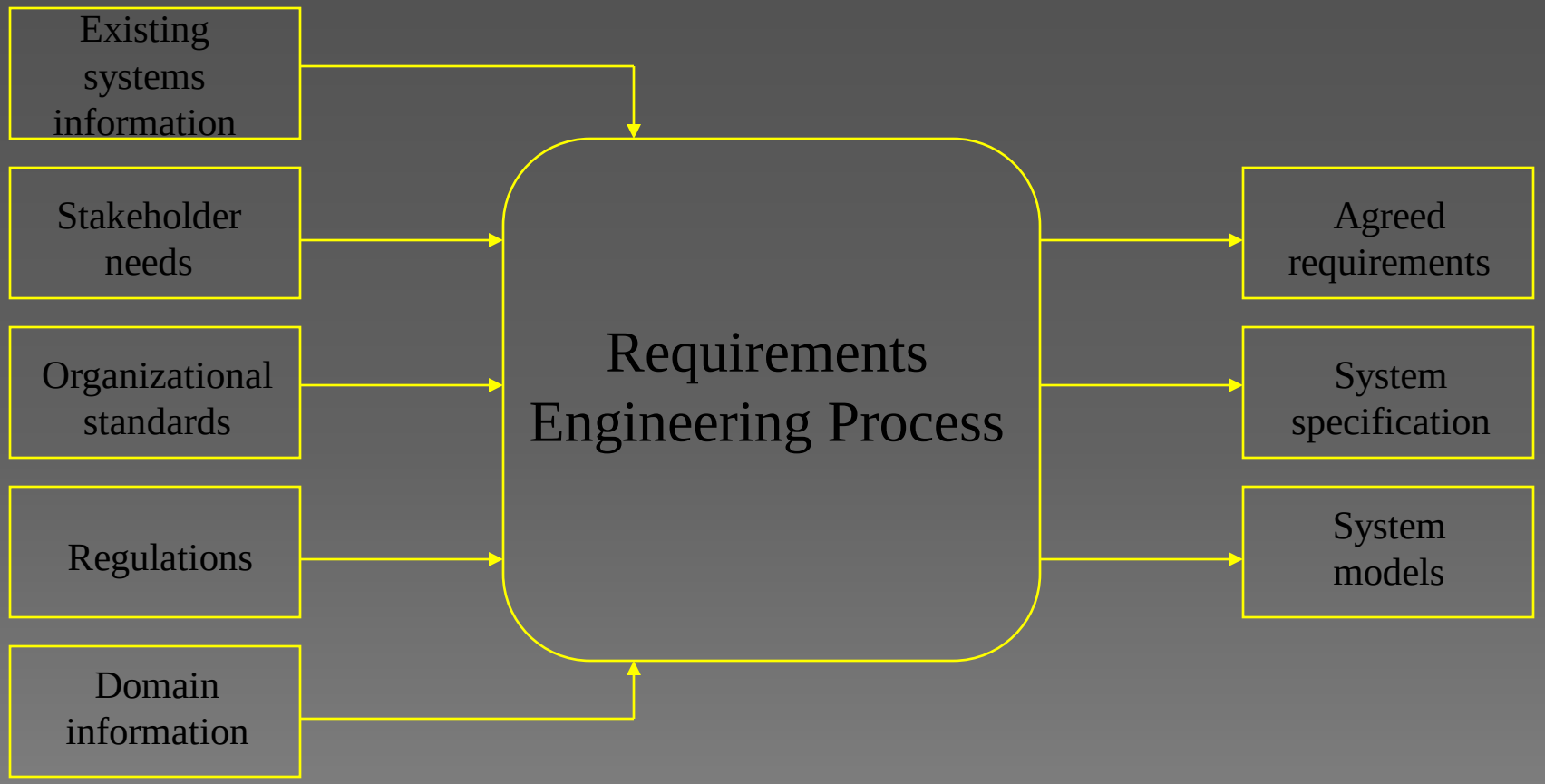
Lecture # 6

Requirements Engineering Process – 1

Requirements Engineering Process

The process(es) involved in developing system requirements is collectively known as Requirements Engineering Process

RE Process - Inputs and Outputs



RE Process – Inputs

It includes:

- Existing system information
  - Information about the functionality of systems to be replaced
  - Information about other systems, which interact with the system being specified

RE Process – Inputs

- Stakeholder needs
  - Description of what system stakeholders need from the system to support their work
- Organizational standards
  - Standards used in an organization regarding system development practice, quality management, etc.

RE Process – Inputs

- Regulations
  - External regulations such as health and safety regulations, which apply to the system
- Domain information
  - General information about the application domain of the system

RE Process – Outputs

It includes

- Agreed requirements
  - A description of the system requirements, which is understandable by stakeholders and which has been agreed by them

RE Process – Outputs

- System specification
  - This is a more detailed specification of the system, which may be produced in some cases

RE Process – Outputs

- System models
  - A set of models such as a data-flow model, an object model, a process model, etc., which describes the system from different perspectives

RE Process Variability

- RE processes vary radically from one organization to another, and even within an organization in different projects
- Unstructured process rely heavily on the experience of the people, while systematic processes are based on application of some analysis methodology , but they still require human judgment

Variability Factors - 1

There are four factors which count towards the variability of the Requirements Engineering Process

- Technical maturity
- Disciplinary involvement
- Organizational culture
- Application domain

Variability Factors - 2

- Technical maturity
  - The technologies and methods used for requirements engineering vary from one organization to other
- Disciplinary involvement
  - The types of engineering and managerial disciplines involved in requirements vary from one organization to another

Variability Factors - 3

- Organizational culture
  - The culture of an organization has important effect on all business and technical processes
- Application domain
  - Different types of application system need different types of requirements engineering process

RE Process - 1

Requirement Engineering Process has a formal starting and ending point in the overall software development life cycle.

- Begins
  - There is recognition that a problem exists and requires a solution
  - A new software idea arises
- Ends
  - With a *complete* description of the external behavior of the software to be built

RE Process - 2

- It is a continuous process in which the related activities are repeated until requirements are of acceptable quality
- It is one of the most critical processes of system development

RE Process - 3

- Based on the need of individual software projects and organizational needs, requirements engineering processes are tailored
- An important point to remember is that

"There is no ideal requirements engineering process!"

Two Main Tasks of RE

There are two main tasks which needs to be performed in the requirements engineering process.

- Problem analysis
  - Analysis of a software problem
- Product description
  - Complete specification of the desired external behavior of the software system to be built. Also known as functional description, functional requirements, or specifications

Problem Analysis - 1

Problem analysis is the first and foremost task of requirements engineering process. It includes:

- Brainstorming, interviewing, eliciting requirements
- Identifying all possible constraints
- Expansion of information

Problem Analysis - 2

- Trading off constraints and organizing information
- Complete understanding should be achieved

Product Description

Product description is another task of requirements engineering process. In this task we:

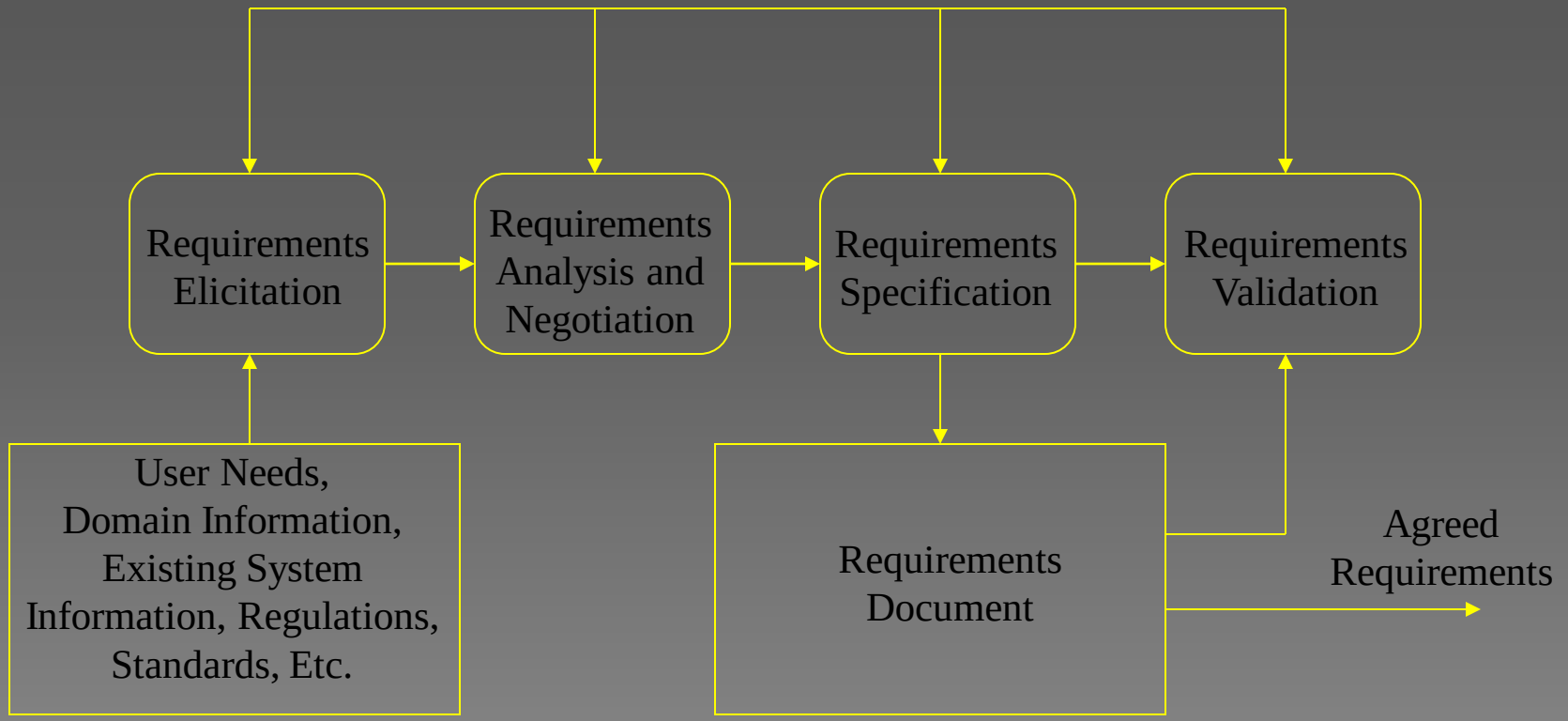
- Make decisions to define the external behavior of the software product
- Organize ideas, resolve conflicting views, and eliminate inconsistencies and ambiguities

What Really Happens

It should be kept in mind that :

"Both problem analysis and product description run in parallel and iteratively throughout the requirements engineering process"

Requirements Engineering Activities



Requirements Elicitation

Requirements elicitation activity is performed by

- Determining the system requirements through consultation with stakeholders, from system documents, domain knowledge, and market studies
- Requirements acquisition or requirements discovery

Requirements Analysis and Negotiation - 1

Requirements analysis and negotiation activity is performed by

- Understanding the relationships among various customer requirements and shaping those relationships to achieve a successful result
- Negotiations among different stakeholders and requirements engineers

Requirements Analysis and Negotiation - 2

- Incomplete and inconsistent information needs to be tackled here
- Some analysis and negotiation needs to be done on account of budgetary constraints

Requirements Specification

Requirements specification includes

- Building a tangible model of requirements using natural language and diagrams
- Building a representation of requirements that can be assessed for correctness, completeness, and consistency

Requirements Document

- Detailed descriptions of the required software system in form of requirements is captured in the requirements document
- Software designers, developers and testers are the primary users of the document

Requirements Validation

- It involves reviewing the requirements model for consistency and completeness
- This process is intended to detect problems in the requirements document, before they are used as a basis for the system development

Requirements Management

- Although, it is not shown as a separate activity in RE Process, it is performed through out the requirements engineering activities.
- Requirements management asks to identify, control and track requirements and the changes that will be made to them

Summary

- Requirements engineering is the process by which we can systematically determine the requirements for a software product
- It is one of the most critical processes of software life cycle
- If performed correctly, it sets the software project on a track which results in a successful project