

# PROJECT REQUIREMENTS

## Module 6

Project requirements, analysis, functional and non-functional requirements, specifications, change control techniques, In terms of ISO-9003 standards, quality assessment, and project products qualities

Real cases of projects of Information technology and software quality engineering

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# ON PROJECT MANAGEMENT THEORY

Project management is based on three theories of management:

- ✓ **Management as planning**
- ✓ **Dispatching model**
- ✓ **Thermostat model**

These ideas were all current when project management emerged. Together they form the theoretical foundation of present management practice.

In the following, we take the crystallization of Turner (1993) (also referenced in the PMBOK® Guide) as a starting point for a reconstruction of the theory of project. According to Turner, the purpose of scope management as follows: 1) an adequate or sufficient amount of work is done; 2) unnecessary work is not done; 3) the work that is done delivers the stated business purpose.

The scope is defined through the **work breakdown structure (WBS)**.

Lecturer. Tuyatsetseg Badarch, PhD. Associate Professor

Turner, J. Rodney. (1993). The Handbook of Project-Based Management. London: McGraw-Hill.

Project Management Institute. (2004). A guide to the project management body of knowledge (PMBOK® Guide)–Third edition. Newtown Square, PA: Project Management Institute.

Koskela, L. & Howell, G. A. (2002). The underlying theory of project management is obsolete. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications, Seattle, Washington. Newtown Square, PA: Project Management Institute.

<https://www.pmi.org/learning/library/underlying-theory-project-management-obsolete-8971>

# ON PROJECT MANAGEMENT REQUIREMENT



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

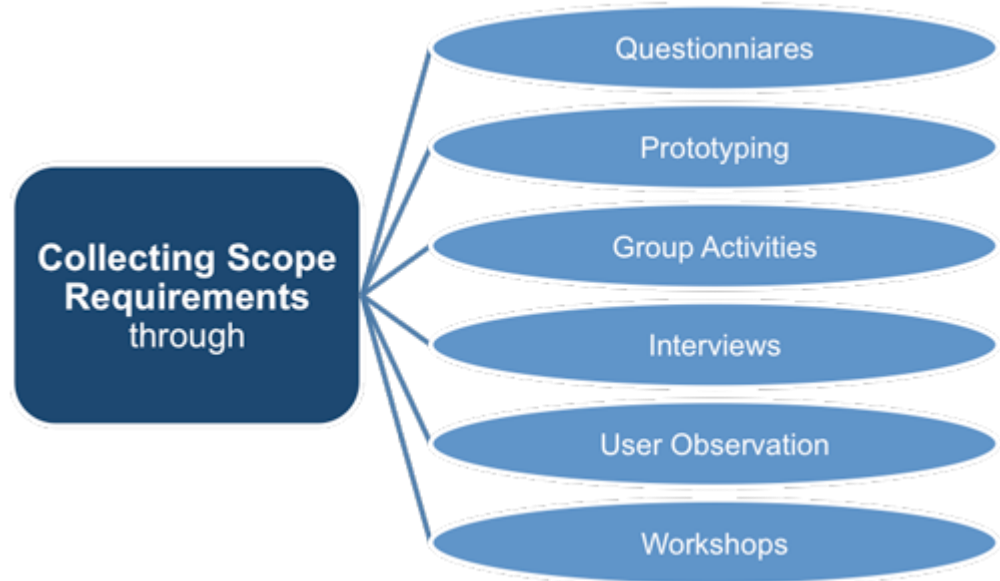
<https://www.pmi.org/learning/library/underlying-theory-project-management-obsolete-8971>

<https://www.brightwork.com/blog/project-requirements>

# PROJECT SCOPE REQUIREMENT

Scope requirements involve face-to-face meetings to discuss requirements and deliverables.

During these interactions we can use visual tools and flowcharts and diagrams that help others to identify particular deliverables.



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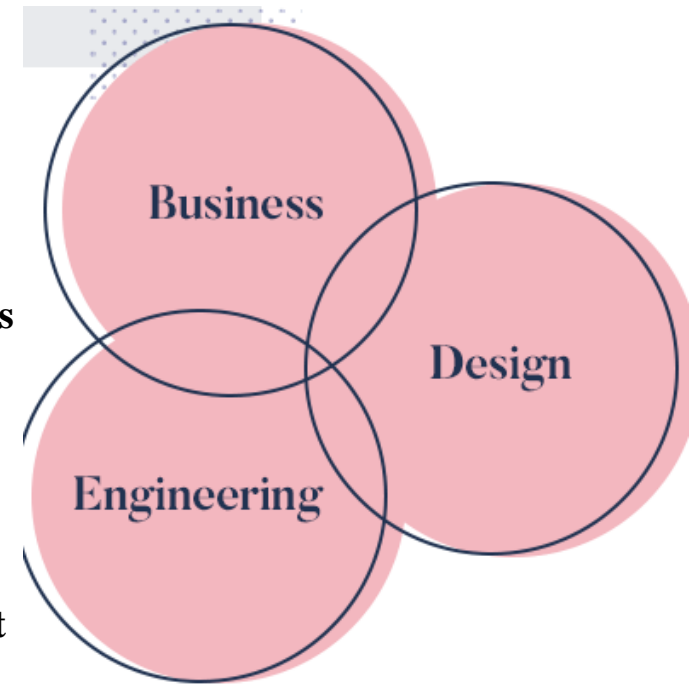
<https://www.pmi.org/learning/library/underlying-theory-project-management-obsolete-8971>

<http://www.free-management-ebooks.com/faqpm/scope-04.htm>

# PROJECT REQUIREMENTS

**In practice, although project managers may understand the theory for developing project requirements, they do not have viable tools, techniques, or processes for enabling project stakeholders to clearly define their needs and the expected outcomes for the project. Project requirement definition requires a progressive elaboration approach.**

**On many projects, the requirements definition effort can take months or, in extreme cases, years to complete before any tangible benefits are realized by the project effort. In this case, it is not uncommon for the environment in which the project was originally established to have changed.**



**Lecturer. Tuyatsetseg Badarch, PhD. Associate professor**

Burek, P. (2008). Creating clear project requirements: differentiating "what" from "how" Paper presented at PMI® Global Congress 2008—North America, Denver, CO. Newtown Square, PA: Project Management Institute.

# PROJECT REQUIREMENTS

Project requirement definition has a progressive elaboration approach based on following steps:

1. **High-level definition of the Project Scope**, which sets the boundaries for areas within the organization that are anticipated to change.
2. **The scope statement** by collaboratively uncovering the need statements to be solved for business requirements, especially.
3. **A technical approach**, finding appropriate solutions that satisfy the project needs.

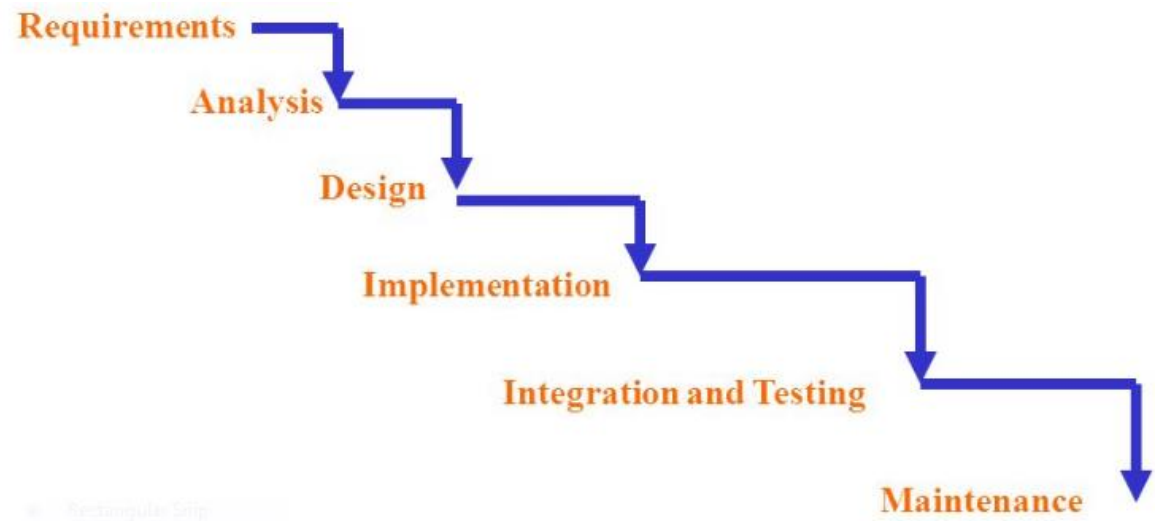
This concept may seem simple, but unfortunately 71% of projects either fail outright, or are “challenged”---projects deliver fewer features and functions than the customer expects, are completed over budget, or are completed behind schedule (Standish Group, 2004).

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# PROJECT REQUIREMENTS

The top four factors associated with project failure are:

- ❖ Poor end user/customer involvement (stakeholders)
- ❖ Poor executive management support
- ❖ Improper planning
- ❖ Unclear statement of requirements



To remove the poor end user/customer involvement and unclear statement of requirements, we recognize that project managers always organize Project Requirement Definition Facilitated Meetings.

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# HINTS FOR SUCCESSFUL REQUIREMENT DEVELOPMENT OF A PROJECT

## Project Stakeholders

Project stakeholders are divided into two different categories:

1. **Business/end users**
2. **Technical/solution providers**

For both, project stakeholders work together to define the **Vison and Scope document** of their the project before the first requirement statement is ever written.

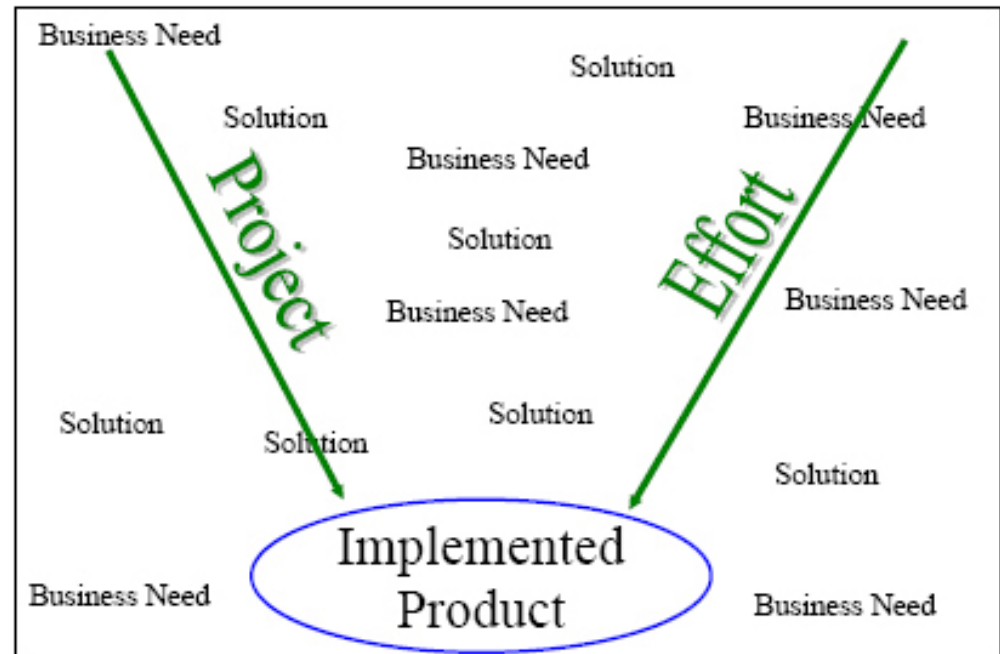
Key representatives from each of the project stakeholder areas should be engaged in the project vision and scoping requirements definition activities.

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# PROJECT REQUIREMENTS DEVELOPED WITHOUT A DEFINED SCOPE STATEMENT

## Without Vision and Scope Statement

It is an important to enhance information needed to determine if any requirements are missing. Business needs and solutions are not necessarily connected each other. Critical needs and solutions may remain outside the project effort, only to be discovered after the project implementation or too late in the project life cycle to be included without major rework and impacts to the project schedule and budget.



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# PROJECT REQUIREMENTS DEVELOPED WITH A DEFINED VISION AND SCOPE STATEMENT

## With Vision and Scope Statement

At high level, “what's” helps the project team to make decisions regarding which requirements to include in the project and which solutions best support the direction of the stakeholders.

Vision&Scope Statement describe

Project Objectives

Context diagram for all entities

Project constraints

Critical success factors

Project assumptions



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# PROJECT REQUIREMENTS DEVELOPED WITH A DEFINED SCOPE STATEMENT

## With Vision and Scope Statement

In addition to business requirements (what's) and technical requirements (how's), there are non-functional requirements.

In general, nonfunctional requirements may include:

Audit requirements

Security requirements

Information requirements

Reporting requirements

Validation requirements



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# DOCUMENTING THE “HOW'S” FOR A PROJECT

## Using “how’s” approach

At low level, using “how’s” approach, project teams should begin technical approach consisting of broad concepts relating to the architecture and solution.

They include:

Security

Information management

Software platform

Storage

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor



# IT PROJECT REQUIREMENTS, CASE STUDY OF SOFTWARE PROJECTS

Software requirements are described by a document, for example by **USE CASE DIAGRAM**.

That document describes the behavior of the software, before the software's design and tested stages.

Requirements refer to software product / system functions that need to be developed in order to achieve desired system performance.

However, this stage of software project specification has the highest number of collisions, errors and inconsistencies that need to be tackled. For the requirement, manager should manage the meetings for interviews with users, stakeholders and anyone else to be taken into account during the design, development and testing of the software. For the document, research, meetings, and discussions are important. Distribution of discussion summaries to verify the data gathered in interviews

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

“Applied Software Project Management”, Andrew Stellman published by OReily, 2010

# USE CASES VS. REQUIREMENTS

We have worked hard on requirements lists. Why should we create Use Cases?

If you list all of the requirements for a project, which is an awful lot of work, and you then give those requirements to someone else, what happens? They are ignored

writing down requirements can be frustrating, and tedious, and a lot of work. Should you write five to ten use cases instead? Would that be better than a list of 100 requirements?

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# NICE PHRASE

Someone says requirements are like the trees in the forest. Without them there is no forest! Many trees together constitute a forest. Without the trees (requirements) you don't have a forest (project).

Lecturer. Tuyatsetseg Badarch, PhD. Associate Professor

<https://cvw.cac.cornell.edu/usecases/requirements>

# ON HISTORY OF USE CASE

The use case modeling is often connected with UML. However, it has been introduced before UML existed.

Its brief history is described as follow:

In 1986, Ivar Jacobson first formulated textual and visual modeling techniques for specifying use cases.

In 1992 his co-authored book Object-Oriented Software Engineering — A Use Case Driven Approach helped to popularize the technique for capturing functional requirements, especially in software development.

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<https://cvw.cac.cornell.edu/usecases/requirements>

# SOFTWARE PROJECT REQUIREMENTS : USE CASES

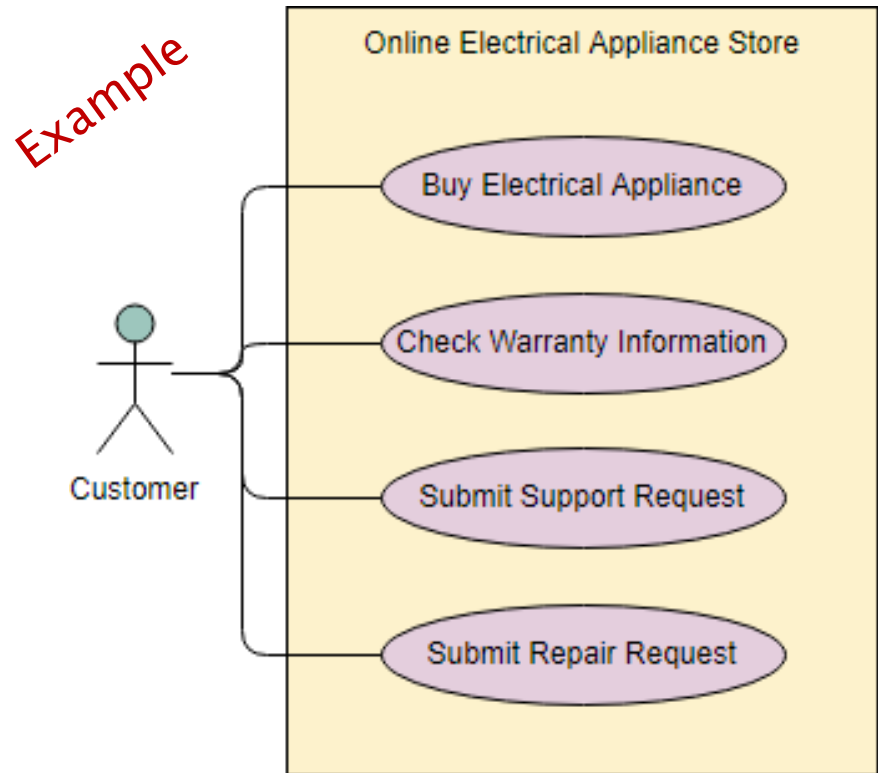
A use case describes the interaction between user and system.

Use cases is simple tools for describing the functionality of the software.

Use cases present the steps that the user follows to use the software.

Use cases do not describe any internal workings of the software.

Use cases do not explain how that software will be implemented.



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

<https://warren2lynch.medium.com/all-you-need-to-know-about-use-case-modeling-828756da3215>

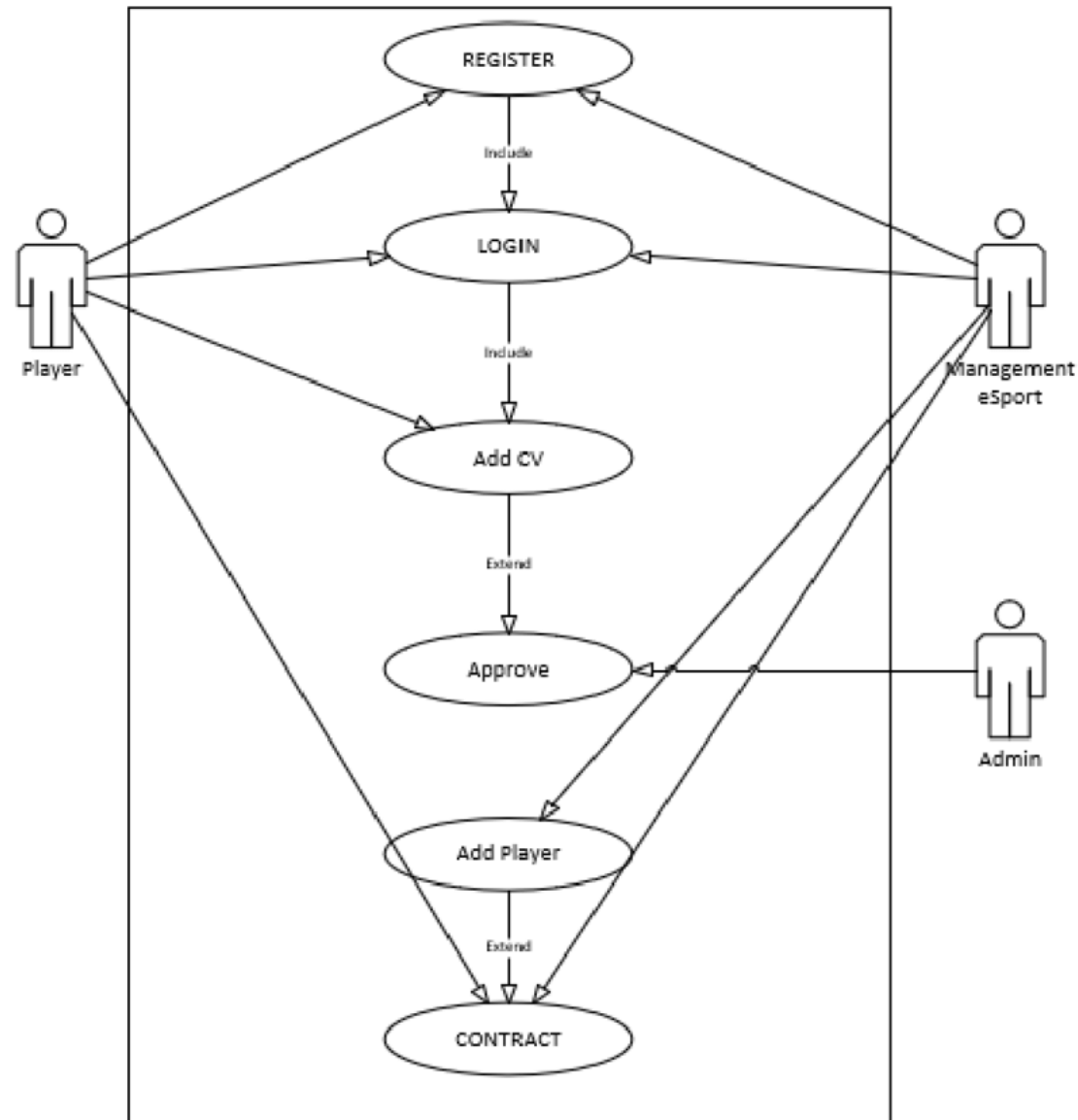
“Applied Software Project Management”, Andrew Stellman published by OReily, 2010

# A USE CASE DIAGRAM FOR REQUIREMENTS FOR INFORMATION SYSTEM RECRUITMENT PROFESSIONAL GAMERS

Example

there are three actors: player, eSport management and system administrator.

The player can access register page, Login, add CV, contract. While eSport management can access the register page, Log in, add a player, contract, while the system administrator can access the contract.



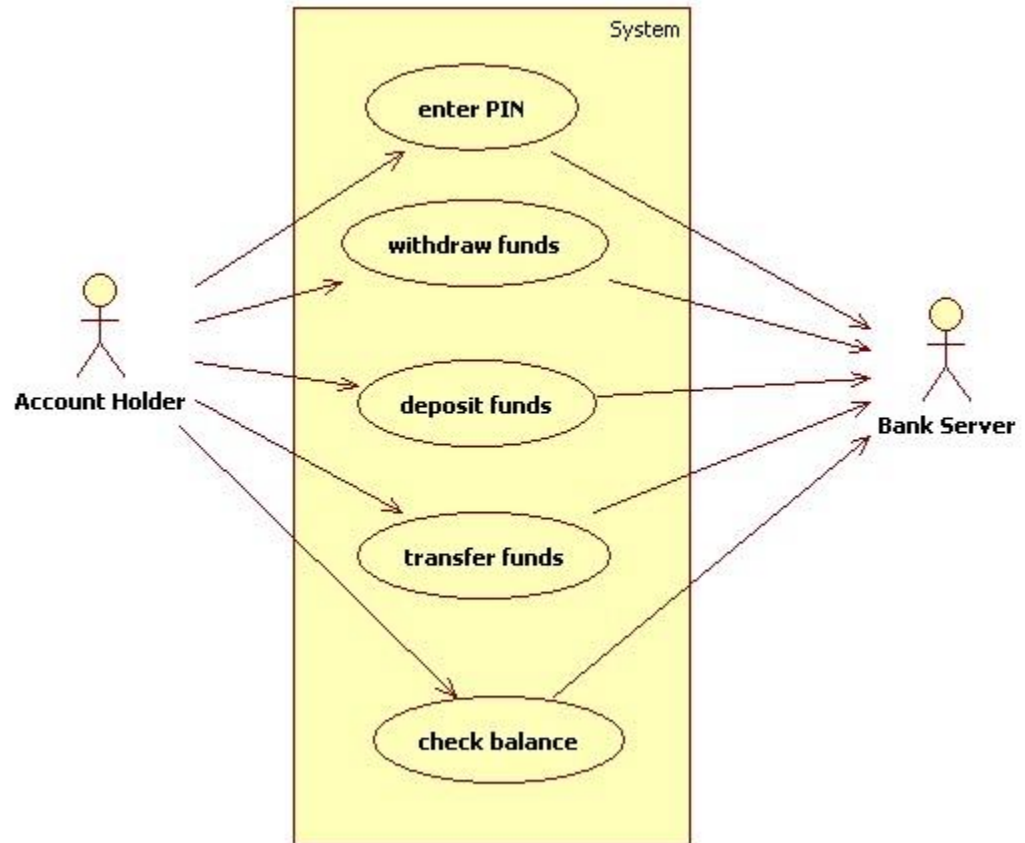
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## A USE CASE DIAGRAM FOR REQUIREMENTS FOR ATM

Example

There are two actors: account holder, bank server

The account holder can access enter PIN, withdraw funds, deposit funds, transfer funds, check balance, while the they all can access the bank server.



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

<http://www.cs.sjsu.edu/faculty/pearce/oom/ooa/requirements/usecases.htm>

“Applied Software Project Management”, Andrew Stellman published by OReily, 2010

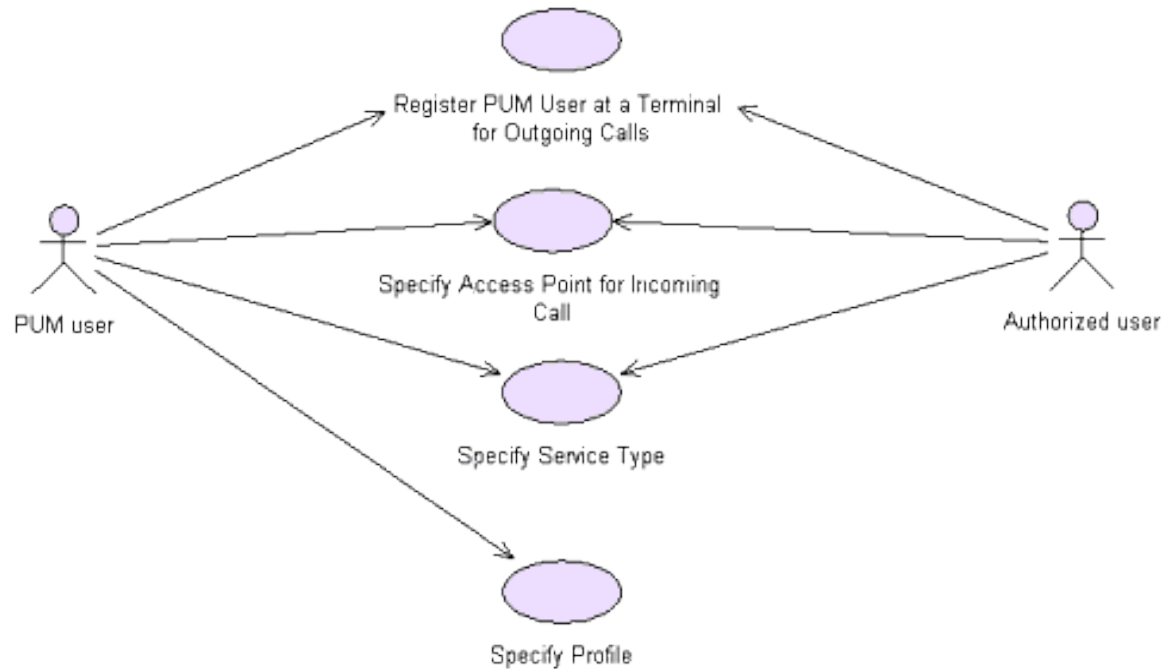
## A USE CASE DIAGRAM FOR REQUIREMENTS FOR PRIVATE USER MOBILITY REGISTRATION (PUMR)

Example

There are two actors: PUM user, authorized user.

The PUM user can four access for its requirements, while the authorized user can access the four parts of the system, too.

A use case model is an excellent vehicle for elicitation of functional requirements.



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

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“Applied Software Project Management”, Andrew Stellman published by OReily, 2010

# FUNCTIONAL REQUIREMENTS

Functional requirements describe the interactions between the system and its environment

Functional requirements define the outward behavior required of the software project.

The goal of the requirement is to communicate the needed behavior in as clear and unambiguous a manner as possible.

The behavior in the requirement can contain lists, bullets, equations, pictures, references to external documents, and any other material that will help the reader understand what needs to be implemented.

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[https://docbox.etsi.org/mts/mts/10-promotionalmaterial/mbs-20111118/languages/uml/uml\\_example.htm](https://docbox.etsi.org/mts/mts/10-promotionalmaterial/mbs-20111118/languages/uml/uml_example.htm)

“Applied Software Project Management”, Andrew Stellman published by OReily, 2010

Example

# FUNCTIONAL vs NONFUNCTIONAL REQUIREMENTS

	Functional requirements	Nonfunctional requirements
Objective	Describe what the product does	Describe how the product works
End result	Define product features	Define product properties
Focus	Focus on user requirements	Focus on user expectations
Documentation	Captured in use case	Captured as a quality attribute
Essentiality	They are mandatory	They are not mandatory, but desirable
Origin type	Usually defined by user	Usually defined by developers or other tech experts
Testing	Component, API, UI testing, etc. Tested before nonfunctional testing	Performance, usability, security testing, etc. Tested after functional testing
Types	External interface, authentication, authorization levels, business rules, etc.	Usability, reliability, scalability, performance, etc.



<https://www.altexsoft.com/blog/business/functional-and-non-functional-requirements-specification-and-types/>

# SOFTWARE REQUIREMENTS SPECIFICATION

The software requirements specification (SRS) represents a complete description of the behavior of the software to be developed.

The SRS includes:

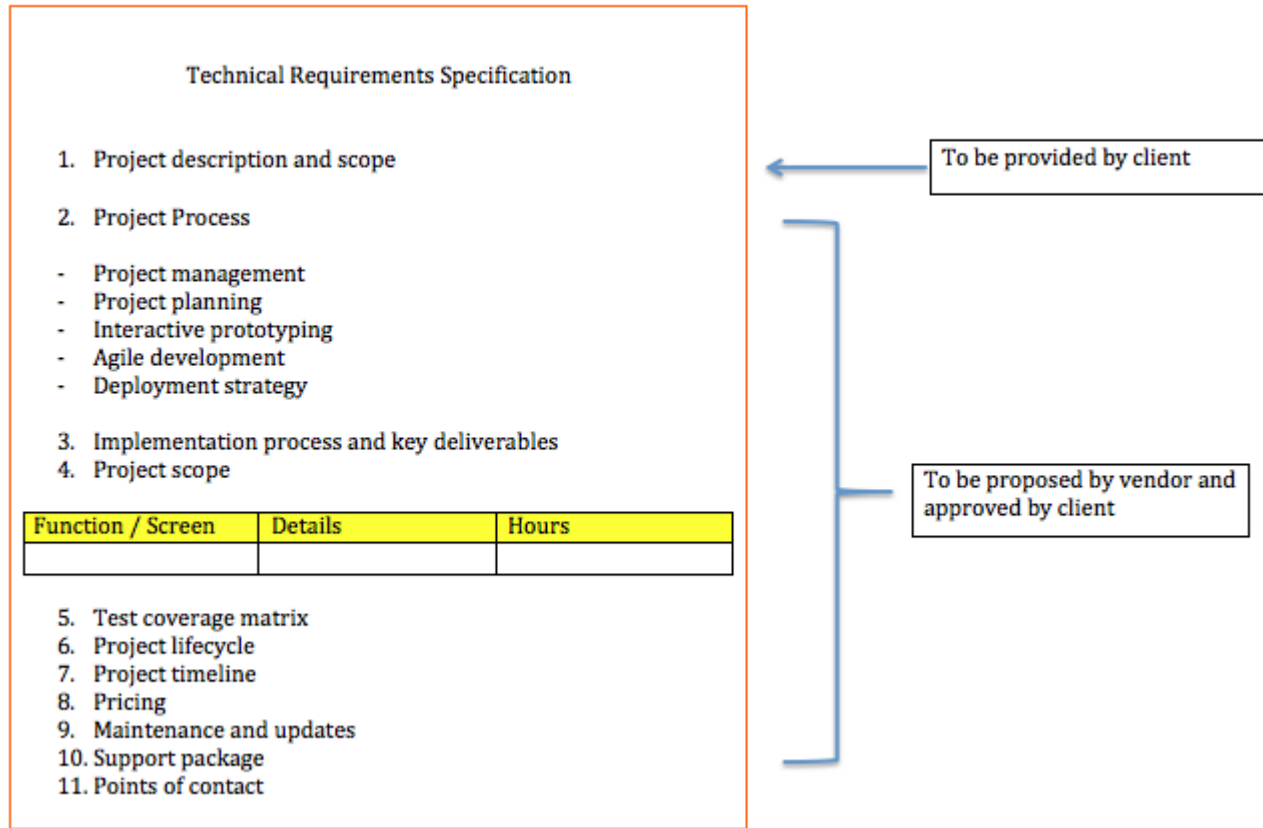
A set of use cases that describe all of the interactions that the users will have with the software.

All of the functional requirements necessary to define the internal workings of the software: calculations, technical details, data manipulation and processing, and other specific functionality that shows how the use cases are to be satisfied

Nonfunctional requirements, which impose constraints on the design or implementation (such as performance requirements, quality standards or design constraints).

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# SOFTWARE REQUIREMENTS SPECIFICATION



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# HINTS FOR A HIGH QUALITY REQUIREMENTS SPECIFICATION

- Not overloaded with requirements
- Non realistic and executable
- Detailed project specification
- Explicit and precise described specification
- Specification that looks into the future
- Specification that isn't bogged down in red tape
- Clear technical specification
- Specification out in a quick manner



*He finally found the time to write down the business requirements. Too bad there wasn't a developer around to implement them.*

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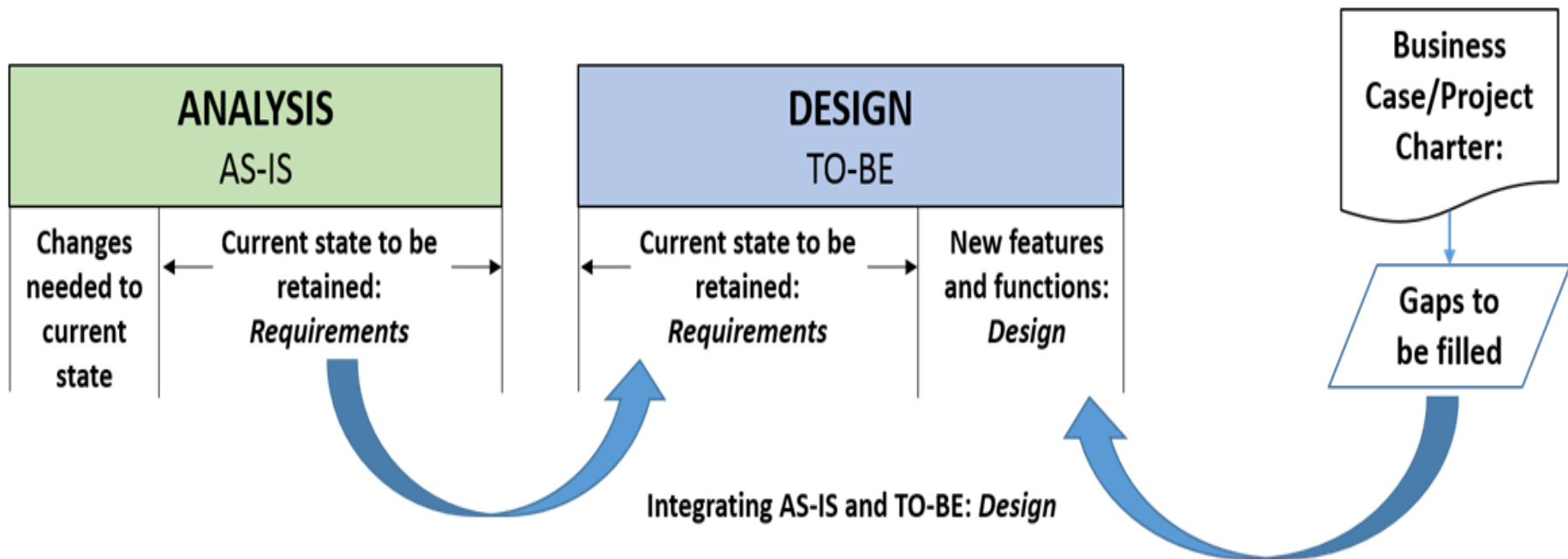
# REQUIREMENTS VS. DESIGN VS. CHANGE

Many people have difficulty understanding the difference between scope, requirements and design.

**Scope/analysis** demonstrates the needs of the organization, and is documented in a vision and scope document

**Requirements** document the behavior of the software that will satisfy those needs

**Design** shows how those requirements will be implemented technically



# CHANGE CONTROL

Change control is a method for implementing only those changes that are worth pursuing, and for preventing unnecessary or overly costly changes from derailing the project.



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# CHANGE EFFECT OF A PROJECT

There are 6 steps for a IT project/software.

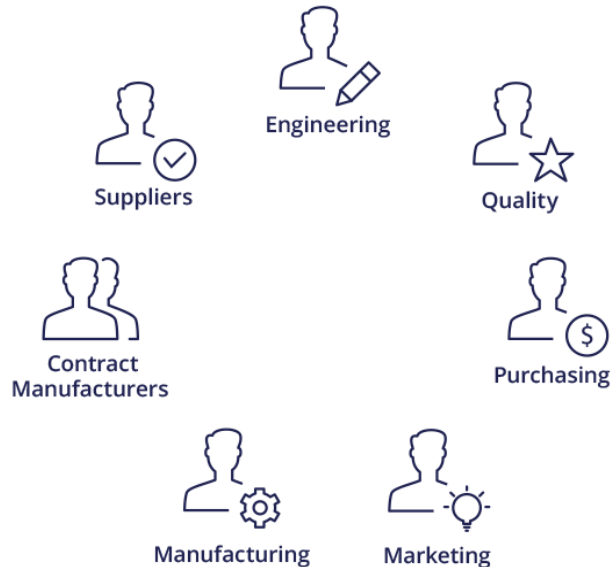
It maybe effect on the followings:

1. scope of the project
2. schedule of progress and milestones; costs of additional resources
3. quality of the completed project
4. human resources
5. risk
6. procurement
7. stakeholders



Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# CHANGE EFFECT OF A PROJECT



CCB members review engineering change requests (ECRs) and engineering change orders (ECOs) to determine if the proposed product designs should be approved, released, and ultimately manufactured.

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

# ON IT PROJECT REQUIREMENTS, SOFTWARE PROJECTS DISCUSSION SUMMARY OUTLINE

A requirements analyst can use a **discussion summary** to summarize information gathered during elicitation and validate it through a review.

1. Project background/fundamentals
2. Goal/Purpose of project
3. Vision and Scope of project
4. Additional all background information
5. Perspectives/estimation
6. Future users
7. Users who can enter
8. Main objectives
9. Clear business rules
10. Flowcharts/or diagrams
11. Assumptions and dependencies
12. Limitations of Design and implementation
13. Risks/risk management
14. Known future enhancements/extensions
15. References
16. Open, unresolved or TBD issues

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor

**THANK YOU**

Lecturer. Tuyatsetseg Badarch, PhD. Associate professor