SEN319 Software Project Management (Fall 2023)

Software Development Activities

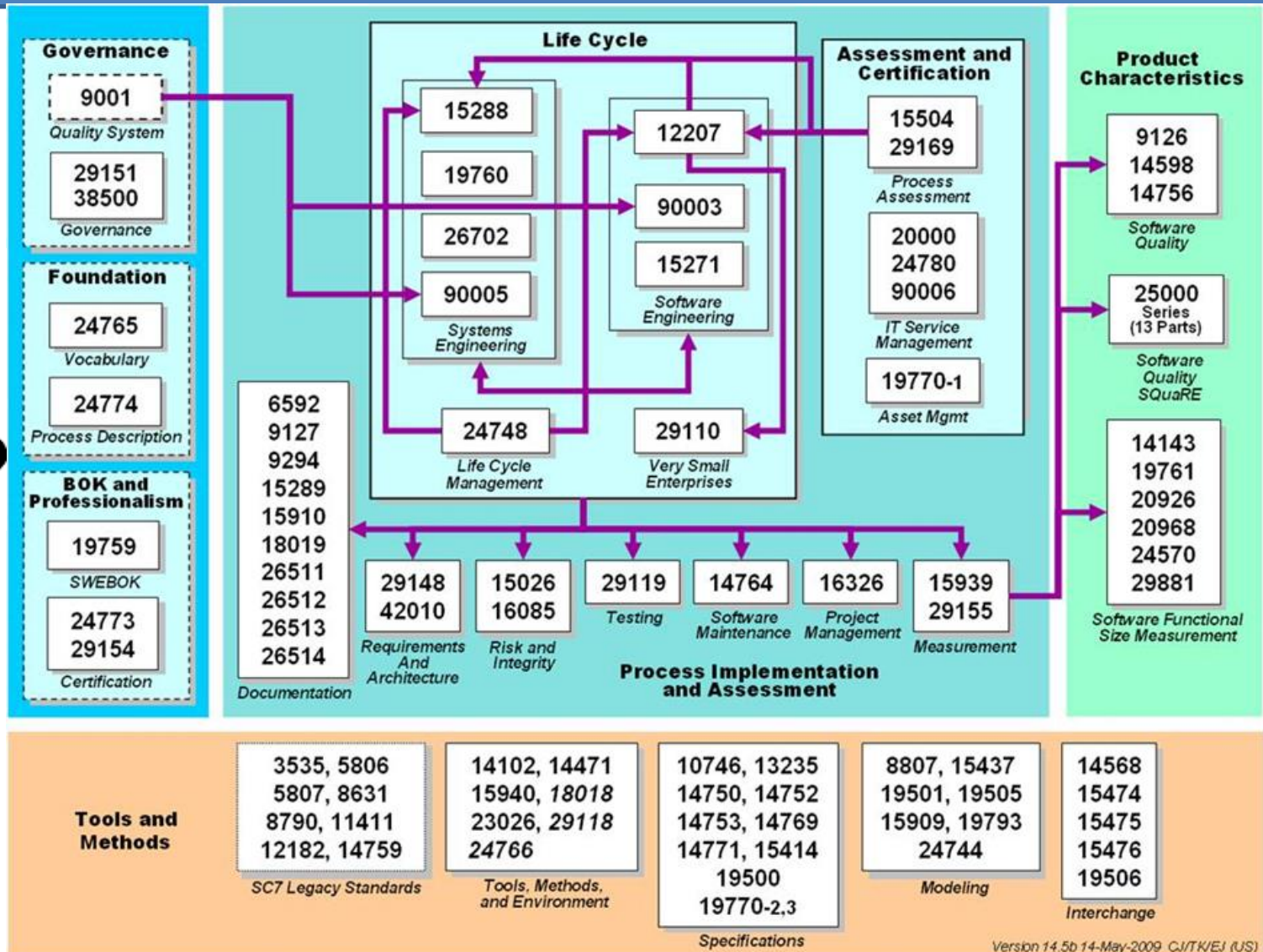## Asst.Prof.Dr. Hasan ÇİFCİ

Agenda

- **Software Engineering Standards**
- **ISO/IEC/IEEE 12207 Software life cycle processes**
- **Essential Steps in Software Development Process**
- **Planning**
- **Stakeholder Needs and Requirements Definition**
- **System/Software Requirements Definition**
- **Design**
- **Implementation**
- **Integration**
- **Verification**
- **Validation**
- **Operation**
- **Maintenance**

Software Engineering Standards

ISO/IEC/IEEE 12207 Systems and software engineering - Software life cycle processes

- It is an international standard for software lifecycle processes. It aims to be a primary standard that defines all the processes required for developing and maintaining software systems, including the outcomes and/or activities of each process.

- It applies to the acquisition of systems and software products and services, to the supply, development, operation, maintenance, and disposal of software products and the software portion of a system, whether performed internally or externally to an organization.

Essential Steps in Software Development Process

The main steps that are involved in SDLC

Planning	Planning	Sw. Requirements Definition	Sw. Specification
Analysis	Analysis of Requirements	Business Modeling	Sw. Development
Design	Sw. Design and Prototype	Design and Implementation	Sw. Validation
Implementation	Testing	Verification and Validation	Sw. Evolution
Deployment	Deployment	Deployment	
Maintenance	Maintenance	Operations and Maintenance	

1. **Planning**
2. **Stakeholder Needs and Requirements Definition**
3. **System/Software Requirements Definition**
4. **Design**
5. **Implementation**
6. **Integration**
7. **Verification**
8. **Validation**
9. **Operation**
10. **Maintenance**

Planning

- **The purpose of the Project Planning process is to produce and coordinate effective and workable plans.**

- **This process determines the scope of the project management and technical activities, identifies process outputs, tasks and deliverables, establishes schedules for task conduct, including achievement criteria, and required resources to accomplish tasks.**

- **This is an ongoing process that continues throughout a project, with regular revisions to plans.**

Stakeholder Needs and Requirements Definition

- **To define the stakeholder requirements for a system that can provide the capabilities needed by users and other stakeholders in a defined environment.**

- It identifies stakeholders, or stakeholder classes, involved with the system throughout its life cycle, and their needs.

- It analyzes and transforms needs into a common set of stakeholder requirements that express the intended interaction the system will have with its operational environment and that are the reference against which each resulting operational capability is validated.

Stakeholder Needs and Requirements Definition

Need vs Requirement

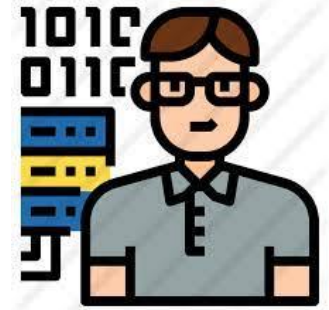| Need	Requirement
Something that is important to users.	Statement which translates or expresses a need and its associated constraints and conditions. (ISO/IEC 29148)
To show my board that our fundraising income has increased	Send board members a quarterly report that include the total amount of gifts received this quarter compared to the same quarter last year.
To track my communications with major gift prospects	Track planned touches with major donors, noting the anticipated people involved, subject, and date of each touch. As the touches are completed, update the date of completion and include notes from your interaction with the donor.
To send emails to my organization's contacts	Group contacts into email lists based on interests. Send mass emails to a list, personalizing the emails with each contact's name. Report on the open rate and click-through rate of each email.

System/Software Requirements Definition

- **The purpose of the System/Software Requirements Definition process is to transform the stakeholder, user oriented view of desired capabilities into a technical view of a solution that meets the operational needs of the user.**

- **This process creates a set of measurable system requirements that specify, from the supplier's perspective, what characteristics, attributes, and functional and performance requirements the system is to possess, in order to satisfy stakeholder requirements. As far as constraints permit, the requirements should not imply any specific implementation.**

Scientist vs Engineer

- **Computer Scientist**
  - **- Proves theorems about algorithms, designs languages, defines knowledge representation schemes.**
  - **- Has infinite time…**

- **Engineer**
  - **- Develops a solution for an application-specific problem for a client.**
  - **- Uses computers & languages, tools, techniques and methods.**

- **Software Engineer**
  - **- Works in multiple application domains.**
  - **- Has only 3 months...**
  - **- …while changes occurs in requirements and available technology.**

Design

- **The purpose of the Design process is to provide sufficient detailed data and information about the system and its elements to enable the implementation consistent with architectural entities as defined in models and views of the system architecture.**

Implementation

- **The purpose of the Implementation process is to realize a specified system element.**

- **This process transforms requirements, architecture, and design, including interfaces, into actions that create a system element according to the practices of the selected implementation technology, using appropriate technical specialties or disciplines.**

- **This process results in a system element that satisfies specified system requirements (including allocated and derived requirements), architecture, and design.**

Integration

- **The purpose of the Integration process is to synthesize a set of system elements into a realized system (product or service) that satisfies system/software requirements, architecture, and design.**

- **This process assembles the implemented system elements.**

- **Interfaces are identified and activated to enable interoperation of the system elements as intended.**

- **This process integrates the enabling systems with the system of interest to facilitate interoperation.**

Verification

- **The purpose of the Verification process is to provide objective evidence that a system or system element fulfils its specified requirements and characteristics.**

- **Verification process identifies the anomalies (errors, defects, or faults) in any information item (e.g., system/software requirements or architecture description), implemented system elements, or life cycle processes using appropriate methods, techniques, standards or rules.**

- **This process provides the necessary information to determine resolution of identified anomalies.**

Validation

- **The purpose of the Validation process is to provide objective evidence that the system, when in use, fulfils its business or mission objectives and stakeholder requirements, achieving its intended use in its intended operational environment.**

- **The objective of validating a system or system element is to acquire confidence in its ability to achieve its intended mission, or use, under specific operational conditions.**

- **Validation is ratified by stakeholders.**

- **This process provides the necessary information so that identified anomalies can be resolved by the appropriate technical process where the anomaly was created.**

Operation

- **The purpose of the Operation process is to use the system to deliver its services.**

- **This process establishes requirements for and assigns personnel to operate the system, and monitors the services and operator-system performance.**

- **In order to sustain services, it identifies and analyzes operational anomalies in relation to agreements, stakeholder requirements and organizational constraints.**

Maintenance

- **The purpose of the Maintenance process is to sustain the capability of the system to provide a service.**

- **This process monitors the system's capability to deliver services, records incidents for analysis, takes corrective, adaptive, perfective and preventive actions and confirms restored capability.**

Thank you…

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