan, and improve all the above
- ...

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Challenge: Three measurable quality requirements

- Examples last year:
- Portability: number of environments executing the system
- Usability: good/bad functions according to users
- Understandability: number of lines not commented

- Many more usability requirements can be imagined
- Many more software properties can be indications of reliability, maintainability

Challenge: Three measurable quality requirements, contd.

Ideas:

- Static code analysis -> vulnerabilities, require a certain percentage of known vulnerabilities found.
- Testing -> require a coverage limit
- Energy consumption -> require a maximum consumption in average
- Performance -> require maximal response time, constrain execution time
- Process -> don’t spend more than x hours development between demonstrations
- Don’t know a good value? Start with a guess and adjust!

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Challenge: A process in focus

- All important processes shall be documented to the level of detail that is useful for you, but
- At least one process shall be described in detail that is understandable by many – the process in focus
- There shall be some way of evaluate the performance and adherence of the process
- During the project the process shall be improved, and the result measured

Challenge: A process in focus, contd.

Some processes from last year

- Evaluate iterations
- SCRUM itself
- Code integration

Other ideas:

- Handling customer meetings
- Regression testing
- Estimation, iteration planning
- Peer-review, inspections

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Challenge: Software quality plan

- Aka SQAP, based on goals and risks
- Contains information about:
  - processes for static verification & validation (V&V), reviews, analysis tools
  - processes with high relevance for quality, CM, change and risk management
  - who initiates and evaluates processes
  - how processes are evaluated
  - cooperation and communication
  - who (individual or group) can take certain decisions
  - what documentation that will be produced
  - a metrics program

Challenge: Software quality plans, contd.

Related documents

- Testing, a major contributor to quality
- Project planning, can contain process descriptions
- Education plan, competence development

- Don’t duplicate information, refer instead
- Only overall system descriptions are duplicated

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- A complicated document with an enormous effort in statements of compliance.
- The meat:
- Implementing SQAP
- Product assurance activities
- Process assurance activities

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- Chapter 3 definitions

3.2 Definitions

Acquirer: A stakeholder that acquires or procures a product or service from a supplier [ISO/IEC/IEEE 12207:2008].

Activity: A set of cohesive tasks of a process, which transforms inputs into outputs [ISO/IEC/IEEE 12207:2008].

Assurance: Grounds for justified confidence that a claim has been or will be achieved (ISO/IEC 15026-1:2013 [B36]).

Assurance case: Representation of a claim or claims, and the support for these claims (ISO/IEC 15026-1:2013 [B36]).

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- Chapter 4 What is SQA?

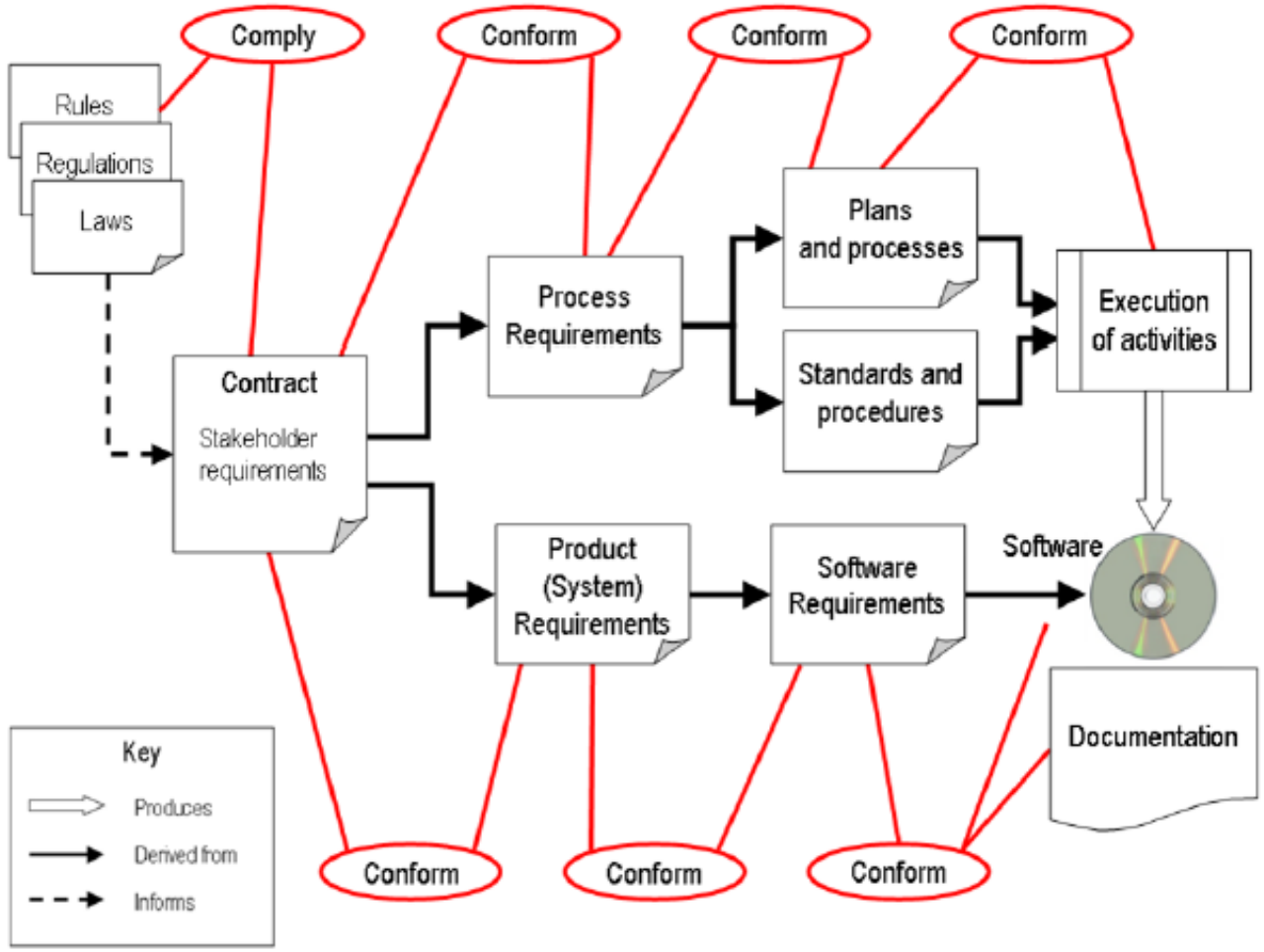

Figure 4—Relationships for determining conformance between project artifacts.

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- Chapter 5 All tasks
- Outline in figure 5

1 Purpose and scope
2 Definitions and acronyms
3 Reference documents
4 SQA plan overview
    4.1 Organization and independence
    4.2 Software product risk
    4.3 Tools
    4.4 Standards, practices, and conventions
    4.5 Effort, resources, and schedule
5 Activities, outcomes, and tasks
    5.1 Product assurance
        5.1.1 Evaluate plans for conformance
        5.1.2 Evaluate product for conformance
        5.1.3 Evaluate product for acceptability
        5.1.4 Evaluate product life cycle support for conformance
        5.1.5 Measure products
    5.2 Process assurance
        5.2.1 Evaluate life cycle processes for conformance
        5.2.2 Evaluate environments for conformance
        5.2.3 Evaluate subcontractor processes for conformance
        5.2.4 Measure processes
        5.2.5 Assess staff skill and knowledge
6 Additional considerations
    6.1 Contract review

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- Annex C: Large checklist

Questions	Suggested inputs
— Is the project scope clearly defined and well-understood? — Is the SQA role on this project understood by the acquirer, the organization, the project team and the SQA team? — Are potential product risks known and well-documented? — Are potential product risks understood so that SQA activities can be planned in a manner commensurate with product risk?	— Acquisition Plan — Contract — Concept of operations

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- Annex F: SQA in agile

Subclause	Task	Adaptation to Agile
5.4.3	Evaluate product for conformance to established requirements	Individual backlog items are determined as "done" (conforms to requirements) or "not done" (does not conform to requirements). SQA evaluates whether the processes that determine whether items are "done" or not are indeed effective. The strong customer involvement will be leveraged to assess conformance of the product. The testing function plays an important role in determining software product conformity and in the development of the software products themselves.

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Challenge: A metric program

Many sources:

- Time reports
- Quality requirements
- Artifact properties
- Process in focus
- Improvements

Challenge: A metric program, contd.

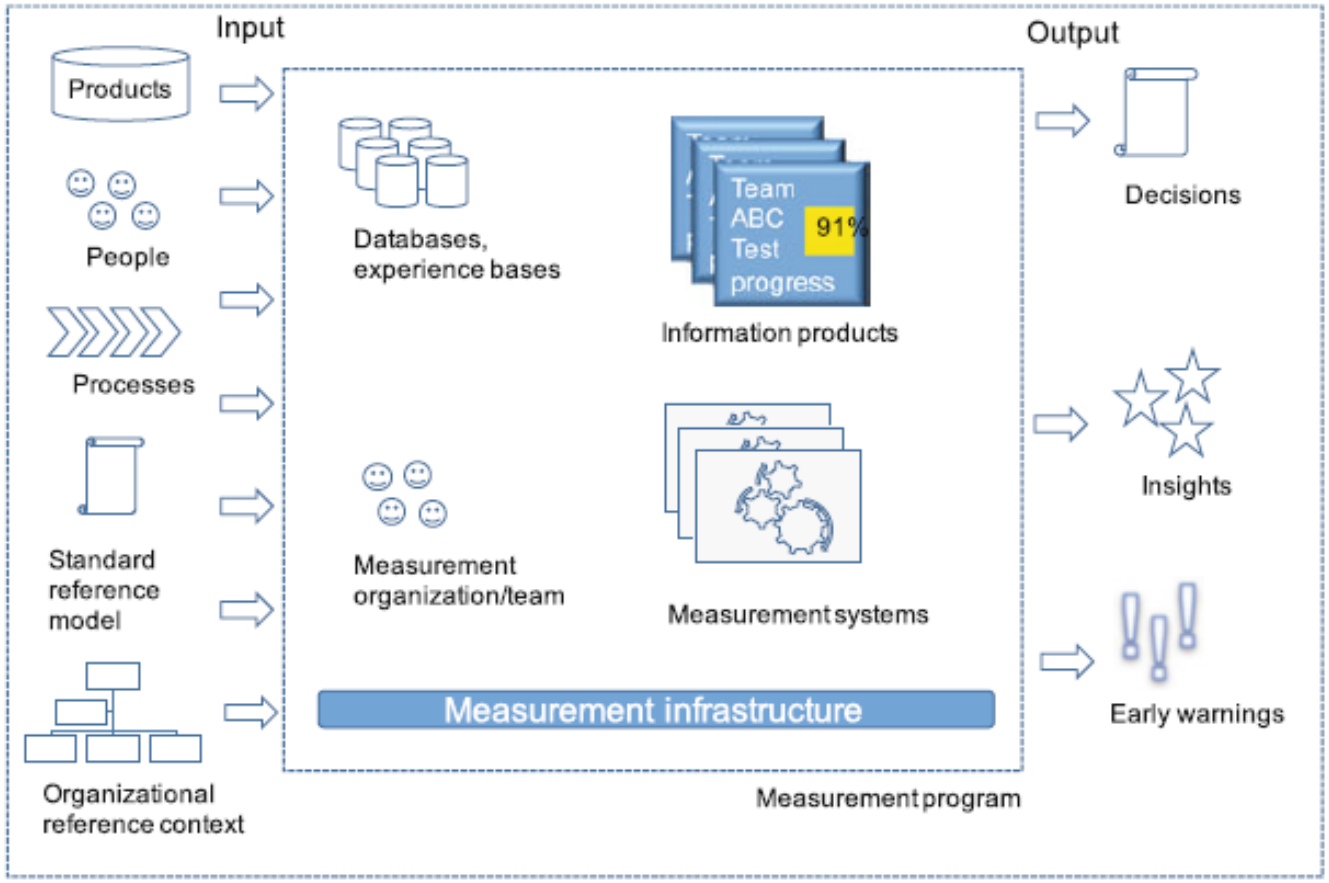

Fig. 1.4 Conceptual model of a measurement program

Staron, M., & Meding, W. (2018). Software Development Measurement Programs. *Springer. https://doi.org/10.1007/978-3-319-91836-5*. Free download within LiU ☺

Metrics from previous years

- Time reports
- Maintainability index
- Cyclomatic complexity
- Lines of code
- Goal evaluation of Kanban board, even subjective opinions

- Add a few artifact metrics just to practice

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Cooperation

- TDDE46 help TDDD96 to reach the goals
- Coaching mode, but
- Ideas
- Feed-back
- Practical assistance
- Meetings organized by TDDE46
- Preparations by both courses
- Joint ownership of assessment reports
- Reflections in TDDE46 logbook

Workshops in schedule

Preliminary Q-req
Outline of SQAP
Idea of a process i.f.

Documents
Feed-back

Q-req
1st complete SQAP
Process i.f.
1st metrics program

Documents
Feed-back

Data exchange
Process
improvement

Data or
instructions

Assessing process
Assessing product

Reports

More meetings may be needed.

Final word: Cost of quality

- Easy to skip when the panic monster arrives
- How much are you prepared to spend? 10%

Read more on the LiU graphic profile

liu.se/grafiskprofil

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