

University of Malaya


Course Title :

Software Development Management
(WXGC6106)

Week 6
Project Scope Management
(Information Technology Project Management)
Chapter 5

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Learning Objectives

- Understand the importance of good project scope management
- Discuss methods for collecting and documenting requirements in order to meet stakeholder needs and expectations
- Explain the scope definition process and describe the contents of a project scope statement
- Discuss the process for creating a work breakdown structure using the analogy, top-down, bottom-up, and mind-mapping approaches

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Learning Objectives (Continued)

- Explain the importance of verifying scope and how it relates to defining and controlling scope
- Understand the importance of controlling scope and approaches for preventing scope-related problems on information technology projects
- Describe how software can assist in project scope management

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What is Scope Project Management?

- **Scope** refers to *all* the work involved in creating the products of the project and the processes used to create them
- A **deliverable** is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes
- Project scope management includes the processes involved in defining and controlling what is or is not included in a project

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Project Scope Management Processes

Collecting requirements: defining and documenting the features and functions of the products produced during the project as well as the processes used for creating them

Defining scope: reviewing the project charter, requirements documents, and organizational process assets to create a scope statement

Creating the WBS: subdividing the major project deliverables into smaller, more manageable components

Verifying scope: formalizing acceptance of the project deliverables

Controlling scope: controlling changes to project scope throughout the life of the project

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Project Scope Management Summary

Planning
 Process: **Collect requirements**
 Outputs: Requirements documentation, requirements management plan, requirements traceability matrix
 Process: **Define scope**
 Outputs: Project scope statement, project document updates
 Process: **Create WBS**
 Outputs: WBS, WBS dictionary, scope baseline, project document update

Monitoring and Controlling
 Process: **Verify scope**
 Outputs: Accepted deliverables, change requests, project document updates
 Process: **Control Scope**
 Outputs: Work performance measurements, organizational process assets updates, change requests, project management plan updates, project document updates

Project Start Project Finish

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Collecting Requirements

- A **requirement** is “a condition or capability that must be met or possessed by a system, product, service, result, or component to satisfy a contract, standard, specification, or other formal document” (PMBOK® Guide, 2008)
- For some IT projects, it is helpful to divide requirements development into categories called **elicitation, analysis, specification, and validation**
- It is important to use an iterative approach to defining requirements since they are often unclear early in a project

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Relative Cost to Correct a Software Requirement Defect

Development Phase	Relative Cost to Correct a Defect
Operation	110
Test	20
Code	10
Design	5
Requirements	1

Source: Robert B. Grady, "An Economic Release Decision Model: Insights into Software Project Management." *Proceedings of the Applications of Software Measurement Conference* (Orange Park, FL: Software Quality Engineering, 1999), pp.227-239.

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Methods for Collecting Requirements

- Interviewing
- Focus groups and facilitated workshops
- Using group creativity and decision-making techniques
- Questionnaires and surveys
- Observation
- Prototyping
- Software tools

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Documenting Requirements

Requirements documents are often generated by software and include text, images, diagrams, videos, and other media;

they are often broken down into different categories such as functional, service, performance, quality, training requirements, and so on

A **requirements management plan** describes how project requirements will be analyzed, documented, and managed

A **requirements traceability matrix (RTM)** is a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed

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Sample Requirements Traceability Matrix

Requirement No.	Name	Category	Source	Status
R32	Laptop memory	Hardware	Project charter and corporate laptop specifications	Complete. Laptops ordered meet requirement by having 4GB of memory.

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Defining Scope

Key inputs for preparing the project scope statement include the **project charter, requirements documentation, and organizational process assets** such as policies and procedures related to scope statements as well as project files and lessons learned from previous, similar projects

As time progresses, the scope of a project should become more clear and specific

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Further Defining Project Scope

Project Charter:
Upgrades may affect servers . . . (listed under Project Objectives)

Project Scope Statement, Version 1:
Servers: If additional servers are required to support this project, they must be compatible with existing servers. If it is more economical to enhance existing servers, a detailed description of enhancements must be submitted to the CIO for approval. See current server specifications provided in Attachment 6. The CEO must approve a detailed plan describing the servers and their location at least two weeks before installation.

Project Scope Statement, Version 2:
Servers: This project will require purchasing ten new servers to support Web, network, database, application, and printing functions. Virtualization will be used to maximize efficiency. Detailed descriptions of the servers are provided in a product brochure in Appendix 8 along with a plan describing where they will be located.

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Creating the Work Breakdown Structure (WBS)

A **WBS** is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project

WBS is a foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes

Decomposition is subdividing project deliverables into smaller pieces

A **work package** is a task at the lowest level of the WBS

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Sample Intranet WBS Organized by Product

Intranet

Web site design Site map Graphic design Programs	Home page design Text Images Hyperlinks	Marketing pages Text Images Hyperlinks	Sales pages Text Images Hyperlinks
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Sample Intranet WBS Organized by Phase

Intranet project

Level 1 - Entire Project	Intranet project
Level 2	Concept Web site design Web site development Roll out Support
Level 3	Evaluate current systems Define requirements Define specific functionality Define risks & risk management approach Develop project plan Brief Web development team
Level 4	Define user requirements Define content requirements Define system requirements Define server owner requirements

Chart form →

<p>Tabular form with Microsoft Project numbering</p> <ul style="list-style-type: none"> 1.0 Concept <ul style="list-style-type: none"> 1.1 Evaluate current systems 1.2 Define requirements <ul style="list-style-type: none"> 1.2.1 Define user requirements 1.2.2 Define content requirements 1.2.3 Define system requirements 1.2.4 Define server owner requirements 1.3 Define specific functionality 1.4 Define risks and risk management approach 1.5 Develop project plan 1.6 Brief Web development team 2.0 Web site design 3.0 Web site development 4.0 Roll out 5.0 Support 	<p>Tabular form with PMI numbering</p> <ul style="list-style-type: none"> 1.1 Concept <ul style="list-style-type: none"> 1.1.1 Evaluate current systems 1.1.2 Define requirements <ul style="list-style-type: none"> 1.1.2.1 Define user requirements 1.1.2.2 Define content requirements 1.1.2.3 Define system requirements 1.1.2.4 Define server owner requirements 1.1.3 Define specific functionality 1.1.4 Define risks and risk management approach 1.1.5 Develop project plan 1.1.6 Brief Web development team 1.2 Web site design 1.3 Web site development 1.4 Roll out 1.5 Support
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Intranet WBS and Gantt Chart in Microsoft Project

WBS

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Intranet Gantt Chart Organized by Project Management Process Groups

WBS

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Executing Tasks for JWD Consulting's WBS

3.0 Executing

- 3.1 Survey
- 3.2 User inputs
- 3.3 Intranet site content
 - 3.3.1 Templates and Tools
 - 3.3.2 Articles
 - 3.3.3 Links
 - 3.3.4 Ask the Expert
 - 3.3.5 User requests feature
- 3.4 Intranet site design
- 3.5 Intranet site construction
- 3.6 Site testing
- 3.7 Site promotion
- 3.8 Site roll out
- 3.9 Project benefits measurement

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Approaches to Developing WBSs

- **Using guidelines:** some organizations, like the DOD, provide guidelines for preparing WBSs
- **The analogy approach:** review WBSs of similar projects and tailor to your project
- **The top-down approach:** start with the largest items of the project and break them down
- **The bottom-up approach:** start with the specific tasks and roll them up
- **Mind-mapping approach:** **mind mapping** is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

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Sample Mind-Mapping Approach for Creating a WBS

```

graph LR
    Root[IT Upgrade Project] --- PM[Project management]
    Root --- UI[Upgrade inventory]
    Root --- IHS[Install hardware and software]
    UI --- PPI[Perform physical inventory]
    UI --- UD[Update database]
    PPI --- BA[Building A]
    PPI --- BB[Building B]
    PPI --- BC[Building C]
    IHS --- AHS[Acquire hardware and software]
    AHS --- Servers
    AHS --- UH[User hardware]
    UH --- Laptops
    UH --- Desktops
    
```

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Project 2007 File with WBS Generated from a Mind Map

Task Name	August 30							September 6						
	F	S	S	M	T	W	T	F	S	S	M	T	W	T
1 Upgrade inventory														
2 Perform physical inventory														
3 Building A														
4 Building B														
5 Building C														
6 Update database														
7 Acquire hardware and software														
8 Servers														
9 User hardware														
10 Laptops														
11 Desktops														
12 Install hardware and software														
13 Project management														

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The WBS Dictionary and Scope Baseline


Many WBS tasks are vague and must be explained more so people know what to do and can estimate how long it will take and what it will cost to do the work

A **WBS dictionary** is a document that describes detailed information about each WBS item

The approved project scope statement and its WBS and WBS dictionary form the **scope baseline**, which is used to measure performance in meeting project scope goals

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Advice for Creating a WBS and WBS Dictionary

- A unit of work should appear at only one place in the WBS
- The work content of a WBS item is the sum of the WBS items below it
- A WBS item is the responsibility of only one individual, even though many people may be working on it
- The WBS must be consistent with the way in which work is actually going to be performed; it should serve the project team first and other purposes only if practical

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Advice for Creating a WBS and WBS Dictionary (Continue)

- Project team members should be involved in developing the WBS to ensure consistency and buy-in
- Each WBS item must be documented in a WBS dictionary to ensure accurate understanding of the scope of work included
- The WBS must be a flexible tool to accommodate inevitable changes while properly maintaining control of the work content in the project according to the scope statement

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Verifying Scope

- It is very difficult to create a good scope statement and WBS for a project
- It is even more difficult to verify project scope and minimize scope changes
- Scope verification** involves formal acceptance of the completed project scope by the stakeholders
- Acceptance is often achieved by a customer inspection and then sign-off on key deliverables

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Scope Control

- Scope control involves controlling changes to the project scope
- Goals of scope control are to:
 - Influence the factors that cause scope changes
 - Assure changes are processed according to procedures developed as part of integrated change control
 - Manage changes when they occur
- **Variance** is the difference between planned and actual performance

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Best Practices for Avoiding Scope Problems

1. Keep the scope realistic. Don't make projects so large that they can't be completed. Break large projects down into a series of smaller ones.
2. Involve users in project scope management. Assign key users to the project team and give them ownership of requirements definition and scope verification.
3. Use off-the-shelf hardware and software whenever possible. Many IT people enjoy using the latest and greatest technology, but business needs, not technology trends, must take priority.
4. Follow good project management processes. As described in this chapter and others, there are well-defined processes for managing project scope and others aspects of projects.

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Using Software to Assist in Project Scope Management

- Word-processing software helps create several scope-related documents
- Spreadsheets help to perform financial calculations and weighted scoring models and to develop charts and graphs
- Communication software like e-mail and the Web help clarify and communicate scope information
- Project management software helps in creating a WBS, the basis for tasks on a Gantt chart
- Specialized software is available to assist in project scope management


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Any questions?



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HW4: WBS for your IT project

Generate the 2- level WBS for an information technology project with which you are familiar.

- Specify the time for each task in WBS.
- Use Microsoft Project in this case.

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