Requirement Engineering

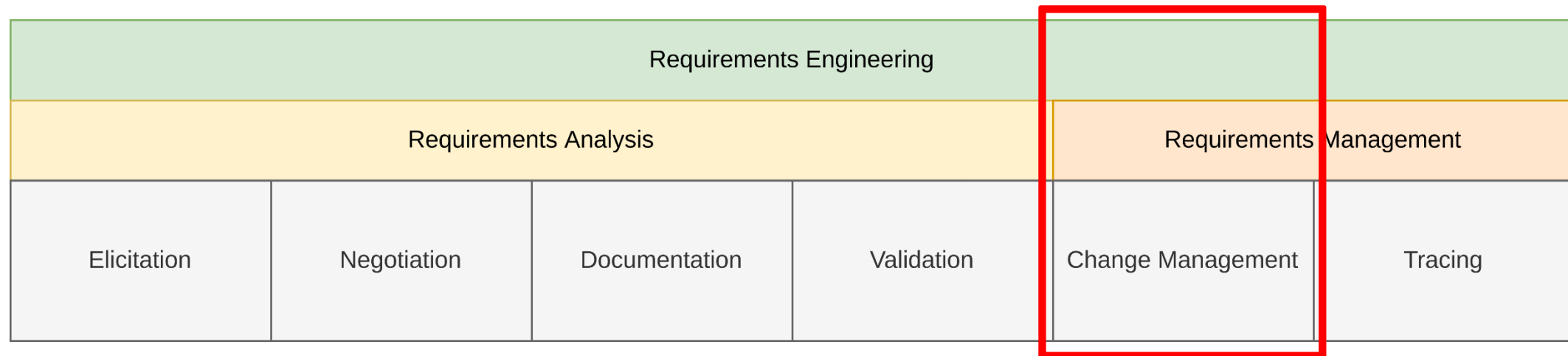## Lecture 12: Requirements Management

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Course Evaluation – QR Code and Link

- Link: [Click Me](#)

General Requirements Engineering Process

Overview

Requirements Engineering					
Requirements Analysis				Requirements Management	
Elicitation	Negotiation	Documentation	Validation	Change Management	Tracing

Lecture 12: Requirements Management

Content

1. Manage Requirements
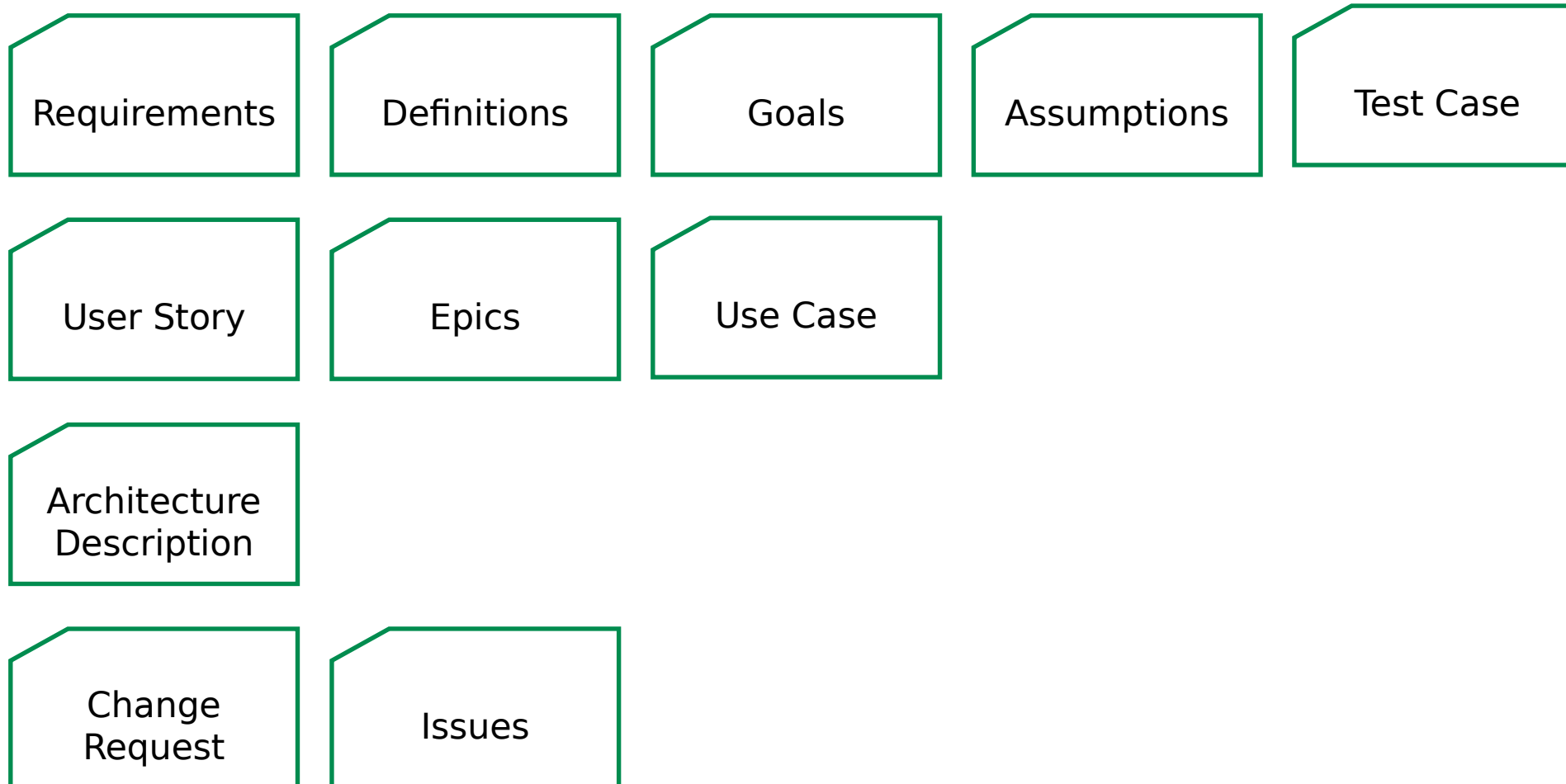2. Change Management

MANAGE REQUIREMENTS

Manage Requirements

Motivation – Why do you need to manage requirements?

- Number/scope of requirements and further information

- Expected product lifetime

- Rate of changes to requirements and related docs

- Number of stakeholders

- Availability of stakeholders

- Heterogenous nature of stakeholder opinons

- Future reusability

- Number of expected releases

- Etc.

Manage Requirements
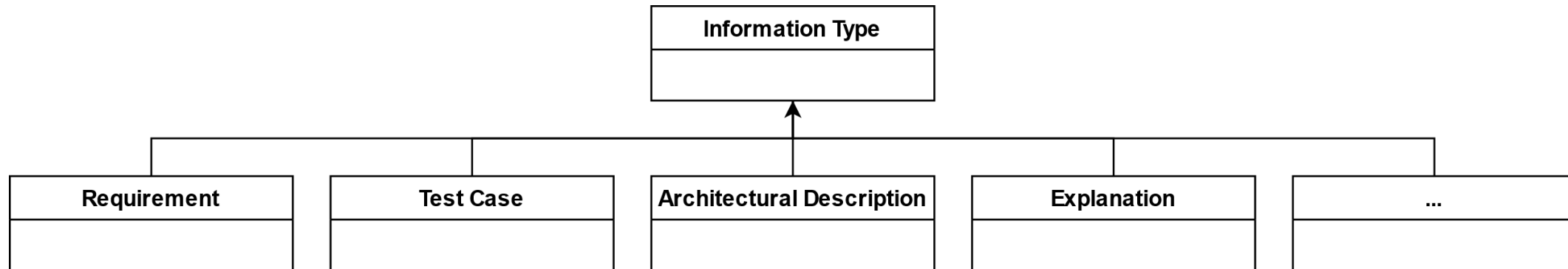
Motivation – What exactly needs to be managed?

Requirements	Definitions	Goals	Assumptions	Test Case

User Story	Epics	Use Case

Architecture Description

Change Request

Issues

Manage Requirements

Definition – Management in Requirements Engineering

> "The process of managing existing requirements and requirements related work products, including the storing, changing and tracing of requirements (traceability)."
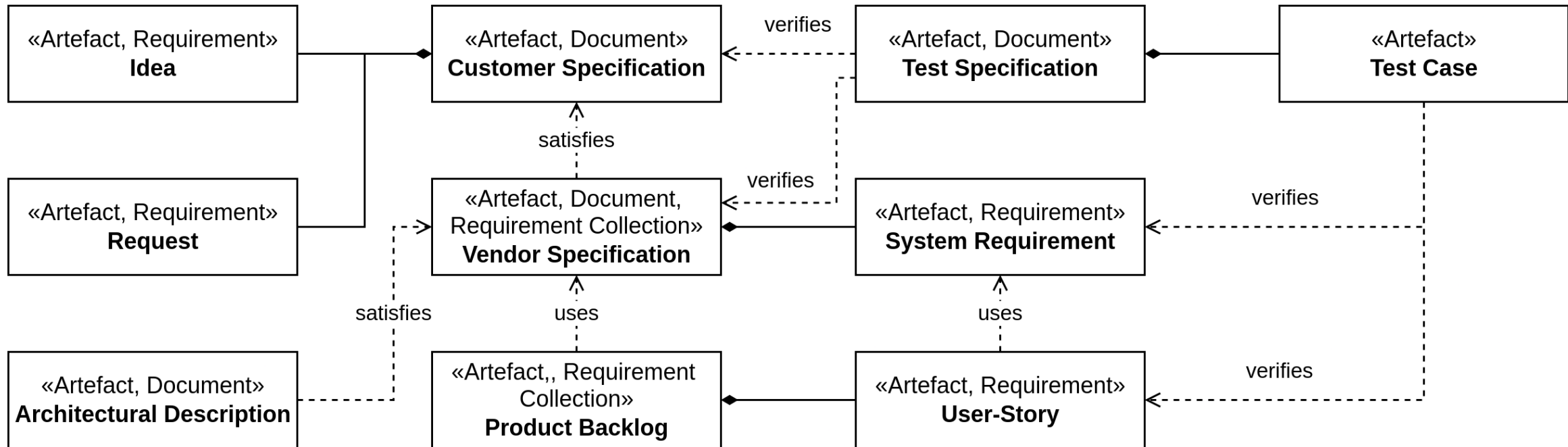
Manage Requirements

Information model - Simple

Based on Chris Rupp et al. (2021) – Requirements Engineering und Management – Das Handbuch für Anforderungen in jeder Situation (7th Edition)

Requirements Engineering – TU Clausthal

9

Manage Requirements

Information model – More complex

Based on Chris Rupp et al. (2021) – Requirements Engineering und Management – Das Handbuch für Anforderungen in jeder Situation (7th Edition)

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10

Manage Requirements

Standardized structures and templates

- Volere

- V-Modell XT

- IEEE 29148-2018

- Etc.

1. https://www.volere.org/
2. Der Beauftragte der Bundesregierung für Informationstechnik. V-Modell XT (o.J.), URL: https://cio.bund.de/Web/DE/Architekturen-und-Standards/V-Modell-XT/vmodell_xt_node.html
3. https://standards.ieee.org/ieee/29148/6937/

CHANGE MANAGEMENT

Change Management

Overview

- Various reasons for changes

  - Errors or incomplete requirements

  - Evolution of context

- Changes are not a bad thing

  - Stakeholders may gain new knowledge at later project stages

  - Proofs interest/involvement of the stakeholders

- Frequent changes are problematic

  - Makes development in agreement with all stakeholders very challenging and time-consuming

  - Indicator for bad process quality

Change Management

Overview

- Necessary to properly structure and process change requests for requirements

- Structured process → Justifiable decisions if and how requests are approved

- Changes may refer to:
  - Individual requirements, e.g., change/addition/removal of a feature
  - The requirements document itself, e.g., updating terminology

Change Management

Change Control Board

- Change control board as entity responsible for change requests
  - Evaluation
  - Decision making
- May delegate tasks to another party
  - For example, drafting of actual changes to the requirements
- Decisions have to be negotiated and agreed upon
  - Contractor
  - All involved stakeholders

Change Management

Change Control Board – Tasks

- Change effort estimation

  - Could be performed by third party

- Evaluate change requests

  - For example, effort/benefit ratio

- Define requirements change and/or new requirements

  - Based on the changed request

  - Changes should be kept to a minimum

- Decide about acceptance or rejection of change requests

Change Management

Change Control Board – Tasks

- Classify incoming changes

  - For example, based on their criticality

- Prioritize accepted change requests

  - In which order should accepted changes be implemented?

- Assign accepted change requests

  - Who is responsible for implementing the changes?

Change Management

Change Control Board – Members

- The following parties should be represented in the change control board:

  - Change manager

  - Contractor

  - Architect

  - Developer

  - Configuration manager

  - Customer representative

  - Product manager

  - Project manager

  - Quality assurance representative

  - Requirements engineer

Change Management

Change Control Board – Change Manager

- Chairperson of the change control board

- Mediates between parties in case of conflicts

- Communicates and documents changes

- Similar to the role of the requirements engineer

Change Management

Change Requests

Should contain the following information:

- Identifier
  - Unique identification of change request possible

- Title
  - Summarizes key concern of the change request

- Description
  - Documents change as precisely as possible
  - Also contains information on the expected effect of a change

- Justification
  - Reasons why the change is necessary

- Date filed
  - Date the change request was filed

- Applicant
  - Name of the person who filed the change request

- Priority
  - Importance of the change

Change Management

Change Requests

The following information is helpful for the management of changes:

- Change validator
  - Person who is responsible to verify if a change was performed correctly

- Impact analysis status
  - Flag indicating whether an impact analysis has been performed

- Change control board decision status
  - Flag indicating the handling status of the request
  - For example: pending, rejected, accepted

Change Management

Change Requests

- Change control board priority

  - Priority of the change request assigned by the change control board

- Responsible

  - Person in charge of performing the change

- System release

  - Version of the system that implements the change

Change Management
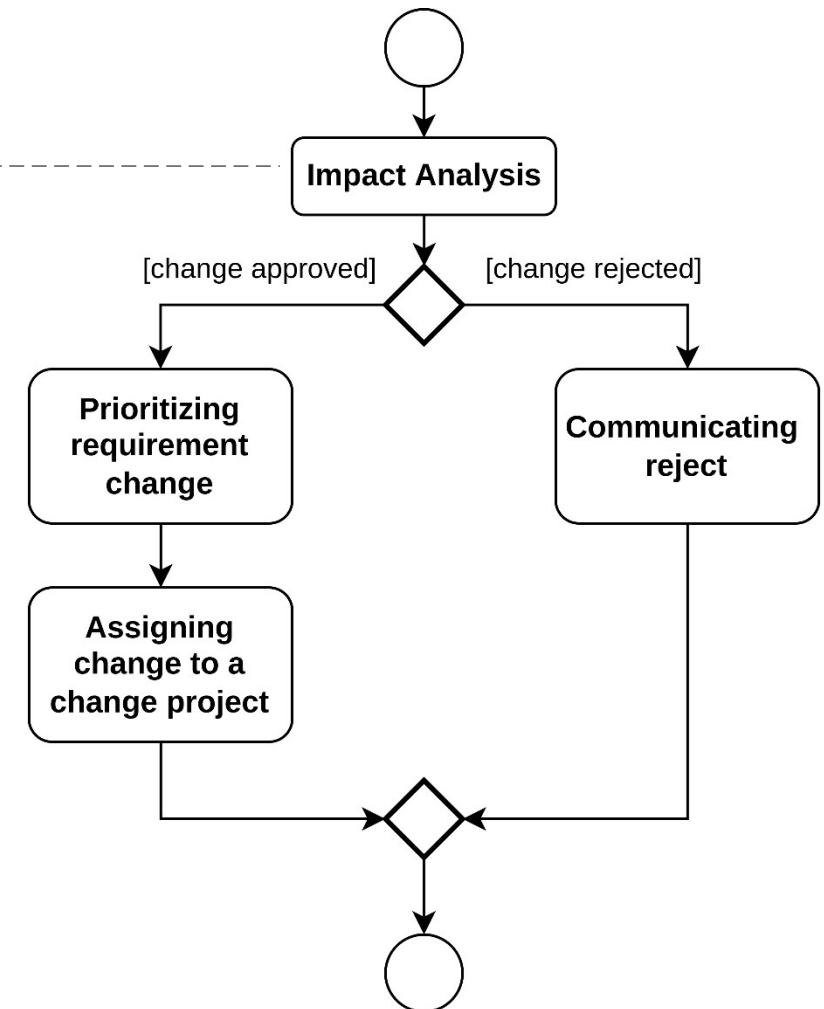
Change Requests – Classifications

Three types of change requests:

- Corrective requirement change
  - Failure in the system
  - Reason for failure is an error in the requirements
  - Change fixes the error
- Adaptive requirement change
  - System needs to be amended
  - For example, change in the system context or stakeholder needs

- Exceptional change (hotfix)
  - Must be immediately done at all costs
  - Can be either adaptive or corrective
  - Usually due to critical bugs

Change Management

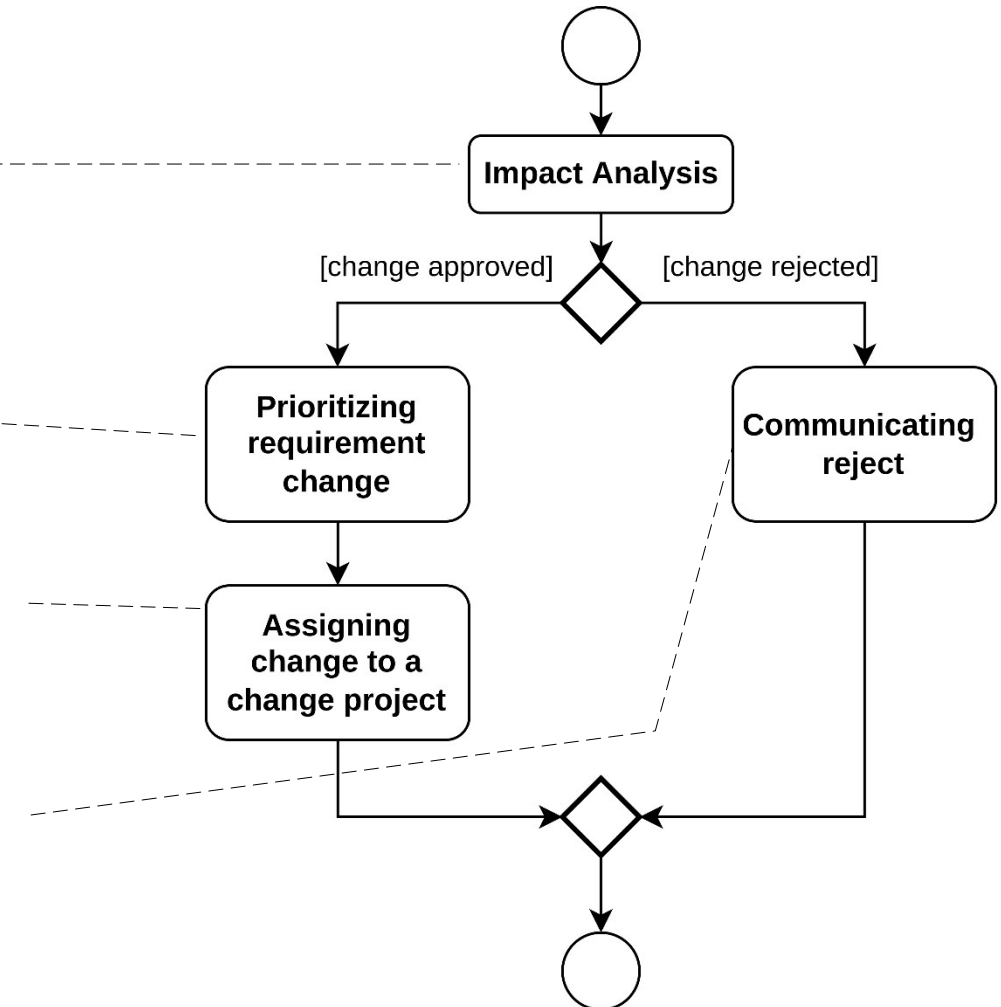## Handling Change Requests

- Effort required for the change is estimated

- Affected requirements are determined

  - Includes new requirements

- Development artifacts that need to be change are determined

- Effort for artifact change usually significantly higher than for requirement changes

  - Maintaining the requirements document is cheap

  - Still often neglected

- Can be supported by traceability information

Impact Analysis

[change approved]   [change rejected]

Prioritizing requirement change

Communicating reject

Assigning change to a change project

Change Management

Handling Change Requests

- Change evaluation
  - Costs and benefits are compared
  - Available resources are considered

- Prioritizing
  - Importance of the change

- Assigning
  - System release for implementing is decided

- Rejection
  - If a change is rejected it is communicated

Impact Analysis

[change approved] [change rejected]

Prioritizing requirement change

Communicating reject

Assigning change to a change project

SUMMARY

Summary

- Requirements of complex projects need to be managed

- Requirements can change throughout a project

- Changes need to be structured and processed

- Change management defines how change requests are handled

- Change control board = Evaluates and approves/rejects changes

- Handling change requests requires a process on its own

Questions?