Software Requirements Engineering (SE2001)

Dr. Syed Muazzam Ali Shah

HEC Approved Ph.D. Supervisor

(Assistant Professor)

Department of Software Engineering

NUCES-FAST Karachi

Contact#: (021) 111-128-128 Ext. 130

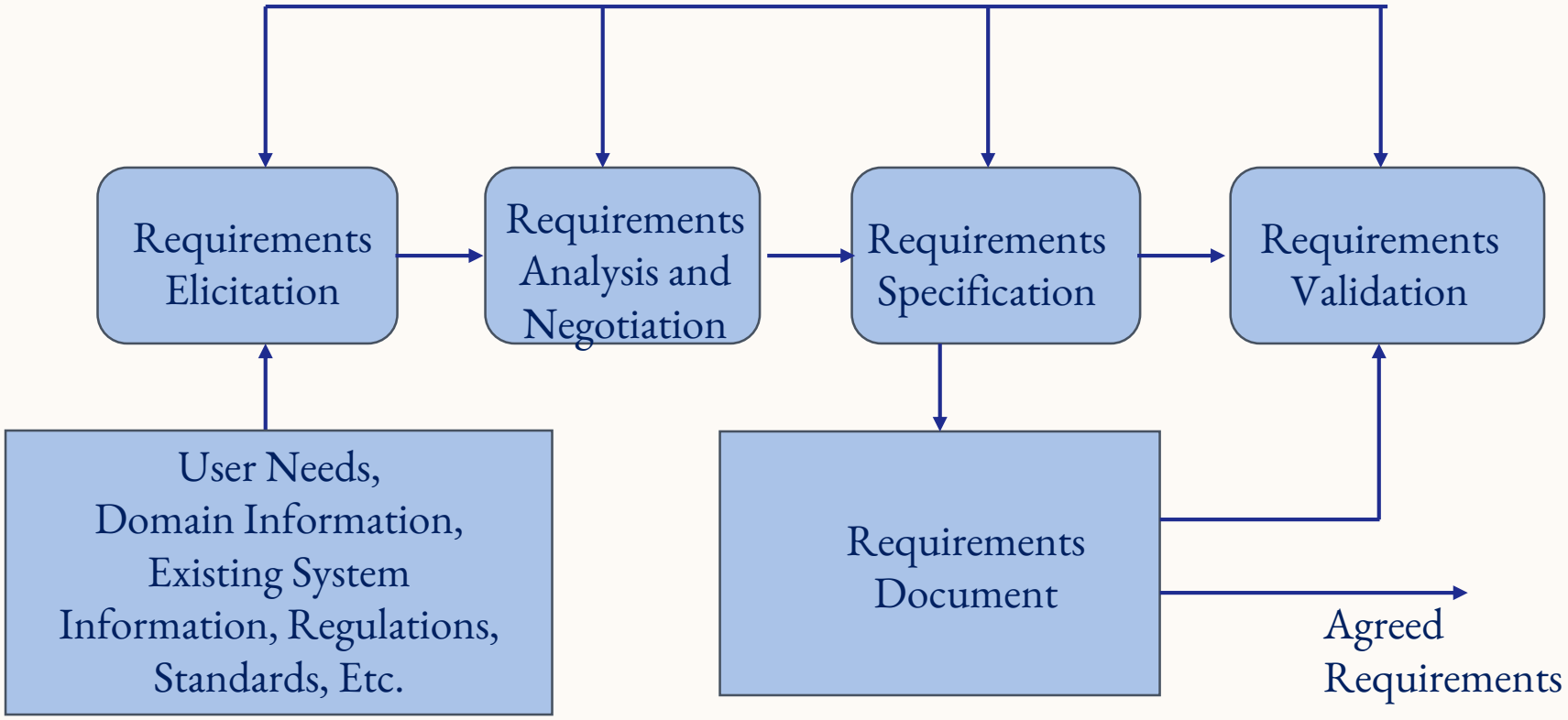
Website: sites.google.com/view/muazzam-kazmi/home

Official page: https://khi.nu.edu.pk/personnel/dr-syed-muazzam-ali-shah-2/

Google Scholar: https://scholar.google.com.tw/citations?hl=en&user=0vcfR-IAAAAJ

Requirements Managements

Requirements Engineering Process



Requirements Management

- The process of managing changes to the requirements for a system.
- In this lecture, we'll talk about the reasons for changes in requirements and how to manage them.

Requirements Management and Traceability

Requirements cannot be managed effectively without requirements traceability

- A requirement is traceable if you can discover who suggested the requirement, why the requirement exists, what requirements are related to it and how that requirement relates to other information such as systems designs, implementations and user documentation

Change - A Constant

- There is nothing permanent except change
  - Heraclitus (500 B.C.).
- No matter where you are in the system life cycle, the system will change, and the desire to change it will persist throughout the life cycle.
- Software is like a sponge due to its susceptibility to change.

Changing Requirements - 1

- All stakeholders want to change requirements, due to different reasons.
- Studies have shown that very significant percentage of delivered defects can be traced back to changing user requirements.

Changing Requirements - 2

- A major issue in requirements engineering is the rate at which requirements change once the requirements phase has “officially” ended.
- This rate is on average 3% per month in the subsequent design phase, and should go down after that.

Changing Requirements - 3

- This rate should come down to 1% per month during coding.
- Ideally, this should come down to no changes in testing, however, this is very rare.

Sources of Change - 1

- New business or market conditions dictate changes in product requirements or business rules.
- New customer needs demand modification of data produced by information systems, functionality delivered by products, or services delivered by computer-based system.

Sources of Change - 2

- Reorganization or business growth/downsizing causes changes in project priorities or software engineering team structure.
- Budgetary or scheduling constraints cause a redefinition of the system or product.

Why All This Modification?

- As time passes, all constituencies know more
  - About what they need
  - Which approach would be best
  - How to get it done and still make money
- Statement of the fact: most changes are justified!

Main Concerns in Requirements Management

- Managing changes to agreed requirements.
- Managing the relationships between requirements.
- Managing the dependencies between the requirements document and other documents produced in the systems engineering process.

CASE Tools For Requirements Management

- Requirements management involves the collection, storage and maintenance of large amounts of information.
- There are now a number of CASE tools available which are specifically designed to support requirements management.
- Configuration management tools may be adapted for requirements engineering.

Stable And Volatile Requirements - 1

- Requirements changes occur while the requirements are being elicited, analyzed and validated and after the system has gone into service.
- Some requirements are more stable, while others may be more subject to change than others.

Stable And Volatile Requirements - 2

- Stable requirements are concerned with the essence of a system and its application domain. They change more slowly than volatile requirements.
- Volatile requirements are specific to the instantiation of the system in a particular environment and for a particular customer.

Requirements Change Factors

- Requirements errors, conflicts and inconsistencies
- Evolving customer/end-user knowledge of the system
- Technical, schedule or cost problems
- Changing customer priorities
- Environmental changes
- Organizational changes

Requirements Change Factors

- **Requirements Errors, Conflicts and Inconsistencies:**
  - As requirements are analyzed and implemented, errors and inconsistencies emerge and must be corrected.
  - These may be discovered during requirements analysis and validation or later in the development process.
- **Evolving Customer/End-user Knowledge of the System:**
  - As requirements are developed, customers and end-users develop a better understanding of what they really require from a system.

Requirements Change Factors

❖ Technical, Schedule or Cost Problems:

- Problems may be encountered in implementing a requirement. It may be too expensive or take too long to implement certain requirements.

❖ Changing Customer Priorities:

- Customer priorities change during system development as a result of a changing business environment, the emergence of new competitors, staff changes, etc.

Requirements Change Factors

❖ Environmental Changes:

- The environment in which the system is to be installed may change so that the system requirements have to change to maintain compatibility.

❖ Organizational Changes:

- The organization which intends to use the system may change its structure and processes resulting in new system requirements.

Types - Volatile Requirements

- Mutable requirements
- Emergent requirements
- Consequential requirements
- Compatibility requirement

Types - Volatile Requirements

❖ Mutable requirements:

- These are requirements which change because of changes to the environment in which the system is operating.

❖ Emergent requirements:

- These are requirements which cannot be completely defined when the system is specified but which emerge as the system is designed and implemented.

Types - Volatile Requirements

❖ Consequential requirements:

- These are requirements which are based on assumptions about how the system will be used. When the system is put into use, some of these assumptions will be wrong.

❖ Compatibility requirement:

- These are requirements which depend on other equipment or processes.

THANK YOU

Dr. Syed Muazzam Ali Shah
muazzam.ali@nu.edu.pk