

# Requirement Validation and Management

Unit 9

Requirement Engineering

# 9.0 Introduction

- Requirements validation is a task that aims for identifying and resolving system problems and high risk issues at the beginning of a development.
- It can also be translated as a system engineering process using certain methodologies for evaluating the correctness and quality of a product through System Development Life Cycle (SDLC).
- Validation in the context of requirements validation can be defined as the determination of the correctness of the final program or product produced from a project parallel with the user's needs and requirements.

## 9.1 Requirement Review

- A requirements review is a manual process that involves people from both client and contractor organisations.
- It is used to check the requirements document for anomalies and omissions.

- Requirements reviews can be informal or formal.
- Informal reviews simply involve contractors discussing requirements with as many system stakeholders as possible.
- Many problems can be detected simply by talking about the system to stakeholders before making a commitment to a formal review.



- In a formal requirements review, the development team should 'walk' the client through the system requirements explaining the implications of each requirement.
- The review team should check each requirement for consistency and should check the requirements as a whole for completeness.



- In a formal review, reviewers may also want to look for:



**Verifiability:**

Are the requirements stated in document realistically testable in working environment?



**Traceability:**

Are the sources of the requirements clearly stated?



**Adaptability:**

Are the requirements adaptable in the sense of they can be changed without having large effects on other requirements?



**Comprehensibility:**

Do the end users of the system really understand the requirements?

## 9.1.1 Review Checklists

- Checklists can be used to specify levels of review inspection activities. This inspection is carried out by an individual who is familiar with the code behind the system.
- Each statement is to be analyzed and determine which line should be corrected or improved.
- Requirements review checklists is just a general guidelines that are concerned with the quality attributes of the requirements documents and the relationships between requirements— which is elicitation, analysis and negotiation, and requirements validation.

*General quality attributes of requirements*

- 1) Completeness
- 2) Consistent
- 3) Traceable
- 4) Unambiguous
- 5) Verifiable
- 6) Understandability



# 1) Completeness

Properties that can be determined for completeness includes: descriptions of all requirements, definition of the response to all reasonable situations, labelling and references Of related figures.

It is up to the requirements analysis to determine which documents is important for completeness of requirements.

## 2) Consistent

If there is a conflict between requirements then the requirements does not meet the consistent checklists.

Consistency also should be check between individual requirements and overall system requirements.

## 3) Traceable

A system requirement is traceable if both the original and the references of the requirements are available.

Traceable of references are used to help the modifications of future requirements documentation.

#### 4) Unambiguous

Each requirement can have only one interpretation. If there is more than one interpretation, it should be a note describing the context of the term.

#### 5) Verifiable

A system requirements specification is verifiable if all or most of the requirements contained within the specification is capable of being tested by observation.

A requirement is verifiable if there is a measurement method by which a person can check the system meets the requirements.

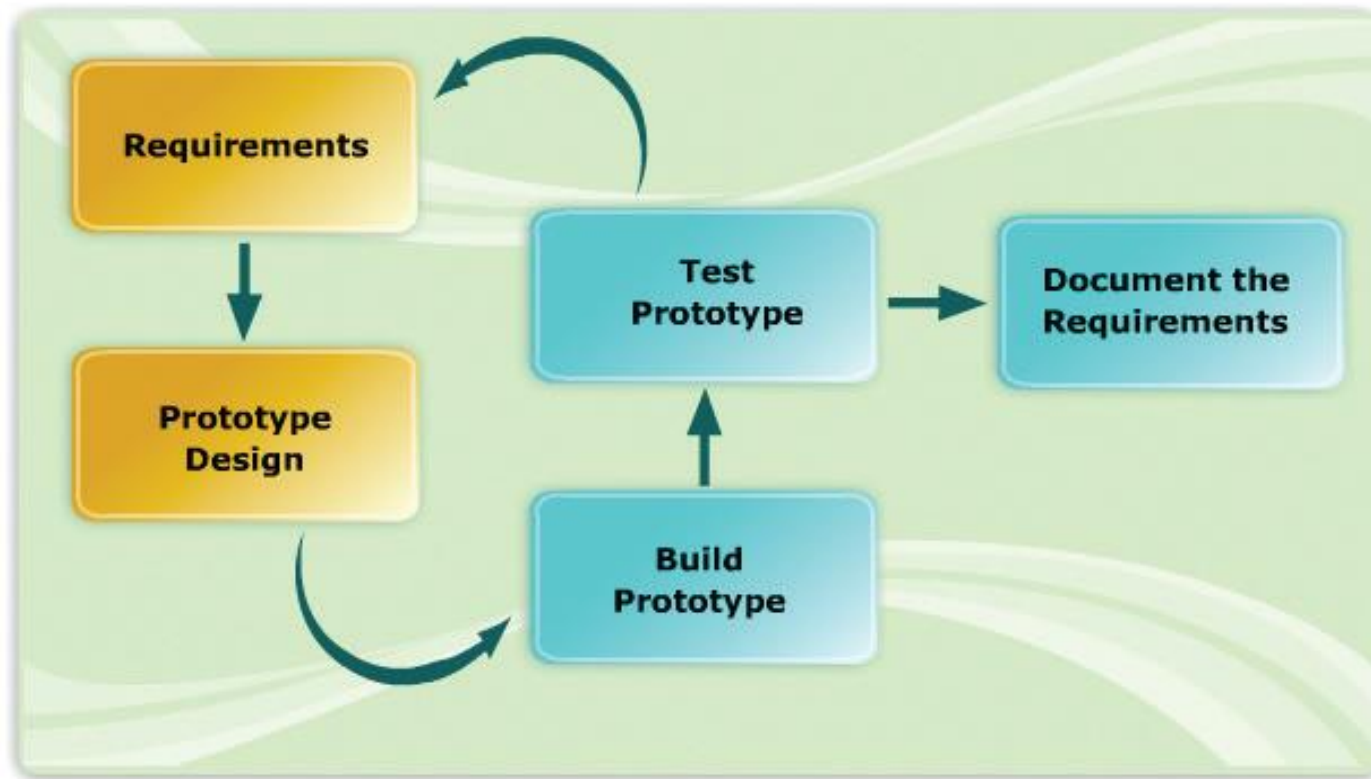
## 6) Understandability

If a reader of the document can read and understand the requirements, that means the documentation prepared is by all mean can be validate.

## 9.2 Requirement Prototyping

- Prototyping is to help end user and the stakeholders to understand better about the requirements used in the functional prototype. This will enable them to discover problems and suggest how they can improve the requirements.
- Prototypes developed for the validation process must be sufficient in number of facilities implemented so that end-user can make practical use of the system.
- If a prototype has been developed during requirements elicitation, it is much easier to include the important components for daily organisation task.

- Using Prototype to Refine Requirements



- The requirements validation is used to prototype design and build the mini version of the system.
- Then, end user will test the prototype system to have a feel about the system and look for any missing requirements.
- After that, any solution to the problems will be added to the requirements and again a prototype will be designed, built and test based on the new requirements input.

- Other areas that should be considered are:



#### Choose tester

It is best to choose the right people as prototype tester so that any outcome will reflect the system in final stages. If possible, any end-users who do different task should be involved so that system functionality will be covered as a whole.

scenario	It should not be readable with no authentication		
check	request page	\$IT	401

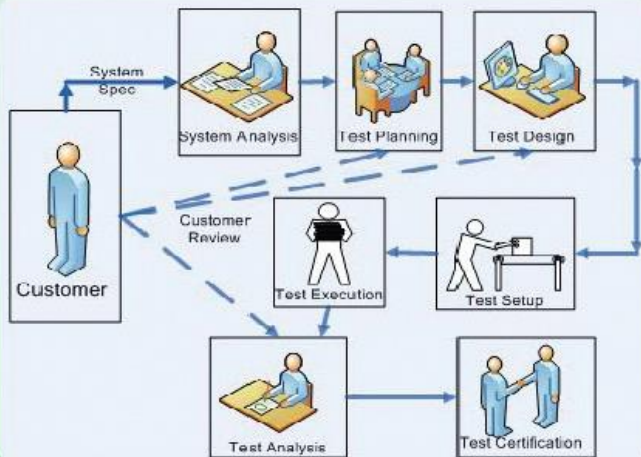
scenario	It should be readable by user user password password		
check	request page	\$IT	authenticated by user @user and password @password 200

scenario	it should not be readable by user user password password		
check	request page	\$IT	authenticated by user @user and password @password 401

scenario	given read locked page	page
create page	@page	with authentication secure-read=true
\$IT=	echo	@page

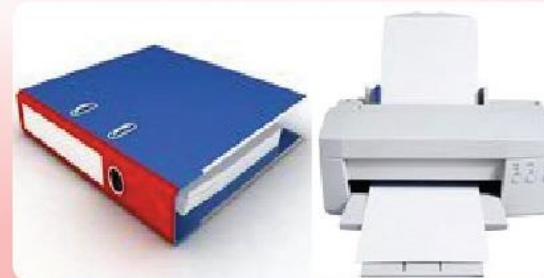
#### Executing scenarios

Users should be testing the scenarios in a confined area so that they can concentrate on using the prototype system and not be disturbed by their work. This practice enables the users to discover particular problems with the system.



#### Develop test scenarios

It is critically important that prototype system is tested in a systematic way. Careful planning should be set up so that test scenarios covered the requirements.



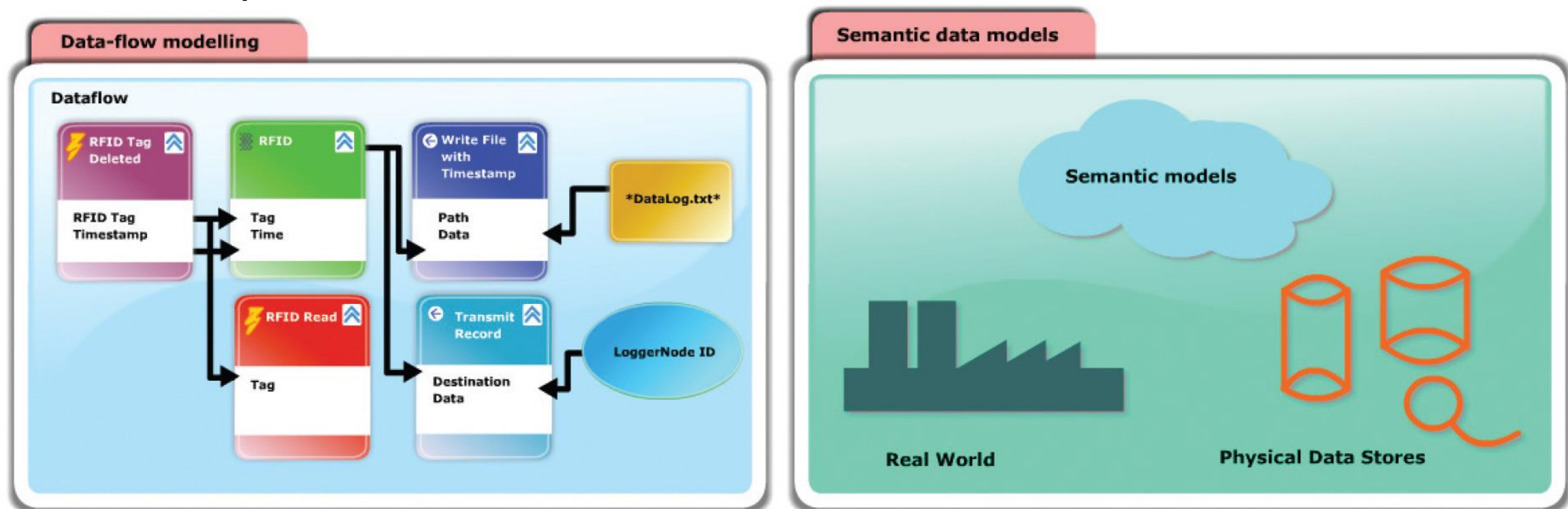
#### Documenting problems

Every problem that the user encountered should be documented in paper or electronic report form. Any suggestion by the user is also welcomed to improve requirements.

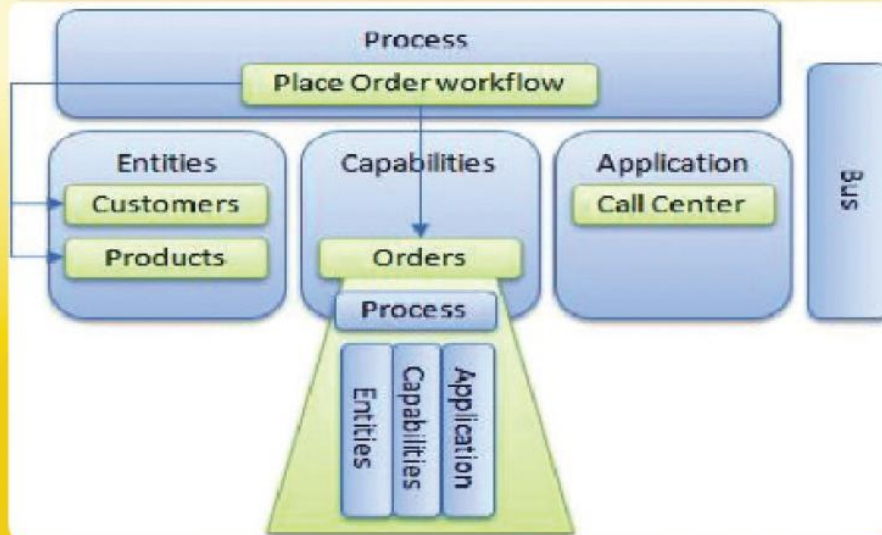


## 9.3 Model Validation

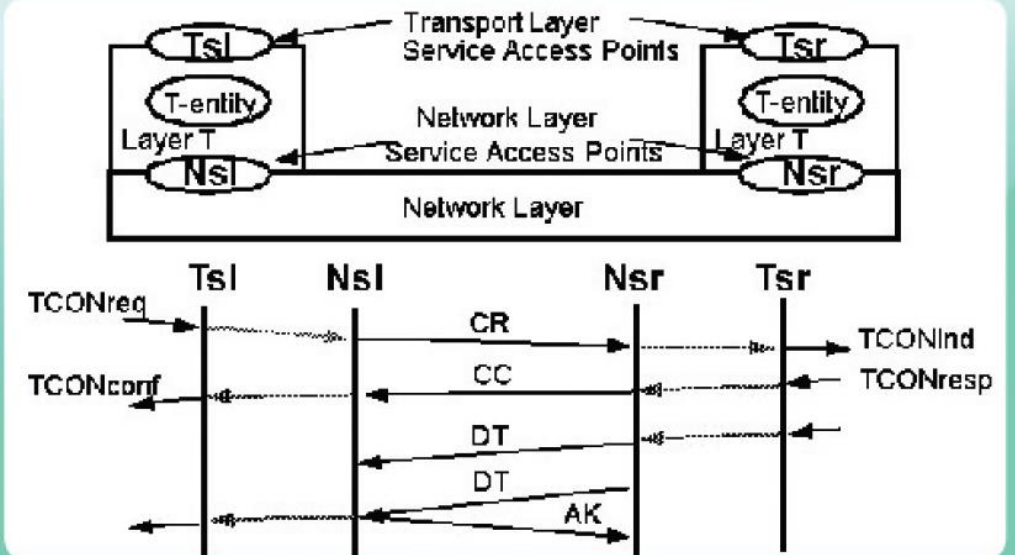
- One or more system models may be used in the process of requirements specification activities. System models that are commonly available include:



## Object oriented approach



## Formal methods

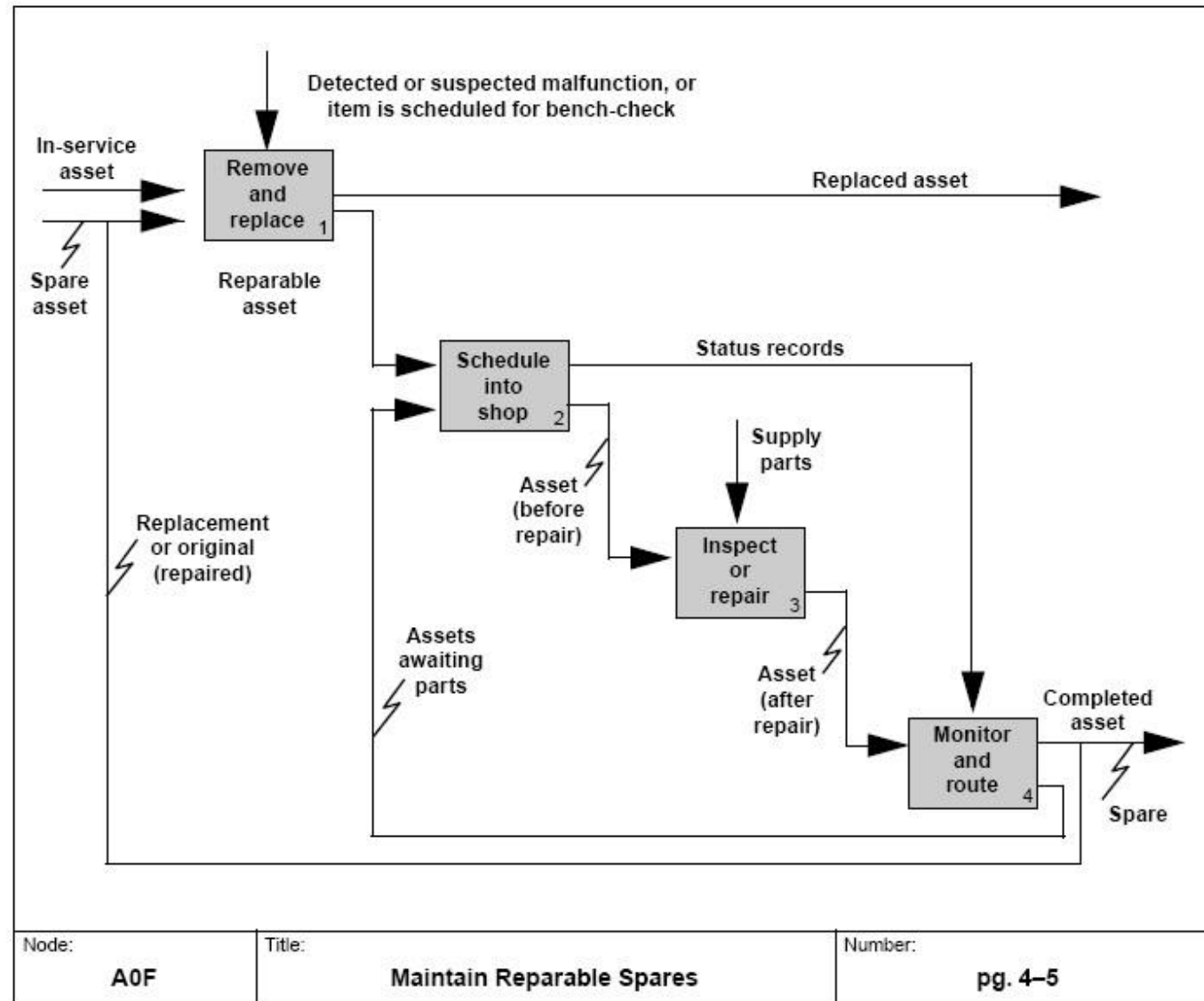


## 9.3.1 Types of System Model

1. Functional modeling
2. Systems architecture
3. Business process modeling
4. Enterprise modeling

# 1. Functional modeling

- In systems engineering, a function model or functional model is a structured representation of the functions (activities, actions, processes, operations) within the modeled system or subject area.
- A function model, similar with the activity model or process model, is a graphical representation of an enterprise's function within a defined scope.
- The purposes of the function model are to describe the functions and processes, assist with discovery of information needs, help identify opportunities, and establish a basis for determining product and service costs.

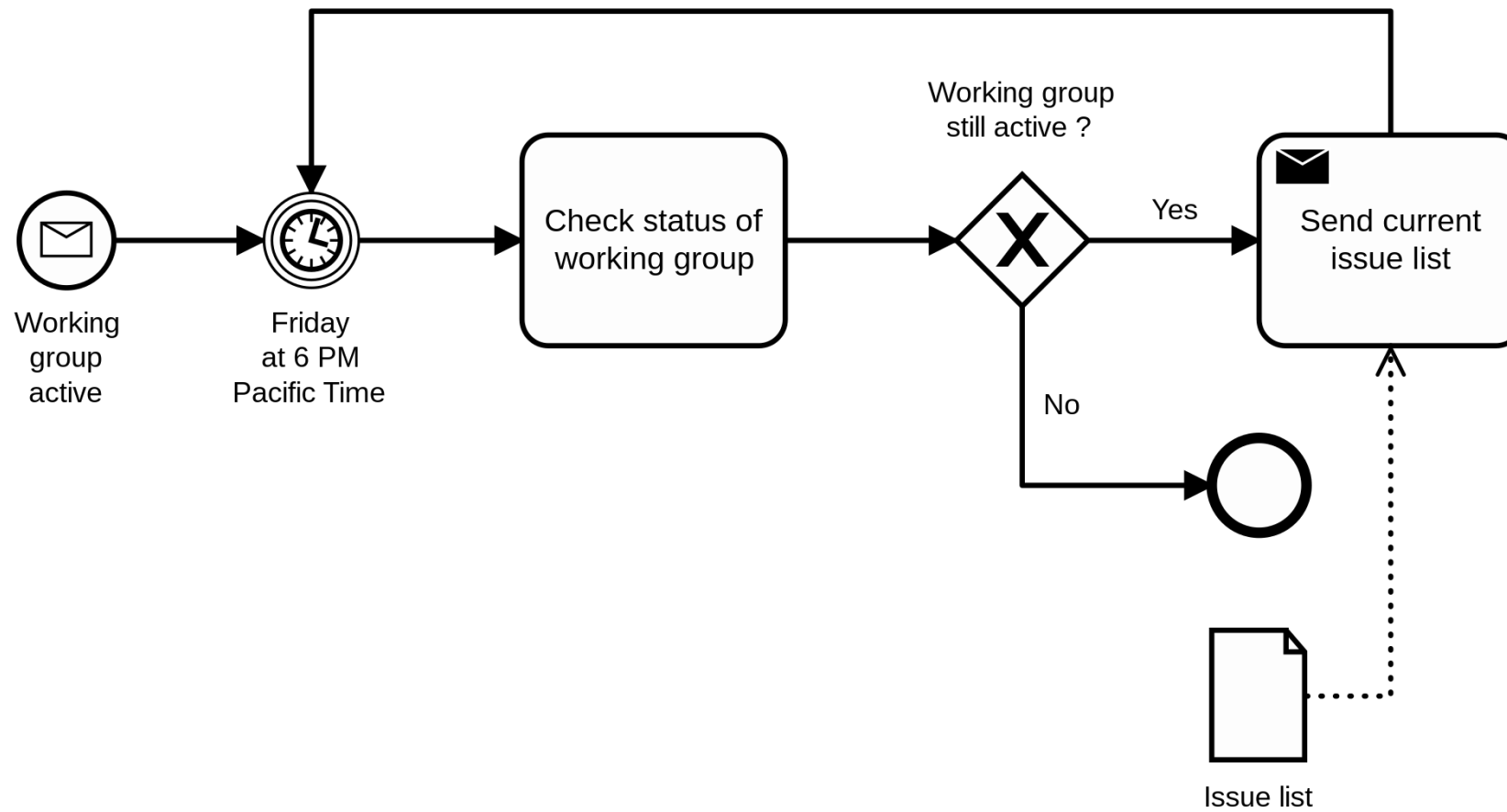


## 2. Systems architecture

- A system architecture is the conceptual model that defines the structure, behavior, and more views of a system.
- An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.
- A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system.

### 3. Business process modelling

- Business process modeling (BPM) in business process management and systems engineering is the activity of representing processes of an enterprise, so that the current business processes may be analyzed, improved, and automated.
- BPM is typically performed by business analysts, who provide expertise in the modeling discipline; by subject matter experts, who have specialized knowledge of the processes being modeled; or more commonly by a team comprising both.

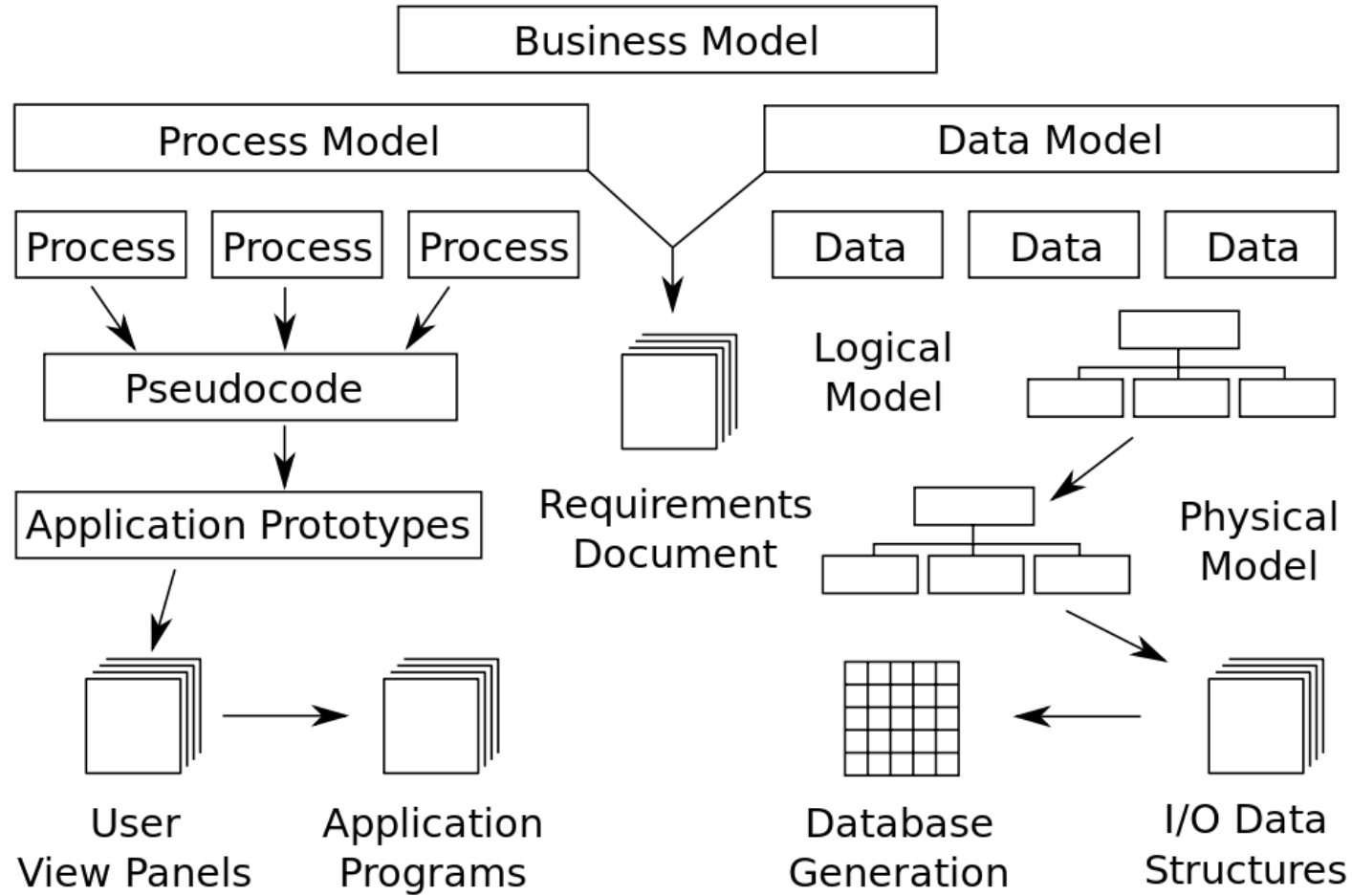




## 4. Enterprise modeling

- Enterprise modelling is the abstract representation, description and definition of the structure, processes, information and resources of an identifiable business, government body, or other large organization.
- It deals with the process of understanding an organization and improving its performance through creation and analysis of enterprise models.

## Business Model Integration



The objectives of model validation are to:

1. Demonstrate each individual components of the model is self-consistent. It should not have conflicts between different areas of the model.
2. If there are several models used, the internal and external components are consistent. In this case, references to the system that has the same entities should be defined as the same in each model.
3. Demonstrate the models accuracy can reflect real-world requirements of the stakeholders. It will be involving making arguments that the defined system in the models is what the stakeholders ask for to develop.

## 9.4 Inspections

- Inspections are a mean of confirming work-products by manually examining the product. It is carried out by a small group of peers to ensure that it is correct and conforms to the requirements and specifications of the product.

## 9.4.1 Phases of Inspection

1. Planning
2. Overview
3. Defect Detection
4. Defect Correction
5. Follow-up

# 1. Planning

- Planning phase focuses on conducting a meeting for inspection process when any work-product(s) for inspections are determined.
- Document to be reviewed is identified and agenda for the inspection is set.
- Participants are identified who will attend the inspection meeting and also the schedule is set.
- Exit and entry criteria for the inspection meeting are identified

## 2. Overview

- The overview phase is also called "Kickoff Meeting", the author(s) of the SRS read(s) the SRS being inspected loudly as the purpose of this process is to make the SRS under inspection easier.
- Setting few limitations are also linked with this phase.

### 3. Defect Detection

- The essence of the inspection process is detecting defects.
- It is performed to identify the defects in the SRS.
- Every participant inspects the SRS and identifies/detect defects in it or a group meeting where more than one inspectors identify defects in the SRS.



## 4. Defect Correction

- The identified defects in SRS at the defect detection stage are then rectified in this phase and this is done by the author of the software requirements specification (SRS).
- The author of SRS is responsible for the removal of all the issues detected in SRS in inspection meeting.
- The purpose of this phase is to ensure that the identified requirement defects have been eliminated from the (SRS).

## 5. Follow-up

- The goal of the follow-up process is to make sure that author(s) of the SRS have rectified all the stated incomplete or/and inconsistent requirements or the detected defects.
- If a significant amount i.e. 10% or more, of SRS, is modified, then further inspection might be conducted.

End of Unit 9