

# Project Scope Management

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**October, 2020**





# Contents

1. What is Project Scope Management
2. Plan Scope Management
3. Collect Requirements
4. Define Scope
5. Create the WBS
6. Validate Scope
7. Control Scope
8. Use Software to Assist in Project Scope Management

# Concepts

- Product scope: the features and functions that characterize a product, service or result
- Project scope: the work performed to deliver a product, service, or result with the specified features and functions
- Scope vs. Deliverables



# Deliverables

- A product created as part of a project
- Product related, such as a piece of hardware or software
- Process related, such as a planning document or meeting minutes



# Scope

**Requirements**

**Boundaries**

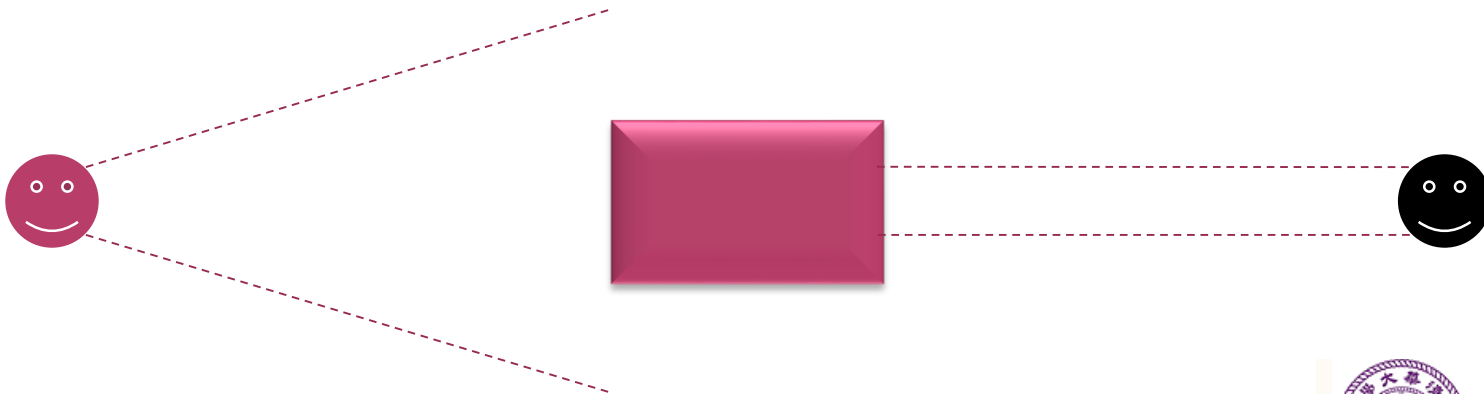
**Deliverables**

**Acceptance  
Criteria**



# Project Scope Management

- Includes the processes involved in defining and controlling what work is or is not included in a project
- Ensure the project team and stakeholders have the same understanding of what products the project will produce and what processes the project team will use to produce them



Knowledge Area	Project Management Process Groups				
	Initiating	Planning	Executing	Monitoring and Controlling	Closing
Integration	√	√	√	√	√
Scope		√		√	
Schedule(Time)		√		√	
Cost		√		√	
Quality		√	√	√	
Resource(HR)		√	√	√	
Communication		√	√	√	
Risk		√	√	√	
Procurement		√	√	√	
Stakeholder	√	√	√	√	

Initiating

Planning

Executing

Monitoring &  
Controlling

Closing

- Plan scope management
- Collect requirements
- Define scope
- Create the WBS

- Validate scope
- Control scope





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# Plan Scope Management

The process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled.

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project charter</li><li>2. Project management plan</li><li>3. Enterprise environmental factors</li><li>4. Organizational process assets</li></ol>	<ol style="list-style-type: none"><li>1. Expert judgment</li><li>2. Data analysis</li><li>3. Meetings</li></ol>	<ol style="list-style-type: none"><li>1. Scope management plan</li><li>2. Requirements management plan</li></ol>

The scope management plan is a component of the project or program management plan that describes how the scope will be defined, developed, monitored, controlled, and validated.



# Scope management plan

1. How to prepare a detailed project scope management?
2. How to create a WBS?
3. How to maintain and approve the WBS?
4. How to obtain formal acceptance of the completed project deliverables?
5. How to control requests for changes to the project scope?



# What are requirements

- 1990 IEEE Standard Glossary of Software Engineering Terminology:
- A condition or capability needed by a user to solve a problem or achieve an objective
- A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed document
- A documented representation of a condition or capability as in 1 or 2

**Which one is better for project management?**



# PMBOK Definition

4<sup>th</sup> edition: 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**

5<sup>th</sup> edition: Conditions or capabilities that **must** be met by the project or present in the product, service, or result to satisfy **an agreement or other formally imposed specification**

6<sup>th</sup> edition: A condition or capability that is **necessary** to be presented in a product, service, or result to **satisfy a business need**

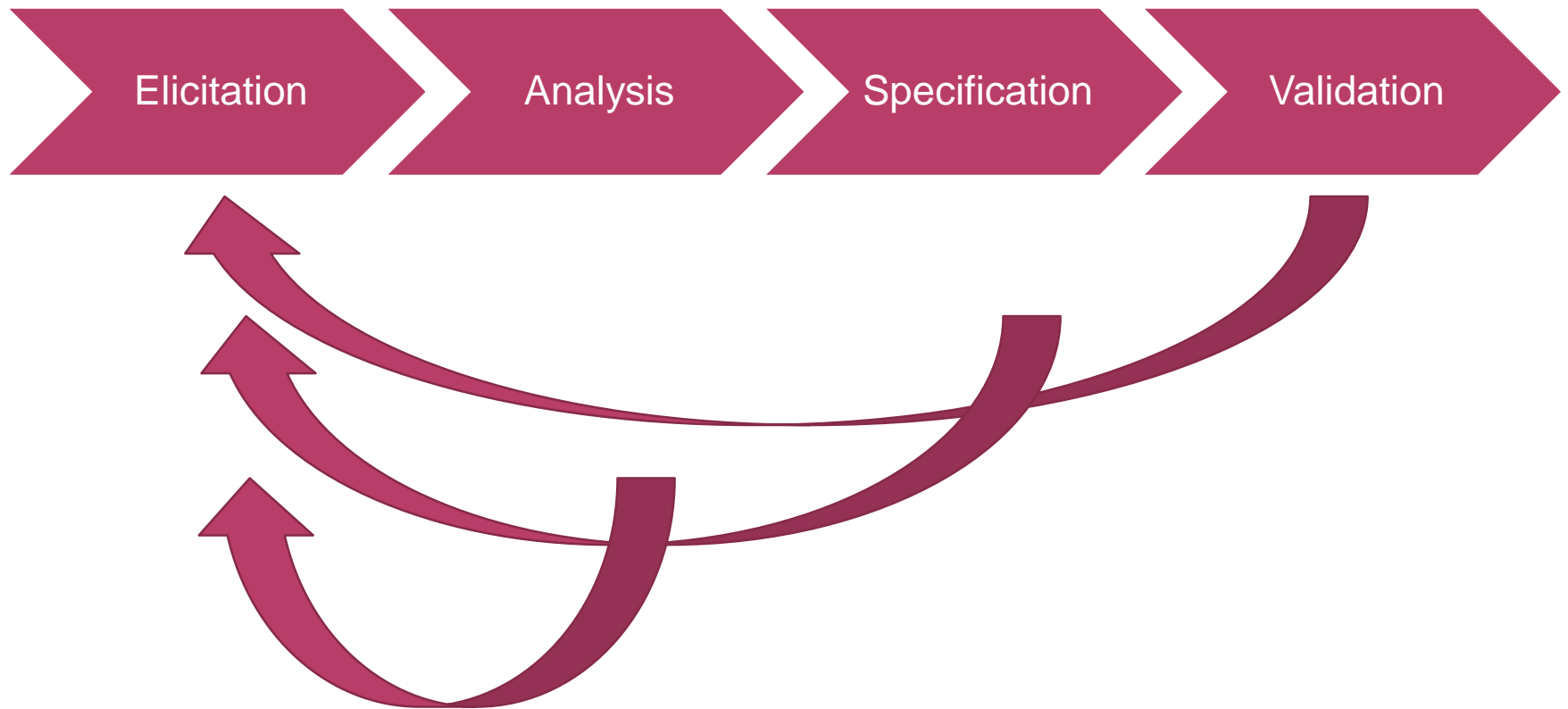


# Requirements in Project Management

- Business requirements
- Stakeholder requirements
- Solution requirements
  - Functional requirements
  - Nonfunctional requirements
- Transition and readiness requirements
- Project requirements
- Quality requirements



# Requirements Development



# Requirements management plan

A component of the project management plan that describes how project requirements will be analyzed, documented, and managed.

- How to plan, track, and report requirements activities?
- How to perform configuration management activities?
- How to prioritize requirements?
- How to use product metrics?
- How to trace and capture attributes of requirements?





# Business Analyst

- 2014 PMI: 49% do requirements management properly, 53% failed to use a formal process
- IIBA – CBAP (Certified Business Analysis Professional), CCBA (Certification of Competency in Business Analysis)
- IREB – CPRE (Certified Professional for Requirements Engineering )
- PMI – PBA (Professional in Business Analysis )

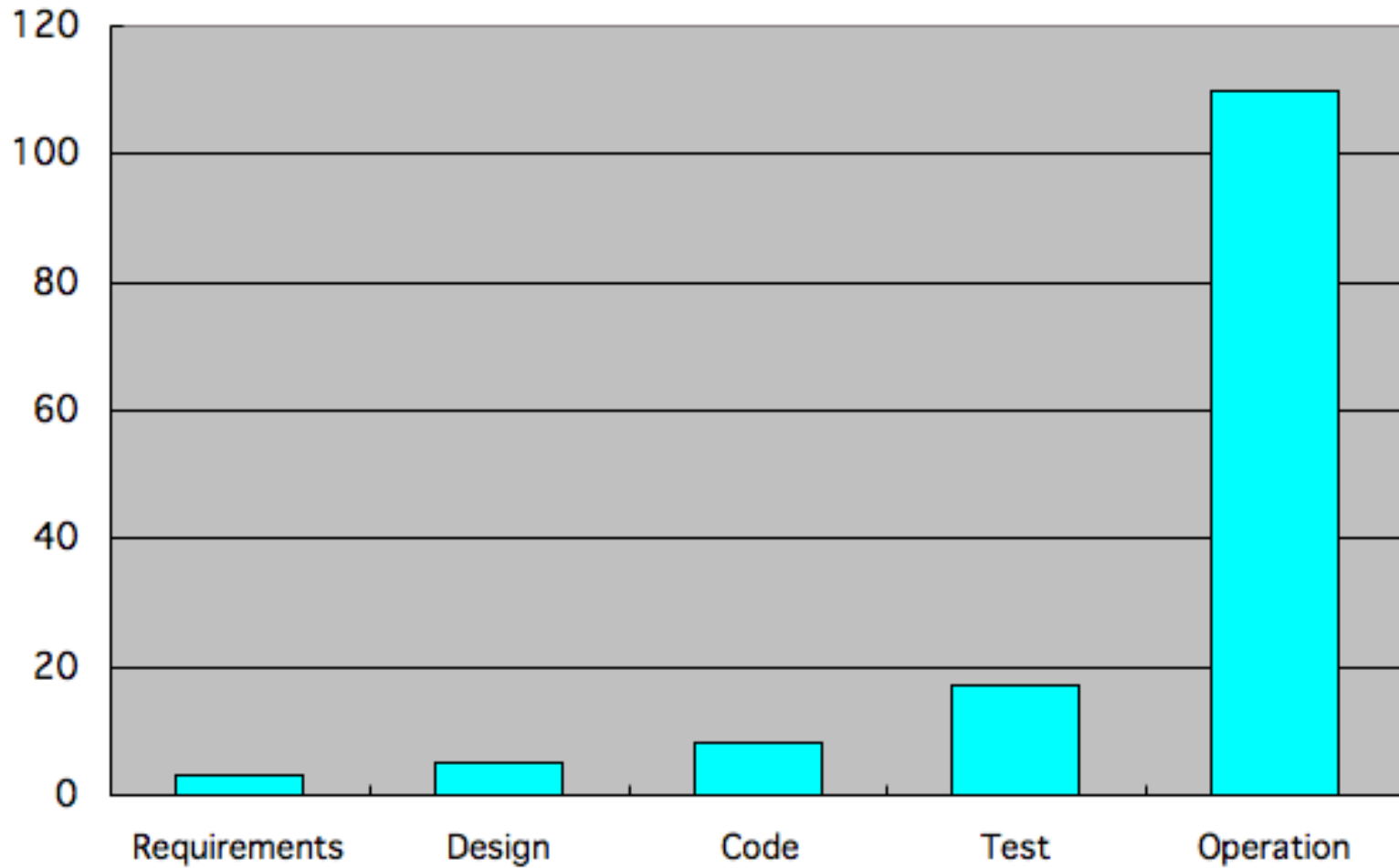




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# Relative Cost to Correct a Software Requirement Defect



# Millennium Bug



# Same Understanding

**I want a cup of tea.**



**Dumplings are cooked in a teapot---you can't pour it out**

# Collect Requirements

The process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives.

It provides the basis for defining the product scope and project scope

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project charter</li><li>2. Project management plan</li><li>3. Project documents</li><li>4. Business documents</li><li>5. Agreements</li><li>6. Enterprise environmental factors</li><li>7. Organizational process assets</li></ol>	<ol style="list-style-type: none"><li>1. Expert judgment</li><li>2. Data gathering</li><li>3. Data analysis</li><li>4. Decision making</li><li>5. Data representation</li><li>6. Interpersonal and team skills</li><li>7. Context diagram</li><li>8. Prototypes</li></ol>	<ol style="list-style-type: none"><li>1. Requirements documentation</li><li>2. Requirements traceability matrix</li></ol>

The requirements need to be elicited, analyzed and recorded in enough detail to be included in the scope baseline and to be measured once project execution begins



# How to Collect Requirements

- Interviewing stakeholders one-on-one
  - Holding focus groups, facilitated workshops
  - Questionnaires and surveys
  - Observation
  - Prototyping and document analysis
  - Benchmarking
1. A project to upgrade the entire corporate accounting system for a multibillion-dollar company with more than 50 locations
  2. A project to upgrade the hardware and software for a small accounting firm with only five employees



# How to Document Requirements

- The format - text, images, diagrams, videos, and other media
- The size - requirements documentation for a plane can weigh more than the plane itself
- Category: functional, service, performance, quality, training, ...





# Requirements Traceability Matrix

A requirements traceability matrix (RTM) is a grid that links product requirements from their origin to the deliverables that satisfy them.

**TABLE 5-1** Sample entry in a 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 16 GB of memory.

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# Requirements Traceability Matrix

- Helps ensure that each requirement address business value by linking it to the business and project objectives
- Provides a means to track requirements throughout the project life cycle, helping to ensure that requirements approved in the requirements documentation are delivered at the end of the project
- Provides a structure for managing changes to the product scope



# A Detailed Example of RTM

**Requirements Traceability Matrix**

Project name								
Cost Center:								
Project Description:								
ID	Associate ID	Requirements Description	Business Needs, Opportunities, Goals, Objectives	Project Objectives	WBS Deliverables	Product Design	Product Development	Test Cases





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# Good Scope Definition

- Helps improve the accuracy of time, cost, and resource estimates
- Defines a baseline for performance measurement and project control
- Aides in communicating clear work responsibilities



# Define Scope

The process of developing a detailed description of work required for the project.

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project charter</li><li>2. Project management plan</li><li>3. Project documents</li><li>4. Enterprise environmental factors</li><li>5. Organizational process assets</li></ol>	<ol style="list-style-type: none"><li>1. Expert judgment</li><li>2. Data analysis</li><li>3. Decision making</li><li>4. Interpersonal and team skills</li><li>5. Product analysis</li></ol>	<ol style="list-style-type: none"><li>1. Project scope statement</li><li>2. Project documents updates</li></ol>

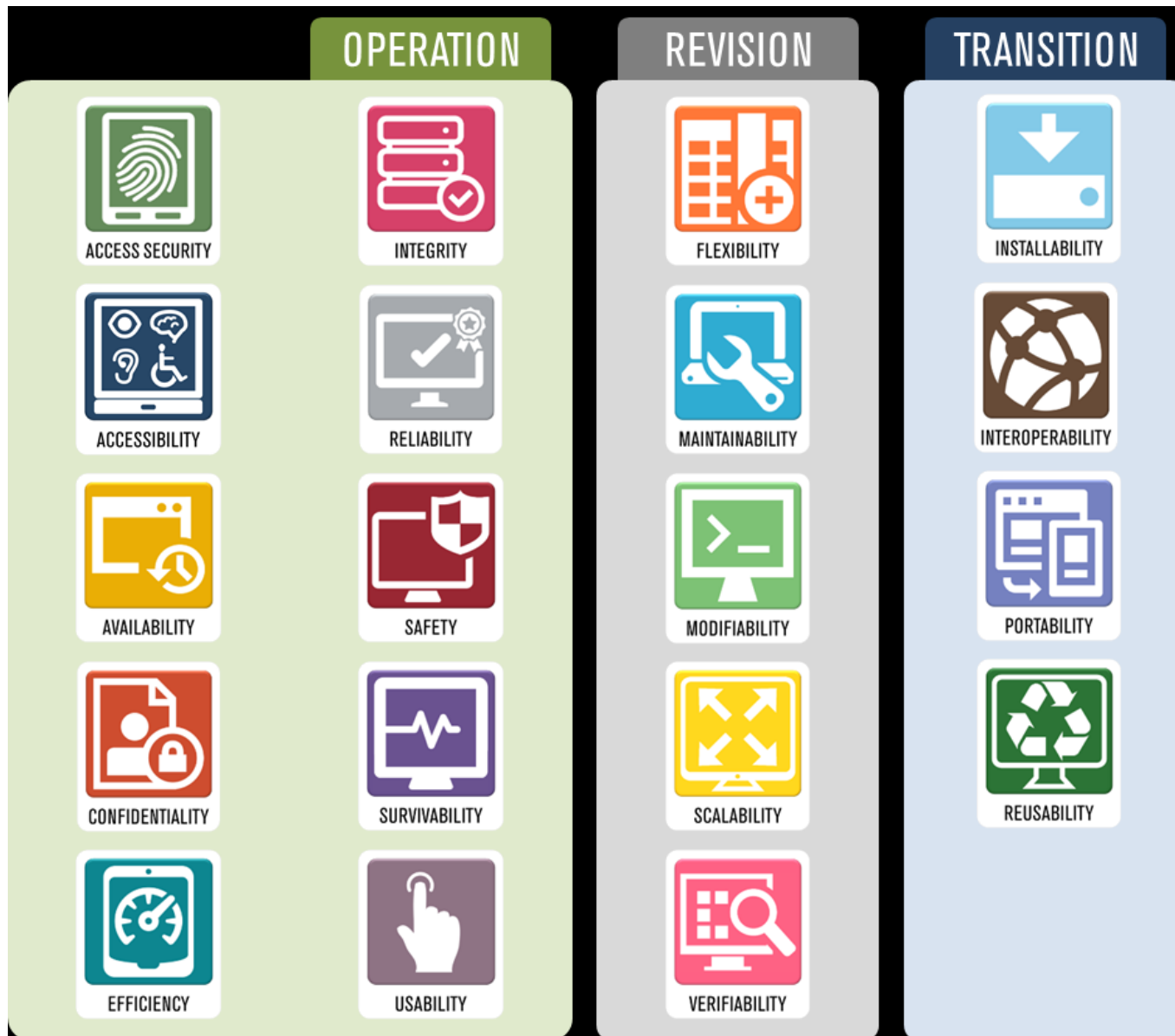


# Project Scope Statement

- A product scope description
- Detail information on all project deliverables
- Product user acceptance criteria
- Project boundaries, constraints, and assumptions
- Supporting documents
- (Software) detailed functions and design specifications
- ...



# NFR





# 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 10 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 Attachment 8, along with a plan describing where they will be located.



## Project Charter

Project purpose or justification

Measurable project objectives  
and related success criteria

High-level requirements

High-level project description

High-level risks

Summary milestone schedule

Summary budget

Stakeholder list

Project approval requirements  
(what constitutes success, who  
decides it, who signs off)

Assigned project manager,  
responsibility, and authority  
level

Name and authority of the  
sponsor or other person(s)  
authorizing the project charter

## Project Scope Statement

Project scope description  
(progressively elaborated)

Acceptance criteria

Project deliverables

Project exclusions

Project constraints

Project assumptions

# **What is the most important feature of Project Scope Statement?**

**Update-to-date**





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# Create WBS

The process of subdividing project deliverables and project work into smaller, more manageable components.

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project management plan</li><li>2. Project documents</li><li>3. Enterprise environmental factors</li><li>4. Organizational process assets</li></ol>	<ol style="list-style-type: none"><li>1. Expert judgement</li><li>2. Decomposition</li></ol>	<ol style="list-style-type: none"><li>1. Scope baseline</li><li>2. Project documents updates</li></ol>



# Work Breakdown Structure

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

A **foundation document** in project management because it provides the basis for planning and managing project schedules, costs, resources, and changes



Can we find anything that should be  
done outside of WBS?



# 100% Rule

- The WBS includes 100% of the work defined by the project scope
- It captures ALL deliverables the project is to produce including project management deliverables

100%





# Develop WBS

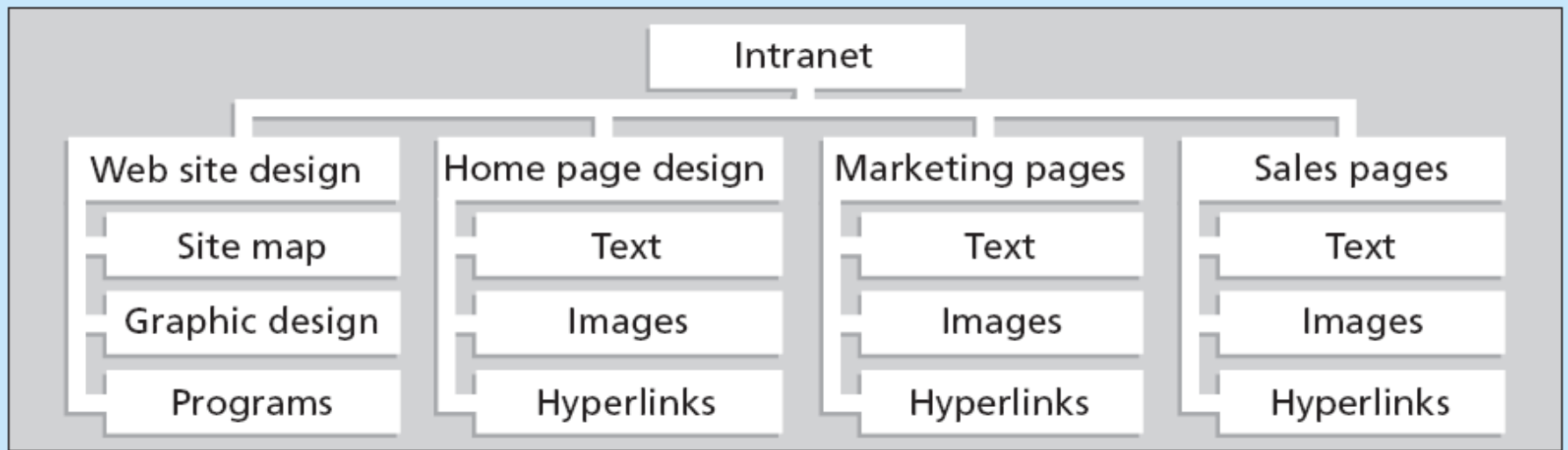
A WBS is often depicted as task-oriented family tree of activities, similar to an organizational chart. (What's the difference?)

**The work package is the work defined at the lowest level of the WBS for which cost and duration can be estimated and managed.**

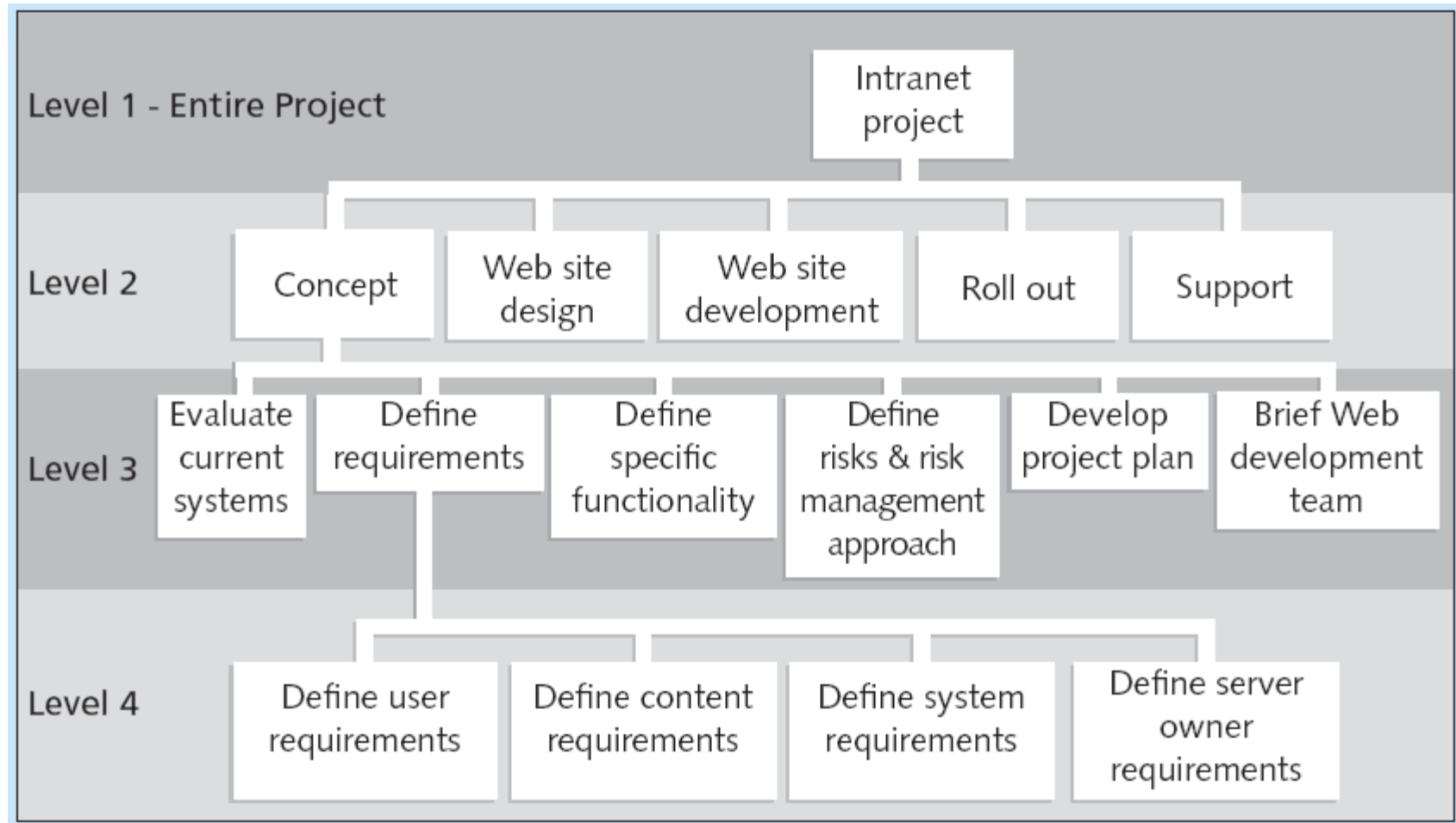
People who will do the work should help to plan the work by creating the WBS



# WBS by Product



# WBS by Phase in Chart



# WBS by Phase in Tabular Form

## 1.1 Concept

- 1.1.1 Evaluate current systems

- 1.1.2 Define requirements

  - 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



# Which one is better?

By Product

VS

By Phase



# WBS vs Specification

- Tasks on a WBS represent work that needs to be done to complete the project.

A WBS item or a specification item?

- UI should be user-friendly
- Design the UI
- Flooring must be durable

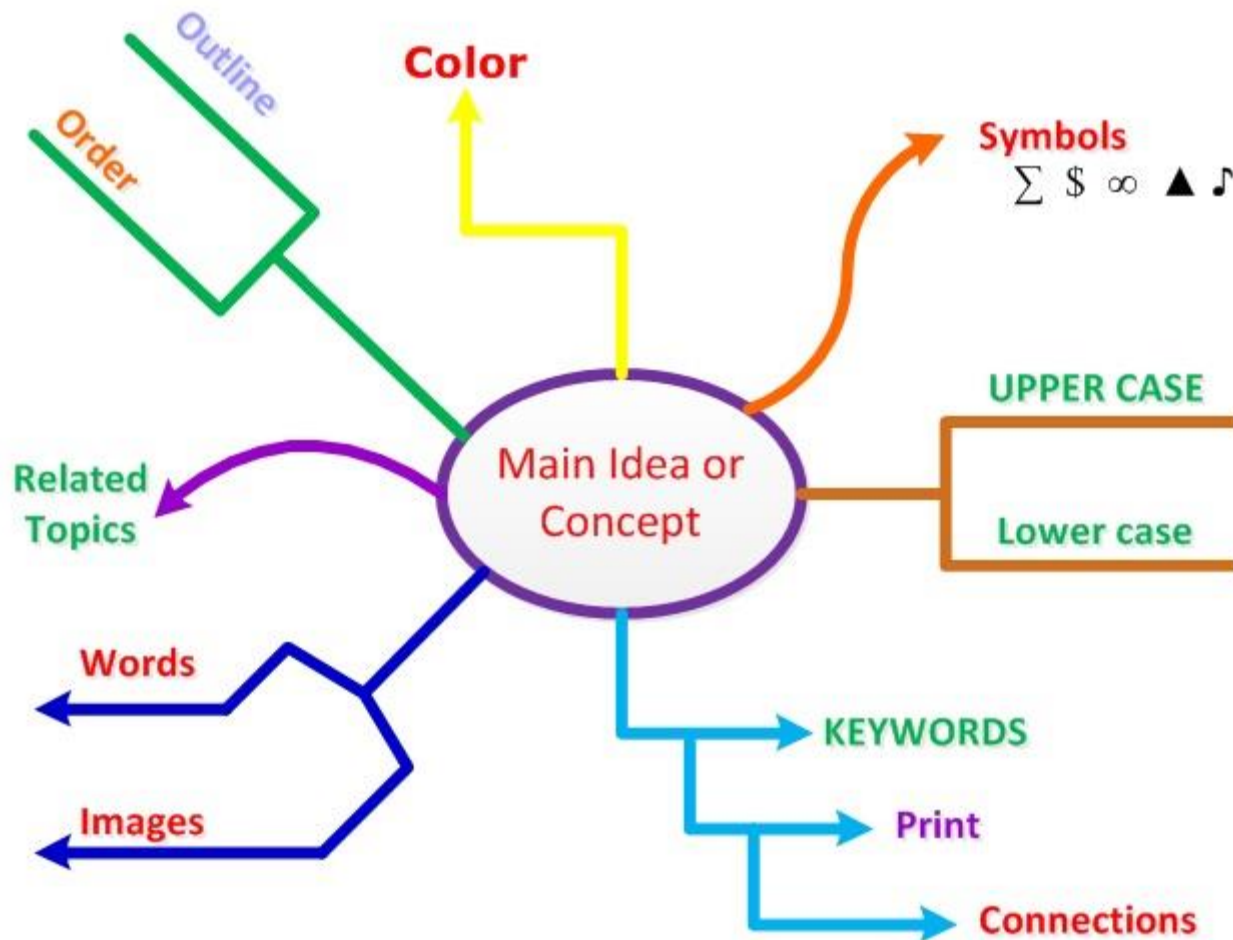


# Develop Work Breakdown Structures

1. Using guidelines
2. The analogy approach
3. The top-down approach
4. The bottom-up approach



# Mind-mapping





# Update Database

In a system upgrade project, there is a task “update database”:

- Execute a set of update SQLs
- Checking the influence first, then execute the SQLs



# WBS Dictionary

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

It includes:

- Project Title
- WBS Item Number
- WBS Item Name
- Description



## WBS Dictionary Entry March 20

**Project Title:** Information Technology (IT) Upgrade Project

**WBS Item Number:** 2.2

**WBS Item Name:** Update Database

**Description:** The IT department maintains an online database of hardware and software on the corporate intranet. However, we need to make sure that we know exactly what hardware and software employees are currently using and if they have any unique needs before we decide what to order for the upgrade. This task will involve reviewing information from the current database, producing reports that list each department's employees and location, and updating the data after performing the physical inventory and receiving inputs from department managers. Our project sponsor will send a notice to all department managers to communicate the importance of this project and this particular task. In addition to general hardware and software upgrades, the project sponsors will ask the department managers to provide information for any unique requirements they might have that could affect the upgrades. This task also includes updating the inventory data for network hardware and software. After updating the inventory database, we will send an e-mail to each department manager to verify the information and make changes online as needed. Department managers will be responsible for ensuring that their people are available and cooperative during the physical inventory. Completing this task is



# Scope Baseline

The **approved** project scope statement and its associated WBS and WBS dictionary

## Performance



# Advices to Create a WBS and WBS Dictionary

1. A unit of work should appear at only one place in the WBS
2. The work content of a WBS item is the sum of the WBS items below it
3. A WBS package is the responsibility of only one individual, even though many people may be working on it
4. 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



## Advices to Create a WBS and WBS Dictionary

5. Project team members should be involved in developing the WBS to ensure consistency and buy-in
6. Each WBS package must be documented in a WBS dictionary to ensure accurate understanding of the scope of work included and not included in that item
7. The WBS must be a flexible tool to accommodate inevitable changes while conforms the scope statement





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# Validate Scope

The process of formalizing acceptance of the completed project deliverables.

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project management plan</li><li>2. Project documents</li><li>3. Verified deliverables</li><li>4. Work performance data</li></ol>	<ol style="list-style-type: none"><li>1. Inspection</li><li>2. Decision making</li></ol>	<ol style="list-style-type: none"><li>1. Accepted deliverables</li><li>2. Work performance information</li><li>3. Change requests</li><li>4. Project document updates</li></ol>





# Scope Creep

- The tendency for project scope to keep getting bigger and bigger
- McDonald's Restaurants - create an intranet that would connect its headquarters with all of its restaurants and provide detailed operational information in real time. For example, headquarters would know if sales were slowing or if the grill temperature was correct in every single store—all 30,000 of them in more than 120 countries. \$170M

**Bad?**



# Scope Validation

- Scope Validation involves formal acceptance of the **completed project deliverables**
- The main tools is **inspection**

**Sign-off**





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# Change Is Inevitable



- Users often not exactly show how they want screens to look or what functionality they will really need to improve business performance.



- Developers are not exactly sure how to interpret user requirements, and also have to deal with constantly changing technologies.

# Scope Control

The goal is to influence the factors that cause scope changes, assure changes are processed according to procedures developed as part of integrated change control, and manage changes when they occur.



# Control Scope

The process of monitoring the status of the project and product scope and managing changes to the scope baseline

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"><li>1. Project management plan</li><li>2. Project documents</li><li>3. Work performance data</li><li>4. Organizational process assets</li></ol>	<ol style="list-style-type: none"><li>1. Data analysis</li></ol>	<ol style="list-style-type: none"><li>1. Work performance information</li><li>2. Change requests</li><li>3. Project management plan updates</li><li>4. Project documents updates</li></ol>



# Variance Analysis

- Variance is the difference between planned and actual performance.
- For example, if a supplier was supposed to deliver five special keyboards and you received only four, the variance would be one keyboard.



# Best Practices

- Keep the scope realistic
- Involve users in project scope management
- Use off-the-shelf hardware and software whenever possible
- Follow good project management processes





# Improving User Input

- Develop a good project selection (sponsor, basic project information available)
- Have users on the project team
- Have regular meetings with defined agendas
- Deliver something to project users and sponsors on a regular basis
- Do not promise to deliver what cannot be delivered in a particular time frame
- Locate users with the developers



# Reducing Incomplete and Changing Requirements

- Develop and follow a requirements management **process** that includes procedures for initial requirements determination
- Employ techniques such as prototyping, use case modeling, and Joint Application Design to **understand** user requirements thoroughly
- Put all requirements in **writing** and keep them current and readily available



# Reducing Incomplete and Changing Requirements

- Create a requirements management **database** for documenting and controlling requirements
- Provide adequate **testing** to verify that the project's products perform as expected
- Use a process for reviewing requested requirements changes from a **system's** perspective (project scope changes include associated cost and schedule changes)
- Emphasize **completion** dates (what to give up)
- Allocate **resources** specifically for handling change requests





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# Software

- Word
- Spread sheet
- Mind-mapping
- Web-based applications
- MS Project





# Thanks!



清华大学  
Tsinghua University