

Quality Management

Objectives

- To introduce the quality management process and key quality management activities
- To explain the role of standards in quality management
- To explain the concept of a software metric, predictor metrics and control metrics
- To explain how measurement may be used in assessing software quality and the limitations of software measurement

Topics covered

- Process and product quality
- Quality assurance and standards
- Quality planning
- Quality control

Software quality management

- Concerned with ensuring that the required level of quality is achieved in a software product.
- Involves defining appropriate quality standards and procedures and ensuring that these are followed.
- Should aim to develop a 'quality culture' where quality is seen as everyone's responsibility.

What is quality?

- Quality, simplistically, means that a product should meet its specification.
- This is problematical for software systems
 - There is a tension between customer quality requirements (efficiency, reliability, etc.) and developer quality requirements (maintainability, reusability, etc.);
 - Some quality requirements are difficult to specify in an unambiguous way;
 - Software specifications are usually incomplete and often inconsistent.

The quality compromise

- We cannot wait for specifications to improve before paying attention to quality management.
- We must put quality management procedures into place to improve quality in spite of imperfect specification.

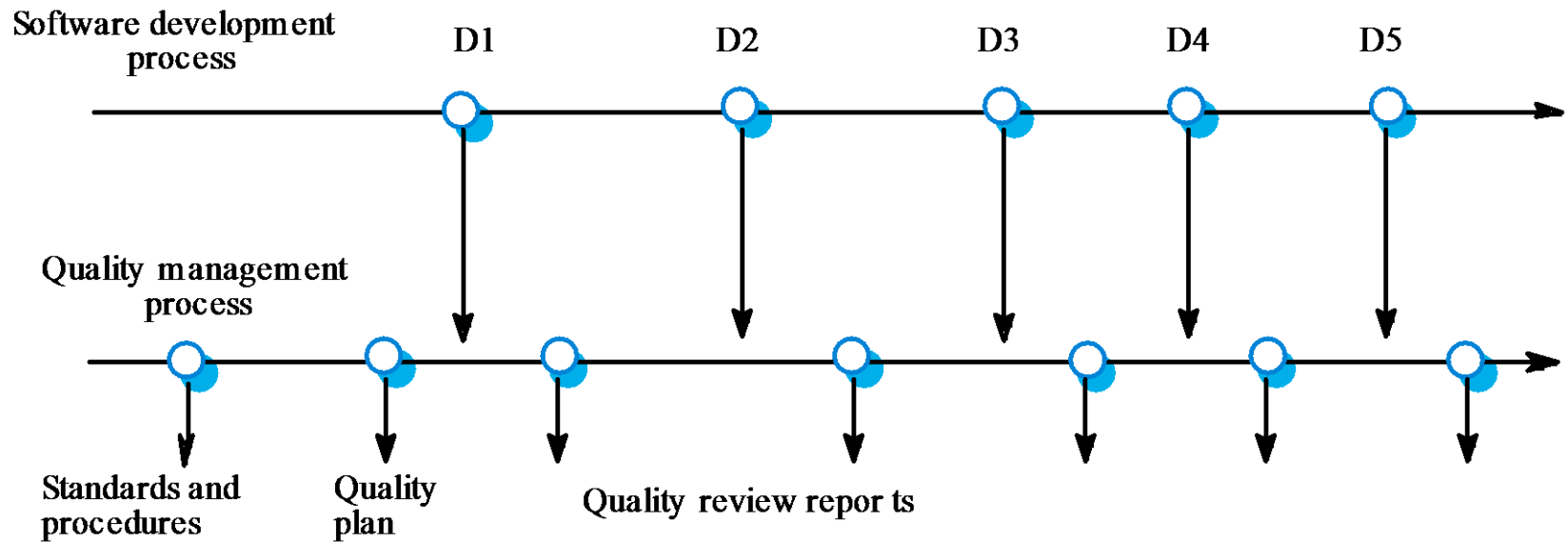
Scope of quality management

- Quality management is particularly important for large, complex systems. The quality documentation is a record of progress and supports continuity of development as the development team changes.
- For smaller systems, quality management needs less documentation and should focus on establishing a quality culture.

Quality management activities

- Quality assurance
 - Establish organisational procedures and standards for quality.
- Quality planning
 - Select applicable procedures and standards for a particular project and modify these as required.
- Quality control
 - Ensure that procedures and standards are followed by the software development team.
- Quality management should be separate from project management to ensure independence.

Quality management and software development



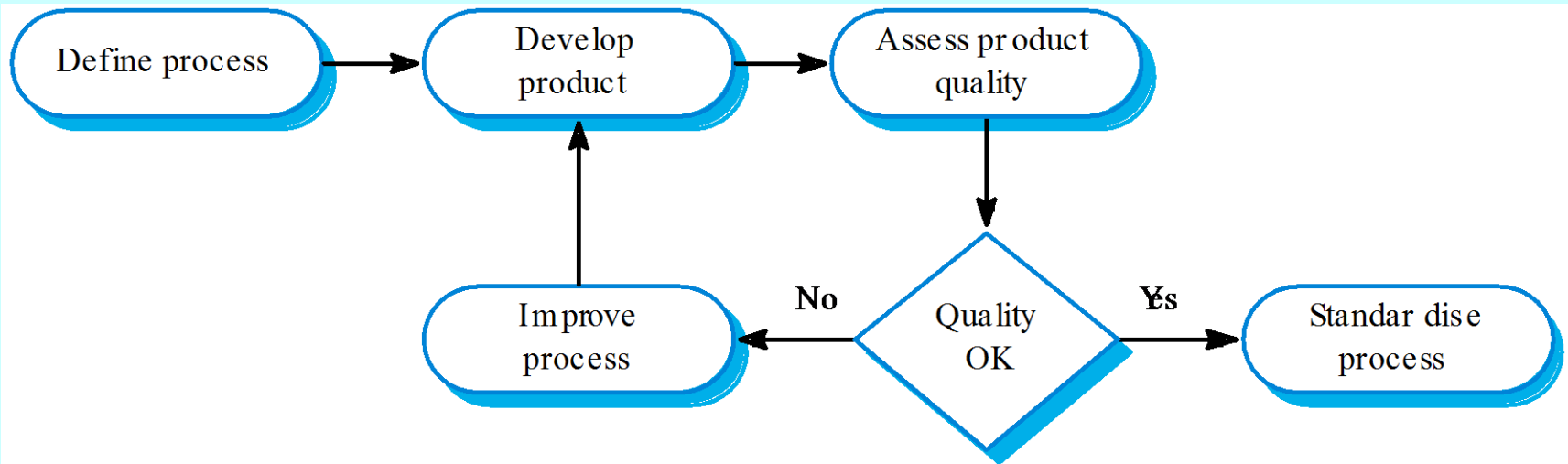
Process and product quality

- The quality of a developed product is influenced by the quality of the production process.
- This is important in software development as some product quality attributes are hard to assess.
- However, there is a very complex and poorly understood relationship between software processes and product quality.

Process-based quality

- There is a straightforward link between process and product in manufactured goods.
- More complex for software because:
 - The application of individual skills and experience is particularly important in software development;
 - External factors such as the novelty of an application or the need for an accelerated development schedule may impair product quality.
- Care must be taken not to impose inappropriate process standards - these could reduce rather than improve the product quality.

Process-based quality



Practical process quality

- Define process standards such as how reviews should be conducted, configuration management, etc.
- Monitor the development process to ensure that standards are being followed.
- Report on the process to project management and software procurer.
- Don't use inappropriate practices simply because standards have been established.

Quality assurance and standards

- Standards are the key to effective quality management.
- They may be international, national, organizational or project standards.
- **Product standards** define characteristics that all components should exhibit e.g. a common programming style.
- **Process standards** define how the software process should be enacted.

Importance of standards

- Encapsulation of best practice- avoids repetition of past mistakes.
- They are a framework for quality assurance processes - they involve checking compliance to standards.
- They provide continuity - new staff can understand the organisation by understanding the standards that are used.

Product and process standards

Product standards

Design review form

Requirements document structure

Method header format

Java programming style

Project plan format

Change request form

Process standards

Design review conduct

Submission of documents to CM

Version release process

Project plan approval process

Change control process

Test recording process

Problems with standards

- They may not be seen as relevant and up-to-date by software engineers.
- They often involve too much bureaucratic form filling.
- If they are unsupported by software tools, tedious manual work is often involved to maintain the documentation associated with the standards.

Standards development

- Involve practitioners in development. Engineers should understand the rationale underlying a standard.
- Review standards and their usage regularly. Standards can quickly become outdated and this reduces their credibility amongst practitioners.
- Detailed standards should have associated tool support. Excessive clerical work is the most significant complaint against standards.