ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ
Σχολή Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών
Τεχνολογία Λογισμικού, 7ο/9ο εξάμηνο 2018-2019

Τεχνολογία Λογισμικού

Ν.Παπασπύρου, Αν.Καθ. ΣΗΜΜΥ, nickie@softlab.ntua,gr

Β.Βεσκούκης, Αν.Καθ. ΣΑΤΜ, v.vescoukis@cs.ntua,gr

Κ.Σαΐδης, ΠΔ 407, saiko@softlab.ntua.gr

Software Quality Assurance, ISO/IEC/IEEE standards

Quality assurance

A way of doing things in a way that achieves the required quality attributes of the product/service being developed/offered

Quality relates to…

- The process
- The product under development

Quality metrics need to be defined

- Many processes share common process quality attributes
- Generally depend on the product and application domain (services, construction, space, software)

Software quality metrics are difficult to define and (especially) measure

Software quality assurance

Involves the {definition, auditing, measurement of compliance to}:

- Guidelines, Standards, Processes

…in order to satisfy certain quality criteria, including but not limited to:

- Reliability, Dependability, Controllability, Portability, Ease of use, Effectiveness, Adaptability, Security, Fault tolerance, Maintainability, Understandability, Resilience, and more

Quality criteria/measures have different weights, depending on the case

We cannot satisfy all (sometimes we cannot measure most), but we do whatever can be done!

Software quality assurance: what can be done

Define organization-wide standards for processes and software artifacts

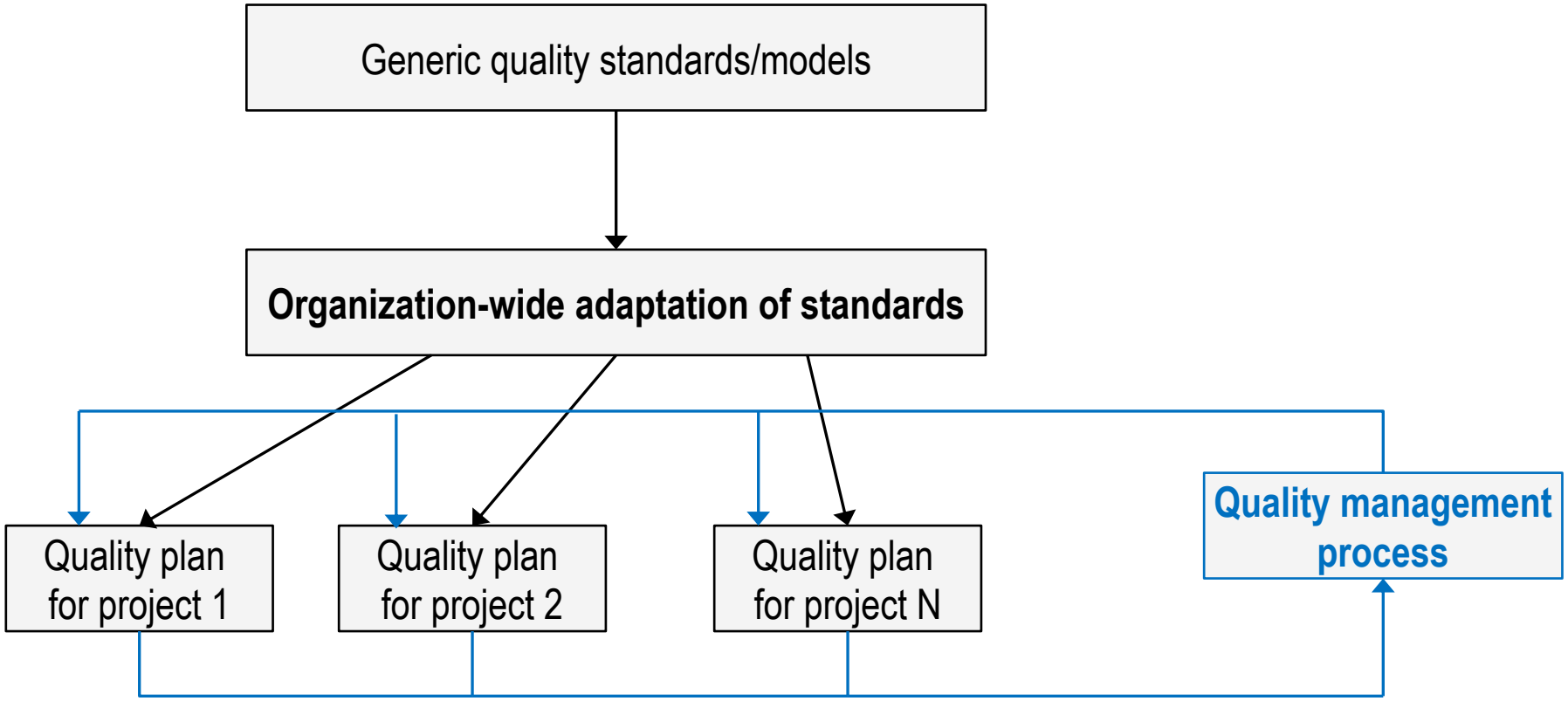
In every software development project

- Select which ones to apply
- Create guidelines about how to apply the selected quality standards

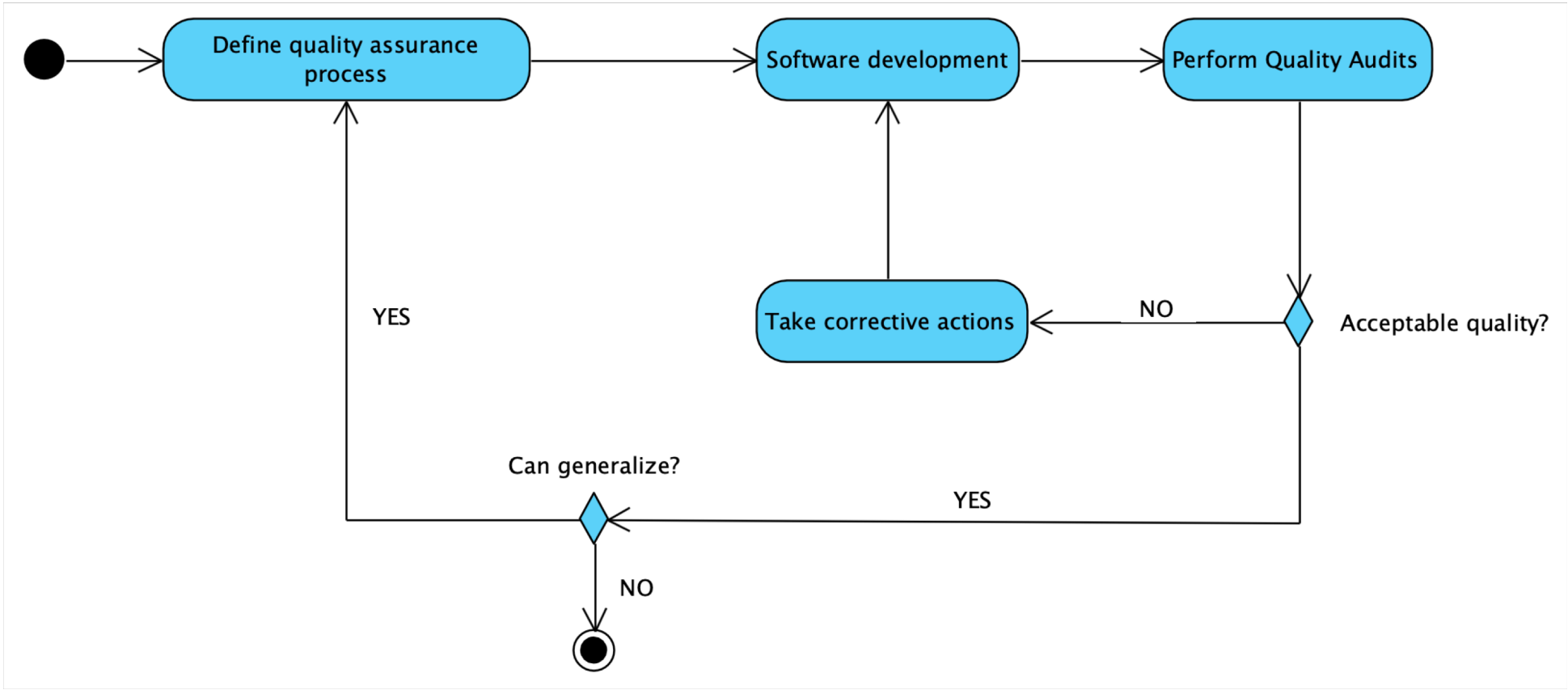
Run quality audits

Collect feedback and improve practices

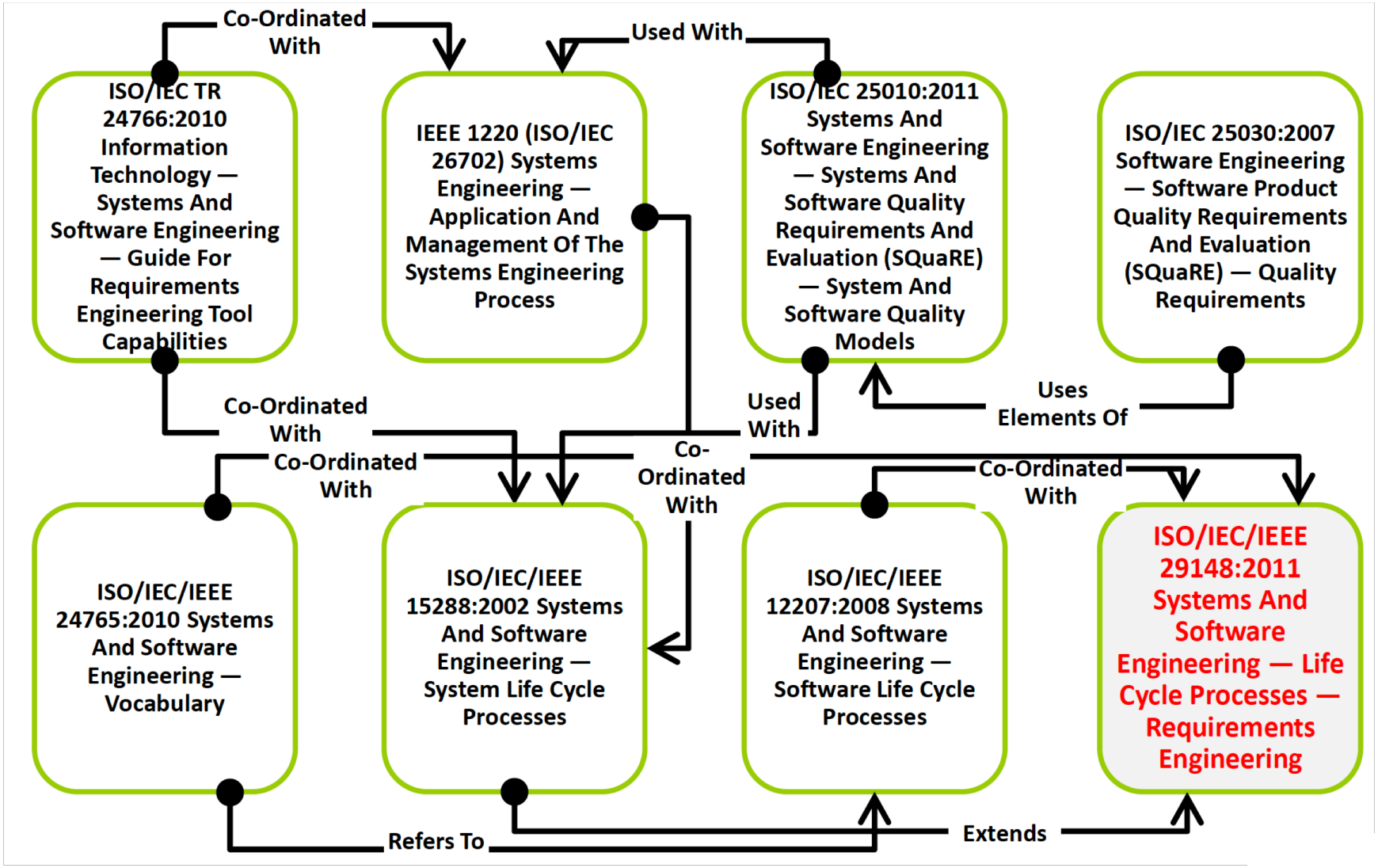
Software quality assurance from an “ISO 9000” viewpoint



Software quality assurance is an ongoing process



Software quality assurance is based on standards



Credit: Alan McSweeney, The Myth of Requirements

ISO/IEC/IEEE 29148:2011

Introduction

This International Standard provides a unified treatment of the processes and products involved in engineering requirements throughout the life cycle of systems and software. This International Standard is the result of harmonization of the following sources:

ISO/IEC 12207:2008 (IEEE Std 12207-2008), *Systems and software engineering — Software life cycle processes*

ISO/IEC 15288:2008 (IEEE Std 15288-2008), *Systems and software engineering — System life cycle processes*

ISO/IEC/IEEE 15289:2011, *Systems and software engineering — Content of life-cycle information products (documentation)*

ISO/IEC TR 19759, *Software Engineering — Guide to the Software Engineering Body of Knowledge (SWEBOK)*

IEEE Std 830, *IEEE Recommended Practice for Software Requirements Specifications*

IEEE Std 1233, *IEEE Guide for Developing System Requirements Specifications*

IEEE Std 1362, *IEEE Guide for Information Technology — System Definition — Concept of Operations (ConOps) Document*

ISO/IEC TR 24748-1, *Systems and software engineering — Life cycle management — Part 1: Guide for life cycle management*

ISO/IEC/IEEE 24765, *Systems and software engineering — Vocabulary*

Software quality assurance plan – a basic layout

Introduction

- Scope, revision process, abbreviations, distribution list, reference

Project description

Project management

- Roles, team structure, scheduling, QA audits

Deliverables

- Identification and classification of project deliverables

Software quality assurance plan – a basic layout

Software documentation templates

- Requirements, design/architecture, user manual, test plan, test reports

Software development process

- Life cycle model
- Development tasks
- Requirements engineering process
- Design/architecture process
- Source code requirements

Software quality assurance plan – a basic layout

Subcontractors

- Testing and acceptance process
- Documentation requirements
- Other requirements

Internal quality audits

- Process
- Documentation

Development team update

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 Systems and Software Engineering – Life Cycle Processes – Requirements Engineering

- Proposes five key deliverables
  1. Stakeholder Requirements Specification (StRS) Document
  2. System Requirements Specification (SyRS) Document
  3. Software Requirements Specification (SRS) Document
  4. System Operational Concept (OpsCon) Document
  5. Concept of Operations (ConOps) Document
- Very detailed and comprehensive and time-consuming to produce
- Level of detail appropriate to large software product solutions
  - Not really applicable to other solutions
- Not necessarily possible to create these deliverables at the requirements gathering phase
  - Substantial design effort required to create these deliverables

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 – Stakeholder Requirements Specification (StRS) Document Scope

- Business Purpose
- Business Scope
- Business Overview
- Stakeholders
- Business Environment
- Goal And Objective
- Business Model
- Information Environment
- Business Processes
- Business Operational Policies And Rules
- Business Operational Constraints
- Business Operation Modes
- Business Operational Quality
- Business Structure
- User Requirements
- Operational Concept
  - Operational Policies And Constraints
  - Description Of The Proposed System
  - Modes Of System Operation
  - User Classes And Other Involved Personnel
  - Support Environment
- Operational Scenarios
- Project Constraints

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 – System Requirements Specification (SyRS) Document Scope

- System Purpose
- System Scope
- System Overview
  - System Context
  - System Functions
  - User Characteristics
- Functional Requirements
- Usability Requirements
- Performance Requirements
- System Interfaces
- System Operations
  - Human System Integration Requirements
  - Maintainability
  - Reliability
- System Modes And States
- Physical Characteristics
  - Physical Requirements
  - Adaptability Requirements
- Environmental Conditions
- System Security
- Information Management
- Policies And Regulations
- System Life Cycle Sustainment
- Packaging, Handling, Shipping And Transportation
- Verification
- Assumptions And Dependencies

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 – Software Requirements Specification (SRS) Document Scope

- Purpose
- Scope
- Product Perspective
  - System Interfaces
  - User Interfaces
  - Hardware Interfaces
  - Software Interfaces
  - Communications Interfaces
  - Memory Constraints
  - Operations
  - Site Adaptation Requirements
- Product Functions
- Product Functions
- Product Functions
- Assumptions And Dependencies
- Apportioning Of Requirements
- Specific Requirements
- External Interfaces
- Functions
- Usability Requirements
- Performance Requirements
- Logical Database Requirements
- Design Constraints
- Standards Compliance
- Software System Attributes
- Verification
- Supporting Information

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 – System Operational Concept (OpsCon) Document Scope

- Scope
  - Scope
  - Document Overview
  - System Overview
- Referenced Documents
- Current System Or Situation
  - Background, Objectives, And Scope
  - Operational Policies And Constraints
  - Description Of The Current System Or Situation
  - Modes Of Operation For The Current System Or Situation
  - User Classes And Other Involved Personnel
    - Organisational Structure
    - Profiles Of User Classes
    - Interactions Among User Classes
    - Other Involved Personnel
  - Support Environment
- Justification For And Nature Of Changes
  - Justification For Changes
  - Description Of Desired Changes
  - Priorities Among Changes
  - Changes Considered But Not Included
  - Assumptions And Constraints
- Concepts For The Proposed System
  - Background, Objectives, And Scope
  - Operational Policies And Constraints
  - Description Of The Proposed System
  - Modes Of Operation
  - User Classes And Other Involved Personnel
    - Organisational Structure
    - Profiles Of User Classes
    - Interactions Among User Classes
    - Other Involved Personnel
  - Support Environment
- Operational Scenarios
- Summary Of Impacts
  - Operational Impacts
  - Organisational Impacts
  - Impacts During Development
- Analysis Of The Proposed System
  - Benefits
  - Disadvantages And Limitations
  - Alternatives Considered

ISO/IEC/IEEE 29148:2011

ISO/IEC/IEEE 29148:2011 – Concept of Operations (ConOps) Document Scope

- Purpose
- Scope
- Strategic Plan
- Effectiveness
- Overall Operation
  - Context
  - Systems
  - Organisational Unit
- Governance
  - Governance Policies
  - Organisation
  - Investment Plan
  - Information Asset Management
  - Security
  - Business Continuity Plan
  - Compliance