CSE 6324

Advanced Topic in Software Engineering

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What is Quality

“a measurable characteristic or attribute of something.”

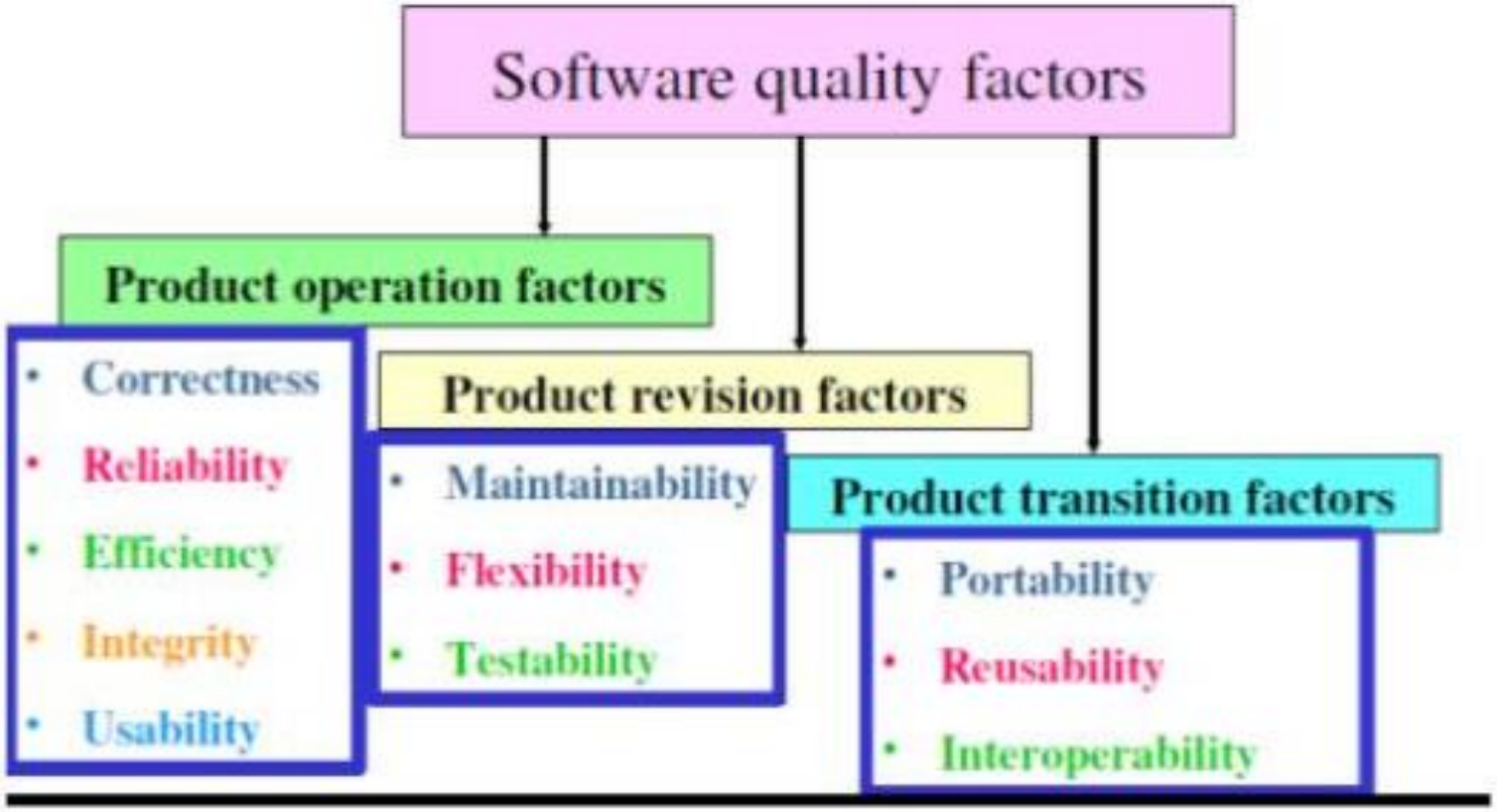
What is Quality

- Quality, simplistically, means that a product should meet its specification.

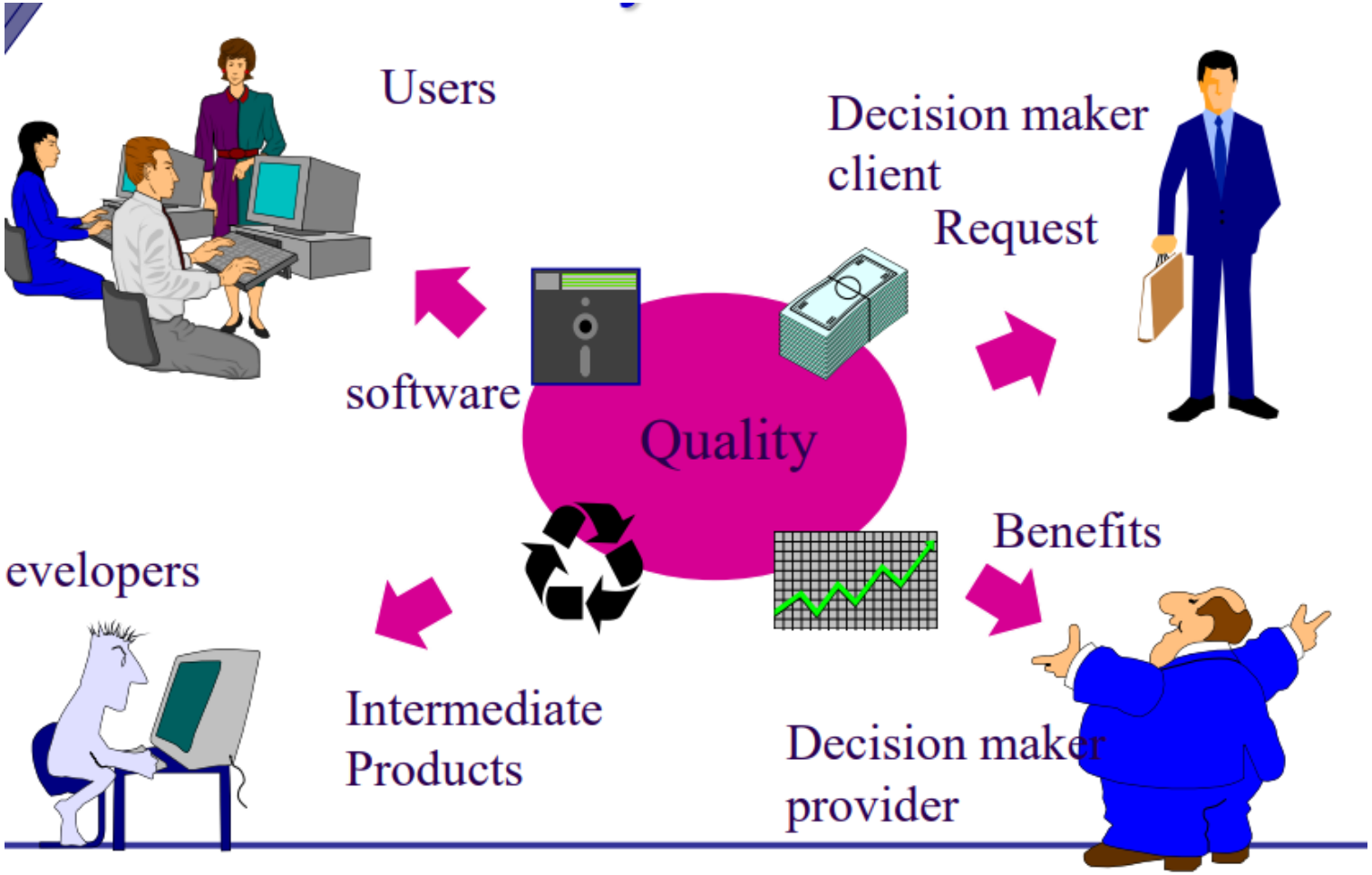
What is Software Quality

- Software requirement are the foundation from which quality is measured.
- Specified standards define a set of development criteria to follow.

Software Quality Factors



Software Quality Difficulties



Software 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.

Software Quality Management

Software Quality Management Activities

1.Quality assurance

1.Software Quality Assurance

- SQA is often thought of as a software testing activity

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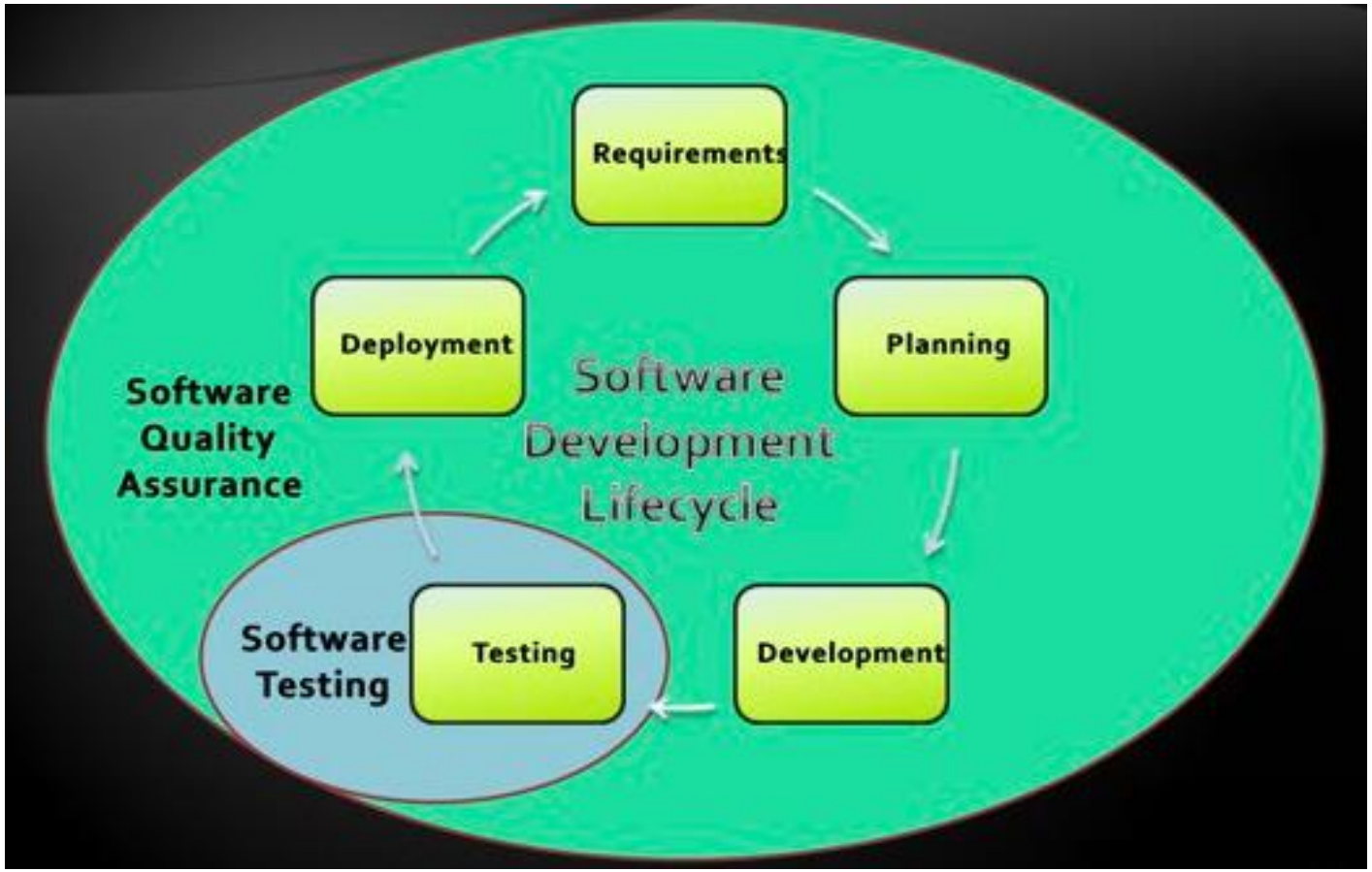
- SQA is often thought of as a software testing activity - WRONG

1.Software Quality Assurance



1.Different Views of Quality

1.Software Quality Assurance

- 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.**

1.Software Quality Assurance

- The two types of standards that many be established as part of the quality assurance process are:

1.**Product standards** define characteristics that all components should exhibit.

E.g. coding standards, documentation standards, etc.

2.**Process standards** define how the software process should be followed during the software development.

E.g., definitions of spec, design and validation processes.

1.Examples of product and process standards

Product standards	**Process standards**
Design review form	Design review conduct
Requirements document structure	Version release process
Method header format	Project plan approval process
Java programming style	Change control process
Project plan format	Test recording process

1.Software Quality Assurance

The relationship between the process and product quality is complex for software because:

- The application of **individual skills and experience** is particularly important in software development;
- **External factors** such as the newness of an application or the need for an accelerated development schedule may impair product quality.
- Since software is designed and not manufactured, therefore software development is a **creative process** rather than a **mechanical manufacturing process.**

1.Importance of software standards

- They are based on the **knowledge about the best or most appropriate practice** - *avoids repetition of past mistakes.*

- They provide ***a framework for quality assurance processes*** - they involve checking compliance to standards.

- They ***provide continuity*** - new staff can understand the organization by understanding the standards that are practiced. Learning effort is also reduced

1.National and international organizations

•**US DoD** (Department of Defense), ANSI (American National Standards Institute), **NATO** (North Atlantic Treaty Organization), **IEEE** (Institute of Electrical and Electronic Engineers)

-have been active in the production of standards

•**ISO 9001** is the most general standard that applies to organizations concerned with the quality process to design, develop and maintain products.

ISO

IEEE

1.ISO 9001 Quality Standard

1. Management Responsibility
2. quality system
3. contract review
4. design control
5. document and data control
6. product identification and traceability
7. process control.

Software Quality Management Activities

1.Quality assurance

Establish standards for quality.

2.Quality planning

Select procedures and standards for a specific project.

2.Quality Planning

- A quality plan **sets out the desired product qualities** and **how these are assessed**.
- The quality plan should **define the quality assessment process.**
- It should set out which organizational standards should be applied and, where necessary, define new standards to be used

2.Software Quality Attributes

Safety	Understandability	Portability
Security	Testability	Usability
Reliability	Adaptability	Reusability
Resilience	Modularity	Efficiency
Robustness	Complexity	Learnability

Software Quality Management Activities

1.Quality assurance

Establish standards for quality.

2.Quality planning

Select procedures and standards for a specific project.

3.Quality control

Ensure that procedures and standards are followed by the software development team.

3.Quality Control

•Quality control involves the **series of inspections, reviews, and tests used throughout the software process** to ensure each work product meets the requirements placed upon it.

3.Quality Review

- There are different types of review with different objectives:

  Inspections for defect removal (product);

  Reviews for progress assessment (product and process);

  Quality reviews (product and standards).

3.Review Results

- Comments made during the review should be classified
  - **No action:** No change to the software or documentation is required;
  - **Refer for repair:** Designer or programmer should correct an identified fault;
  - **Reconsider overall design:** The problem identified in the review impacts other parts of the design. Some overall judgement must be made about the most cost-effective way of solving the problem;

Challenges in Software Quality Assurance

Challenge	Solutions
Communication	Effective communication at all levels Horizontal and vertical communication Add text here
Unrealistic Schedule	Prepare a proper and well scheduled plan Keep track that all the activities are conducted in accordance to the plan Add text here
Unclear Requirements	Analyze requirements of the project Prepare requirement plan Add text here
Lack of Resources	Make available resources in proper quantity Ensure proper utilization of resources Add text here

Questions: