# PMP® V5 RDS

## Project Scope Management

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V1.1

# Overview

- Scope Management includes the processes required to ensure that the project includes all the work, and only the work required, to complete the project successfully
- Define and control what is/is not included

# Scope Management Processes

- **5.1 Plan Scope Management** —The process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled.
- **5.2 Collect Requirements**—The process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives.
- **5.3 Define Scope**—The process of developing a detailed description of the project and product.
- **5.4 Create WBS**—The process of subdividing project deliverables and project work into smaller, more manageable components.
- **5.5 Validate Scope**—The process of formalizing acceptance of the completed project deliverables.
- **5.6 Control Scope**—The process of monitoring the status of the project and product scope and managing changes to the scope baseline.

# PMI's View

- Scope must be defined, clear, and formally approved before work starts.
- Requirements are gathered from all the stakeholders.
- Requirement gathering should take a substantial amount of time.
- Work breakdown structure (WBS) should be used on all PMBOK projects.

# PMI's View

- Gold plating (over processing) is not allowed.
- Any change to scope must be evaluated for its effect on time, cost, risk, quality, and resources.
- No changes to scope are allowed without an approved change request.
- Scope changes should not be approved if they do not fit in the project charter.
- PM needs to continuously determine what is and is not included in the project.

# Product Scope

- The features and functions that characterize a product, service, or result
- The resulting product is compared to the product requirements
- Measured against the project management plan

# Project Scope

- The work performed to deliver a product, service, or result with the specified features and functions
- The project scope includes product scope.

# Plan Scope Management

(planning)

# Plan Scope Management

- The process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled
- The key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project

# Scope Management Plan

## Plan Scope Management: Outputs

- How scope will be defined, developed, monitored, controlled, and verified
- Components:
  - Process for preparing a detailed project scope statement
  - Process that enables the creation of the WBS from the detailed project scope statement
  - Process that establishes how the WBS will be maintained and approved
  - Process that specifies how formal acceptance of the completed project deliverables will be obtained
  - Process to control how requests for changes to the detailed project scope statement will be processed

# Requirements Management Plan

## Plan Scope Management: Outputs

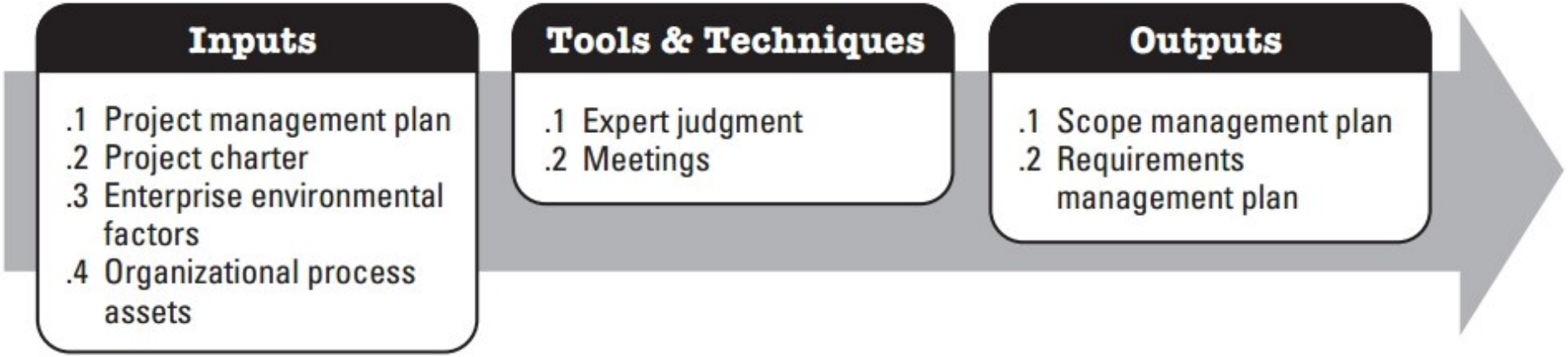
- How requirements will be analyzed, documented, and managed
- Components:
  - How requirements activities will be planned, tracked, and reported
  - Configuration management activities:
    - How changes to the product will be initiated
    - How impacts will be analyzed
    - How they will be traced, tracked, and reported
    - The authorization levels required to approve these changes

# Requirements Management Plan

## Plan Scope Management: Outputs

- Components (cont'd):
  - Requirements prioritization process
  - Product metrics that will be used and the rationale for using them
  - Traceability structure to reflect which requirement attributes will be captured on the traceability matrix.

# Plan Scope Management
## (planning)



# Collect Requirements

(planning)

# Collect Requirements

- The process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives
- The key benefit of this process is that it provides the basis for defining and managing the project scope including product scope

# Requirements

- Include quantified and documented needs and expectations of the sponsors, customers, and other stakeholders
- Be collected in enough details to be measured once project execution begins
- The foundation of the WBS, Cost, Schedule, Quality planning, and procurement

# Requirements Classifications

- Business requirements
- Stakeholder requirements
- Solution requirements: features, functions, and characteristics of the product, service, or result
  - Functional requirements: the behaviors of the product
    - E.g. processes, data, and interactions with the product.
  - Nonfunctional requirements: conditions or qualities required for the product to be effective
    - E.g. reliability, security, performance, safety, etc.

# Requirements Classifications

- Transition requirements:
  - temporary capabilities, such as data conversion and training requirements
- Project requirements:
  - the actions, processes, or other conditions the project needs to meet
- Quality requirements:
  - condition or criteria needed to validate the successful completion of a project deliverable or fulfillment of other project requirements

# Inputs

- Project charter: the high-level requirements defined
- Contact all stakeholders from stakeholders register for more specific input
- Missing a needed requirement can become very expensive, time consuming, and causing problems
- Try to find all requirements before starting the project

# Tools and Techniques

- Interviews
  - Team or PM interviews stakeholders to identify their requirements
- Focus Groups
  - Get a specific set of stakeholders' or subject matter experts' opinions and requirements
  - Members can discuss with each other, directed by a moderator
- Facilitated Workshops:
  - Invite stakeholders with different perspectives
  - Can help quickly define cross-functional requirements and reconcile stakeholder differences
  - Issues discovered more quickly than individual interviews

# Group Creativity Techniques

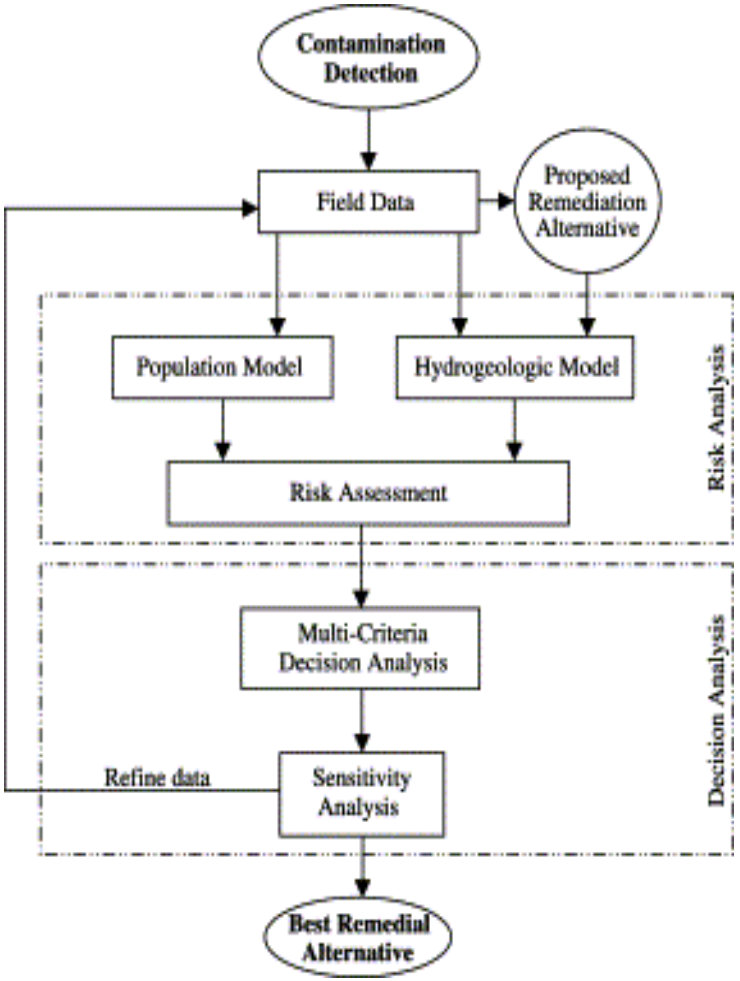
## Collect Requirements: Tools and Techniques

- Brainstorming:
  - Get individual thoughts
  - One person mentions an idea to determine scope
  - Generates an idea from another person
  - Leads to another idea
- Nominal Group Technique
  - Usually done during brainstorming
  - Ranks the most useful ideas from brainstorming

# Group Creativity Techniques

## Collect Requirements: Tools and Techniques

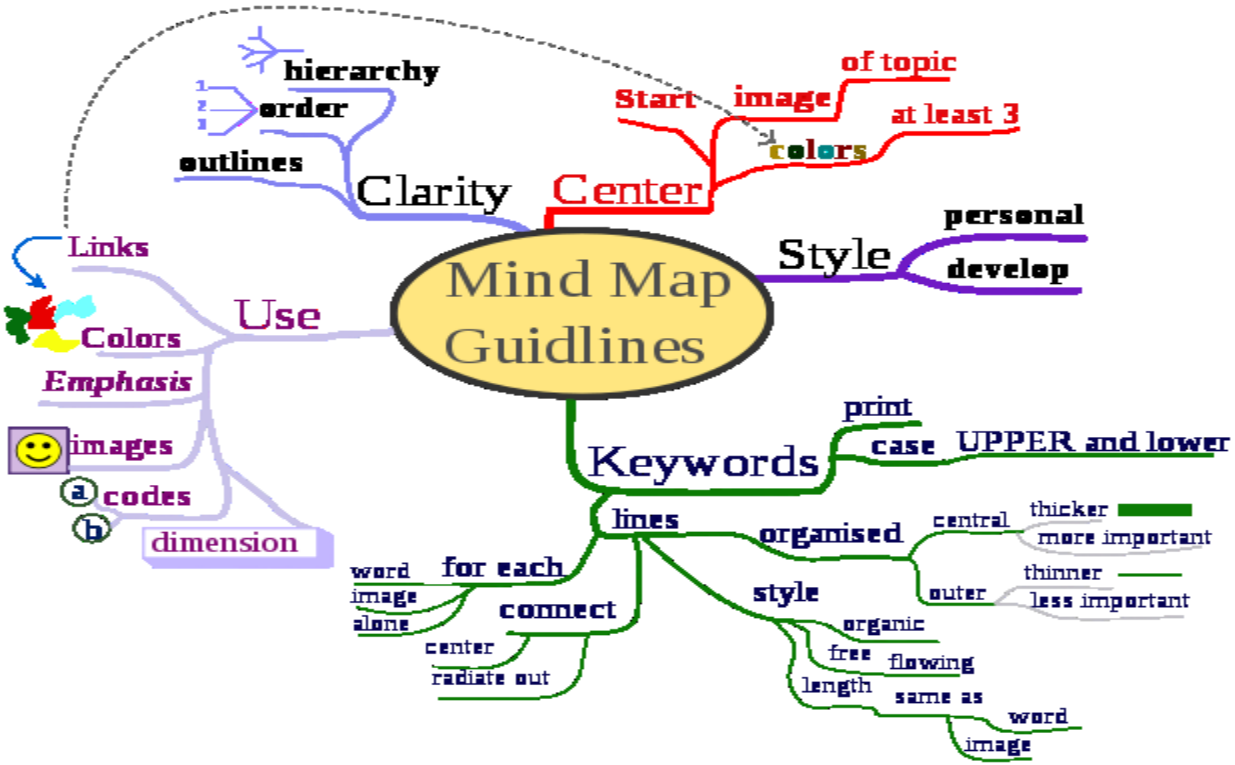
- Multi-criteria decision analysis
  - A technique that utilizes a decision matrix to provide a systematic analytical approach for establishing criteria, such as risk levels, uncertainty, and valuation, to evaluate and rank many ideas



# Group Creativity Techniques

## Collect Requirements: Tools and Techniques

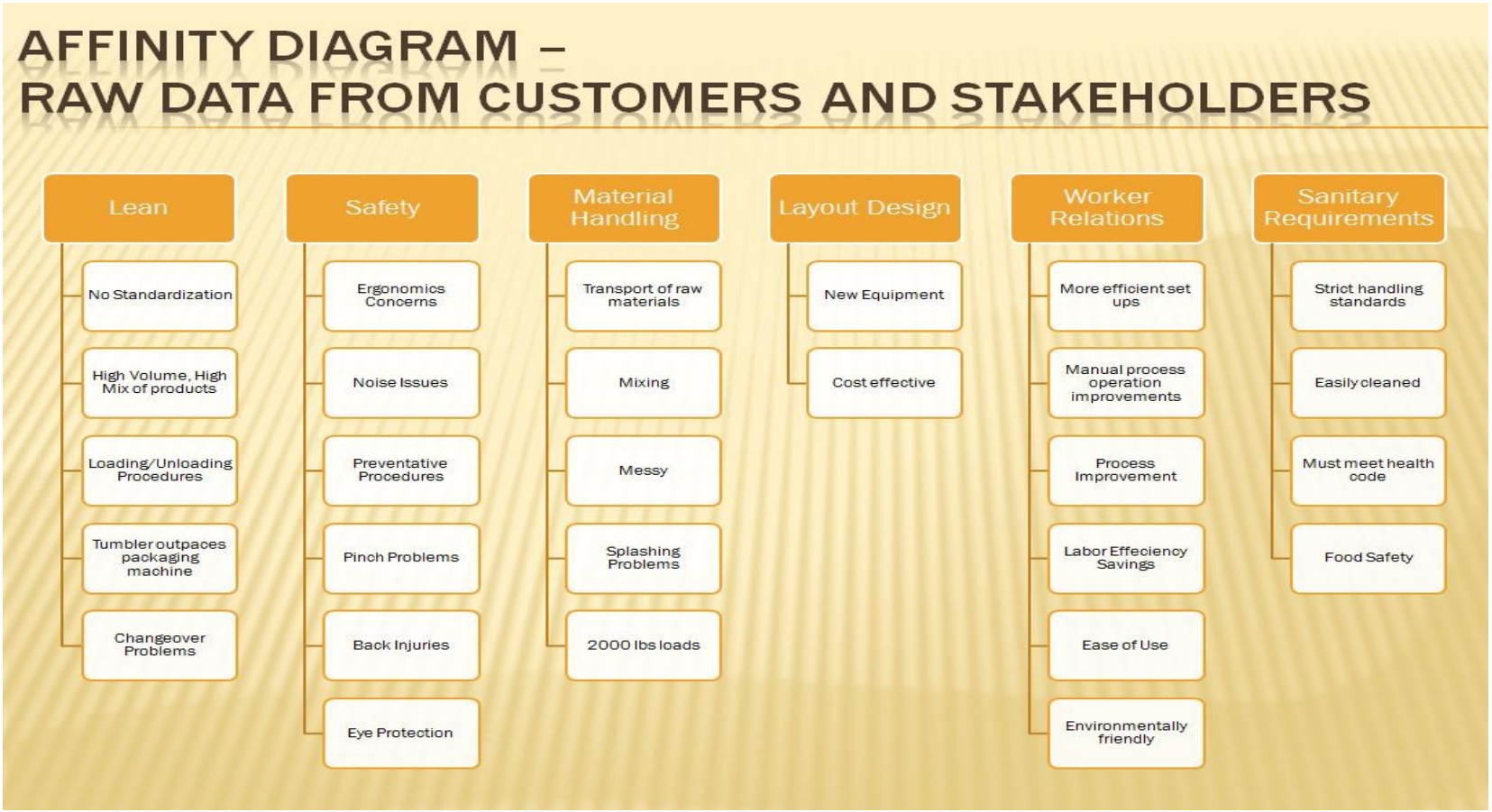
- Idea / mind Maps
  - Diagram of ideas/notes to help generate, classify or record information
  - Reflect commonality and differences in understanding, and generate new ideas



# Group Creativity Techniques

## Collect Requirements: Tools and Techniques

- Affinity Diagrams:
  - Ideas sorted into groups by similarities
  - Each group of requirements is then given a title



# Group Decision-Making Techniques

## Collect Requirements: Tools and Techniques

- The requirements collected from a group must be agreed and documented
- Unanimous:
  - everyone agrees
- Dictatorship:
  - a single person makes decision, may have negative impact to project if stakeholders do not buy-in
- Majority:
  - chooses the decision with more than half of the members' support
- Plurality:
  - go for the one with the largest number of supporters, when there is no majority
- Consensus:
  - general agreement about a decision without formal voting

# Tools and Techniques

- Questionnaires and Surveys
  - Used for large groups
  - Quantitative
- Observation
  - Job shadowing – watching a potential user of the product at work
  - Sometimes participate in the work to help identify requirements

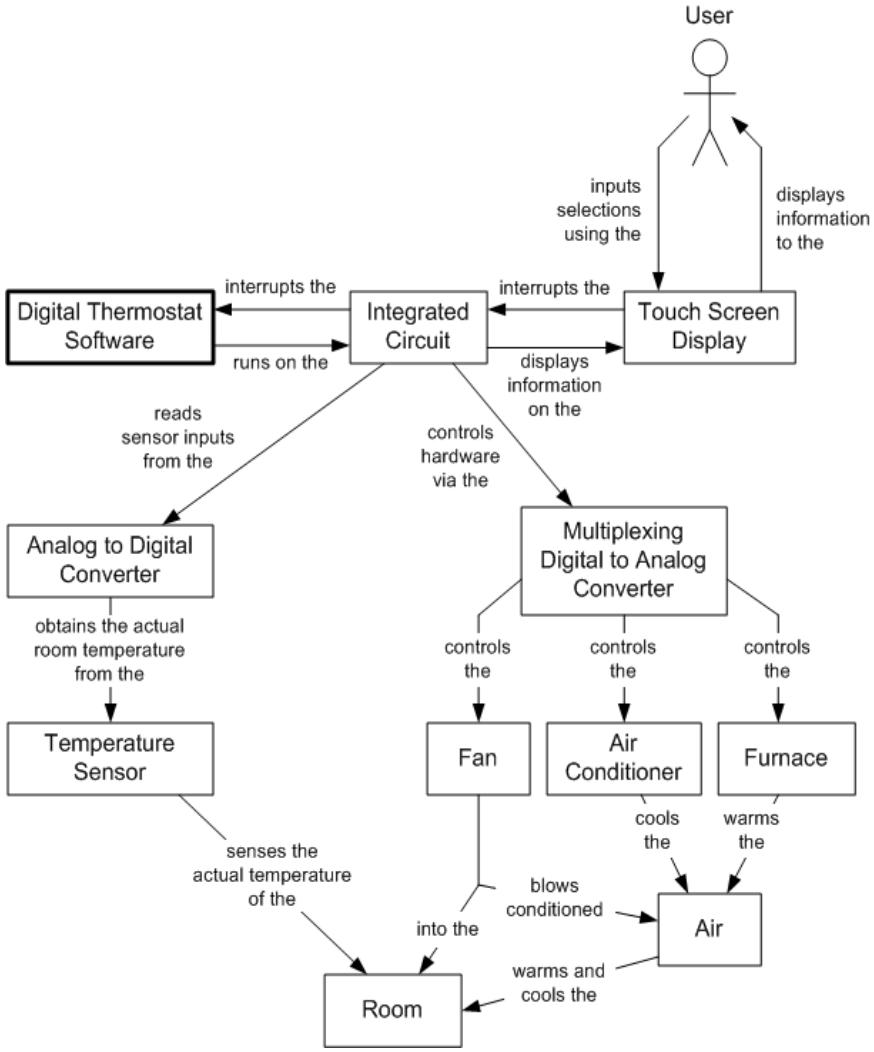
# Tools and Techniques

- Prototype
  - Model of the proposed product
  - Presented to stakeholders for feedback
  - May be updated many times to incorporate the feedback (iterate), until all requirements have been identified
- Benchmarking
  - Comparing actual or planned practices to those of comparable organizations to identify best practices, generate ideas for improvement
  - The organizations compared can be internal or external
    - E.g. CMMI, OPM3

# Context Diagrams

## Collect Requirements: Tools and Techniques

- A scope model
- Visually depict the product scope by showing a business system (process, equipment, computer system, etc.), and how people and other systems(actors) interact with it



# Document Analysis

## Collect Requirements: Tools and Techniques

- To elicit requirements by analyzing existing documentation and identifying information relevant to the requirements.
  - Business plans, marketing literature, agreements, requests for proposal, current process flows, logical data models, business rules repositories, application software documentation, business process or interface documentation, use cases, other requirements documentation, problem/issue logs, policies, procedures, and regulatory documentation such as laws, codes, or ordinances, etc. (no need to remember the details)

# Other Tool

- Delphi Technique
  - Request for information sent to experts (remote) who participate anonymously
  - Response compiled by PM/team
  - Results sent back to them for further review
  - Iterates until consensus is reached

# Requirements Documentation

## Collect Requirements: Outputs

- Helps make sure the requirements are clear and unambiguous – measurable and testable
- Especially when there are many stakeholders
- Also helps make sure the work being done will be accepted

# Requirement Traceability Matrix

**Collect Requirements: Outputs**

- Keep track of
  - Where a requirement came from
  - Analyze requirements when there are proposed changes to project or product scope
- Typical attributes used
  - A unique identifier
  - A textual description of the requirement
  - The rationale for inclusion
  - Owner, source, priority, version, current status (such as active, cancelled, deferred, added, approved) and date completed
- Additional attributes may include
  - Stability, complexity, and acceptance criteria

# 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 |
|---|---|---|---|---|---|---|---|---|
| 001 | 1.0 | | | | | | | |
| | 1.1 | | | | | | | |
| | 1.2 | | | | | | | |
| | 1.2.1 | | | | | | | |
| 002 | 2.0 | | | | | | | |
| | 2.1 | | | | | | | |
| | 2.1.1 | | | | | | | |
| 003 | 3.0 | | | | | | | |
| | 3.1 | | | | | | | |
| | 3.2 | | | | | | | |
| 004 | 4.0 | | | | | | | |
| 005 | 5.0 | | | | | | | |

# Balance Stakeholders Requirements

- Make sure the requirements can be met within the project objectives
- Otherwise, look for options
- Prioritize requirements
- Resolve conflicts

# Resolve Competing Requirements

- The project manager should facilitate the resolution of competing requirements by accepting those that best comply with:
  - The business case
  - The project charter
  - The project constraints
- Reject those
  - Not related to the reason the project was initiated
  - Related, but does not fall within the project charter

For Reference Only

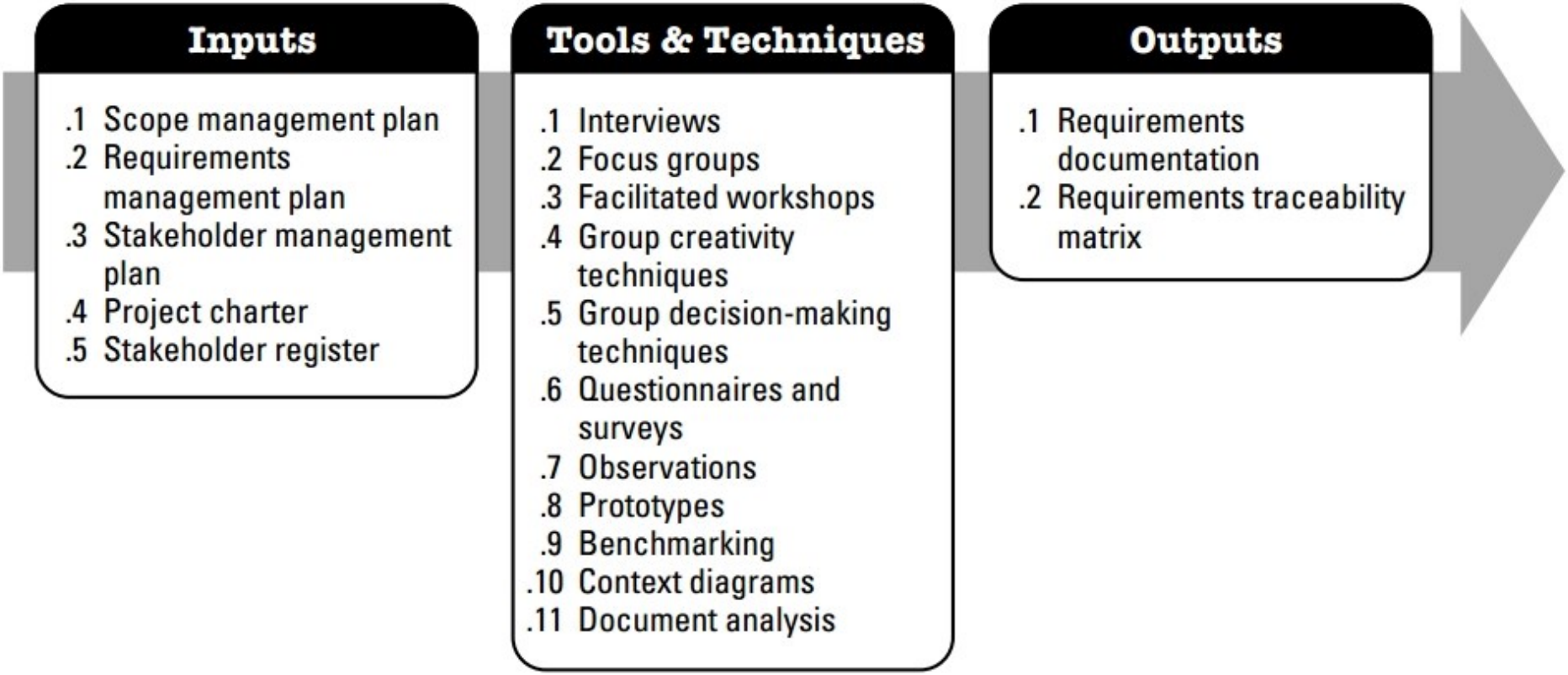
# Prioritize Requirements

- MoSCoW technique
  - Must have
  - Should have
  - Could have
  - Won't have
  - An Agile PM technique

# Conflict Resolution: Additional Actions

- Review the competing requirements against the previous list (the traceability matrix)
- Look for options
- Hold meetings, interviews, and discussions to facilitate the resolution
- Bring suggested changes to the project charter to the sponsor's attention for approval
- Escalate the issue when a fair and equitable solution cannot be facilitated

# Collect Requirements
## (planning)



# Define Scope

(planning)

# Define Scope

- The process of developing a detailed description of the project and product
- The key benefit is that it describes the project, service, or result boundaries by defining which of the requirements collected will be included in and excluded from the project scope
- Builds upon the major deliverables, assumptions and constraints documented during project initiation
- Existing risks, assumptions and constraints are analyzed for completeness
- Additional risks, assumptions and constraints are added as necessary

# Product Analysis

## Define Scope: Tools and Techniques

- Analyze the objectives and description of the product state by the customer or sponsor
  - Then turn them into tangible deliverables
- Efforts may need to be expended to determine and define deliverables
  - Rather than just receiving a complete list from customer

# Project Scope Statement

## Define Scope: Outputs

- Defines
  - What we will do in this project
  - The approved project and product scope
- The project manager should
  - Identify areas where people want but not approved
  - Clarify areas where the work could be easily misunderstood
  - Identify what is NOT included to make it clear those additions are not allowed

# Project Scope Statement

## Define Scope: Outputs

- May include:
  - Product scope description
  - Deliverables
  - Acceptance criteria
  - What is not part of the project (project exclusion)
  - Constraints
  - Assumptions

# Constraints and Assumptions

- Constraints: factors that limit the team's options
- Assumptions: things that are assumed to be true (not yet proved)
- If the constraints change or the assumptions are proven wrong, the project management plan may need to be changed
- Recorded in project scope statement, and are inputs to many project management processes

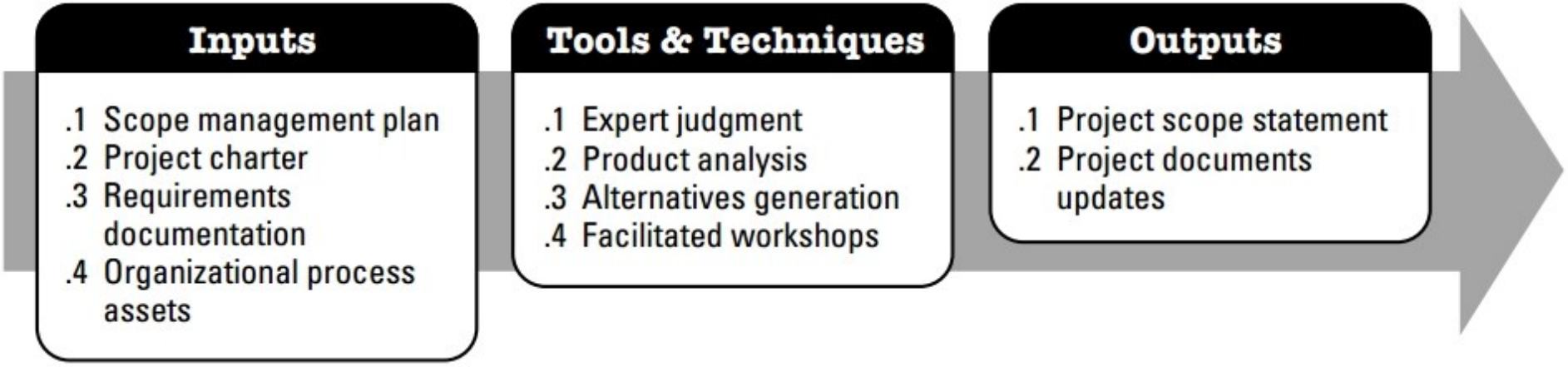
## Project Charter

- 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

# Define Scope
## (planning)

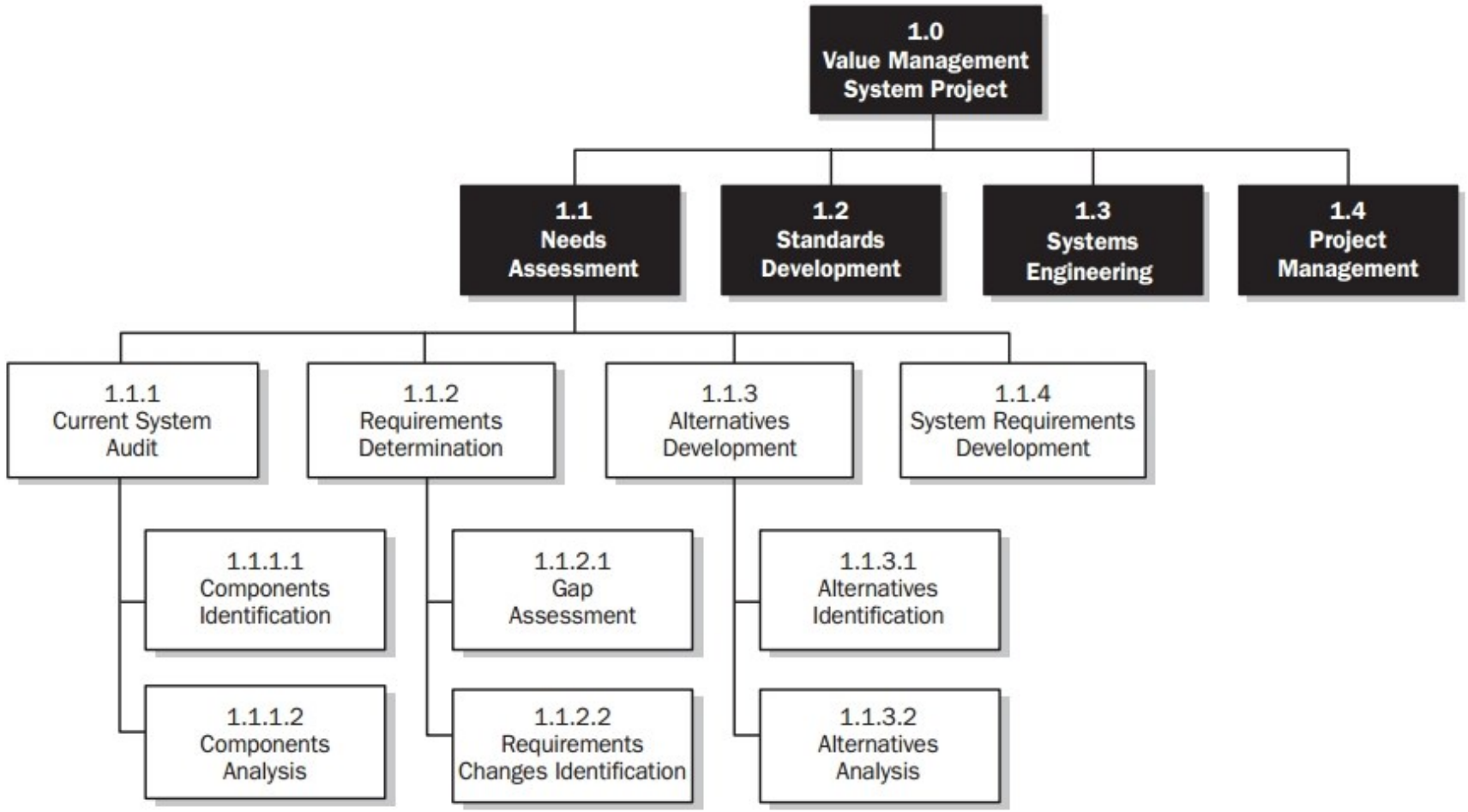


# Create WBS

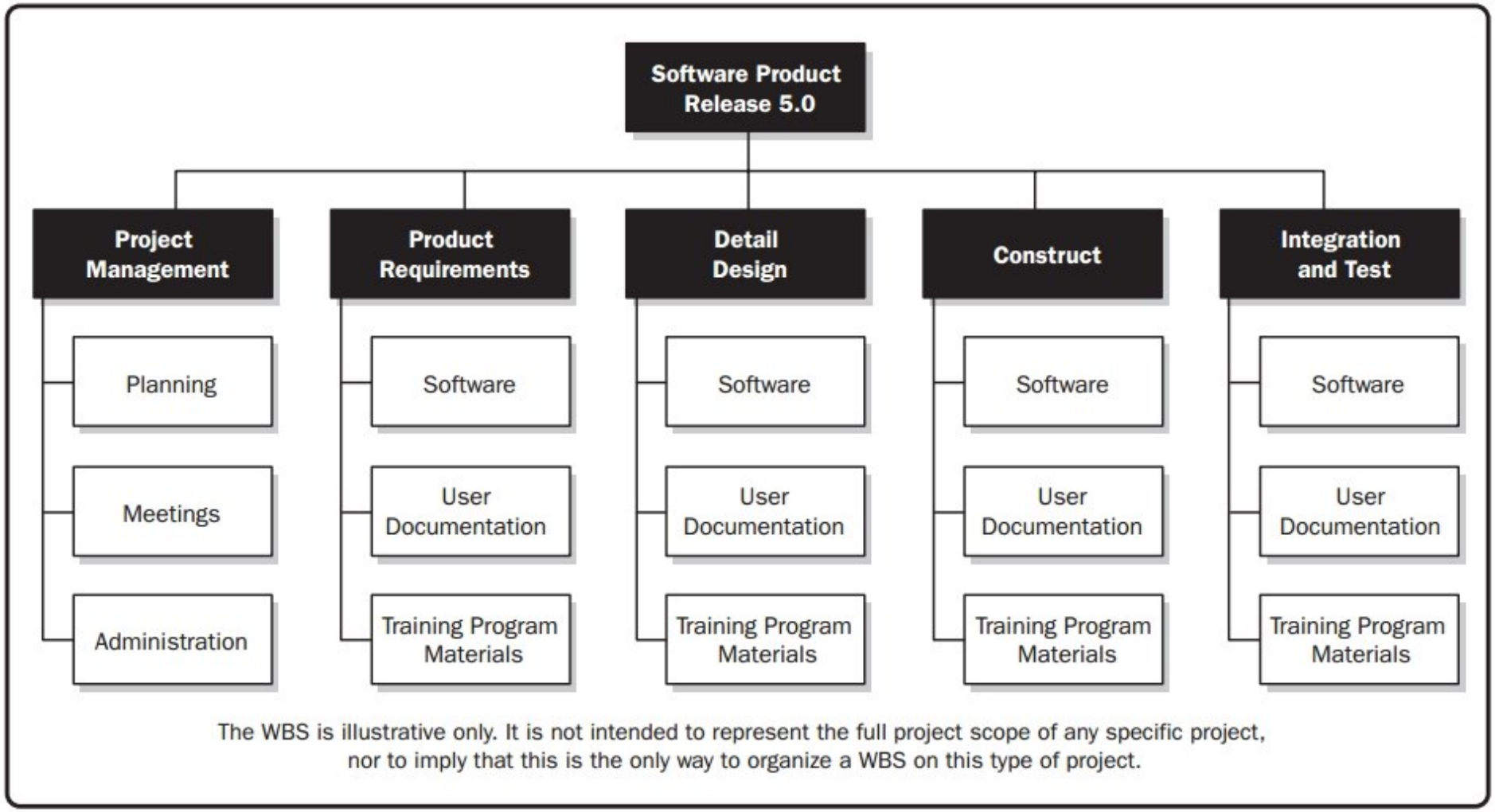
(planning)

# Create WBS

- The process of subdividing project deliverables and project work into smaller, more manageable components
- The key benefit of this process is that it provides a structured vision of what has to be delivered
- Why project scope statement is not enough?
  - Only descriptive
  - Not covering details




The WBS is illustrative only. It is not intended to represent the full project scope of any specific project, nor to imply that this is the only way to organize a WBS on this type of project.

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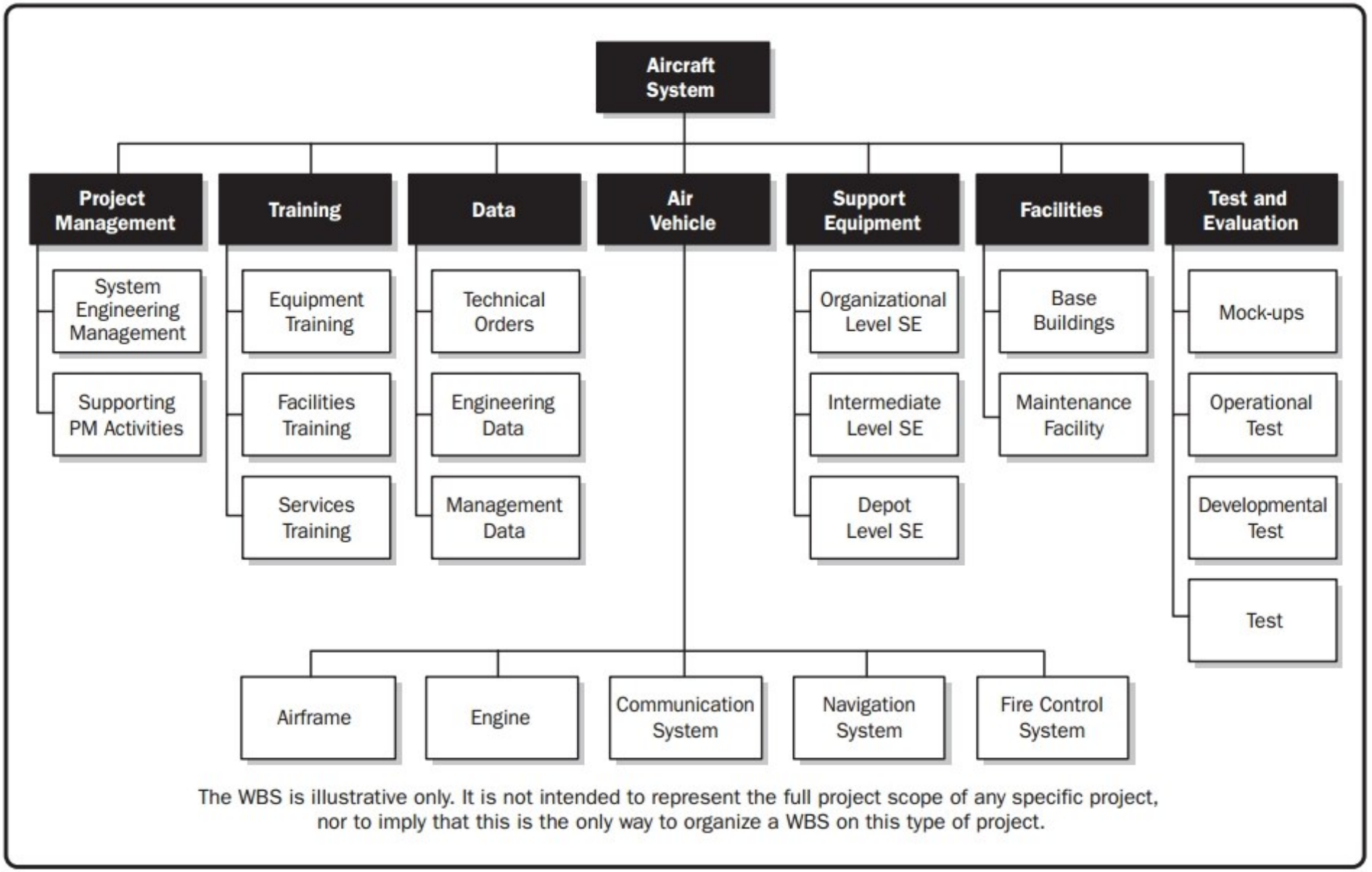


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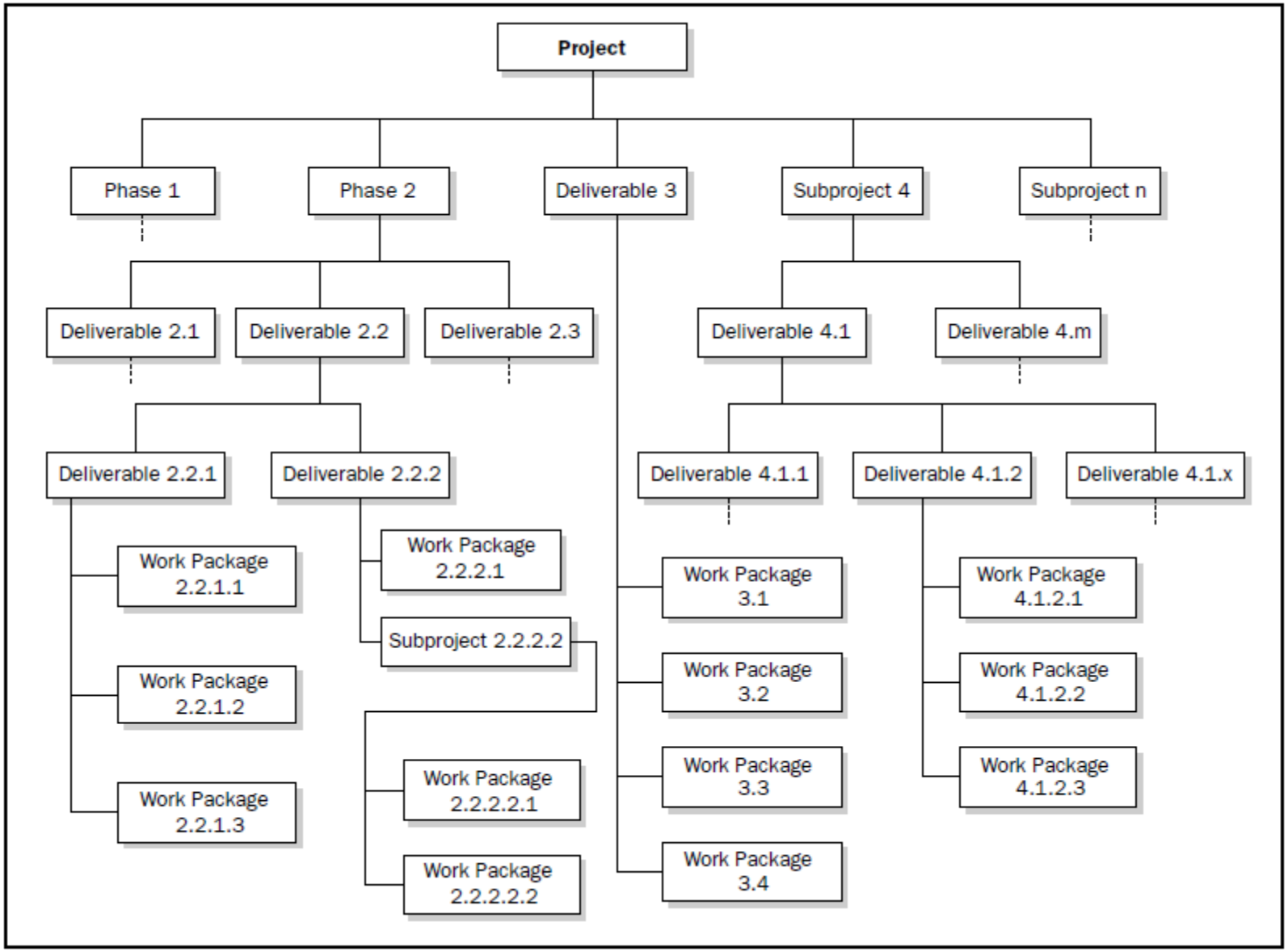
# Work Breakdown Structure

- Subdivide project deliverables and project work into smaller, more manageable components
- Each descending level of the WBS representing an increasingly detailed definition of the project work
- Lowest level WBS contains the work packages
- Work packages can be scheduled, cost estimated, monitored and controlled

# WBS

- WBS is created with input from the team and stakeholders
- Allows the team to walk through the project in their minds
- Helps people better understand the project and makes it feel more achievable
- Helps get the team and other stakeholders buy-in the deliverables
- A WBS is a complete hierarchy of the project


Project
Phase 1
Phase 2
Deliverable 3
Subproject 4
Subproject n
Deliverable 2.1
Deliverable 2.2
Deliverable 2.3
Deliverable 4.1
Deliverable 4.m
Deliverable 2.2.1
Deliverable 2.2.2
Deliverable 4.1.1
Deliverable 4.1.2
Deliverable 4.1.x
Work Package 2.2.1.1
Work Package 2.2.1.2
Work Package 2.2.1.3
Work Package 2.2.2.1
Subproject 2.2.2.2
Work Package 2.2.2.2.1
Work Package 2.2.2.2.2
Work Package 3.1
Work Package 3.2
Work Package 3.3
Work Package 3.4
Work Package 4.1.2.1
Work Package 4.1.2.2
Work Package 4.1.2.3

# How to create a WBS?

- Project title is at the top of the WBS
- Next level is project life cycle
- Later levels break the project into smaller pieces
- Decomposition continues until the work packages can be managed
  - 2 approaches: 8-80 hours rule OR easy for estimation
- Top-down effort
- A WBS is deliverable-oriented and includes only deliverables that are needed
- Deliverables not in the WBS are not part of the project

# Work Packages

- Work packages are reached when deliverables:
  - Can be realistically and confidently estimated
  - Can be completed quickly
  - Can be completed without interruption
  - May be outsourced or contracted out
  - Nouns, not actions: “program files”, “installed hardware”

# Benefits of using WBS

- Helps prevent work from slipping through the cracks
- Provides the project team members with an understanding of where the pieces fit into the PM plan and gives them an indication of the impact of their work on the project as a whole
- Facilitates communication and cooperation among the project team and other stakeholders
- Helps prevent changes

# Benefits of using WBS

- Focuses the team's experience on what needs to be done, resulting in higher quality and a project that is easier to manage
- Provides a basis for estimating staff, cost, and time
- Provides PROOF of the need for staff, cost, and time
- Gets team buy-in and builds the team

# How to make use of WBS

- When there is a scope change; the WBS, along with the scope statement, can help you see if the new scope is within the planned scope
  - Part of integrated change control to evaluate any impacts of other changes on scope
- As a way to control scope creep by reminding everyone what work is to be done
- As a communication tool
- To help new team members see their roles

# A WBS is…

- Identifies all the deliverables to be completed
- Is the foundation of any projects
- Is VERY important (a core tool for the PMBOK framework)
- Should exist for every project
- Forces you to think through all aspects of the project
- Can be reused for other project
- Does not show dependencies
- A tool of decomposition

# Control Account

- The WBS is finalized by establishing control accounts for the work packages and a unique identifier from a code of accounts.
- These identifiers provide a structure for hierarchical summation of costs, schedule, and resource information.
- A control account is a management control point: accounting purpose
- Control accounts can be used to group related work packages; these packages can be assigned to a responsible person (team manager)

# WBS Dictionary

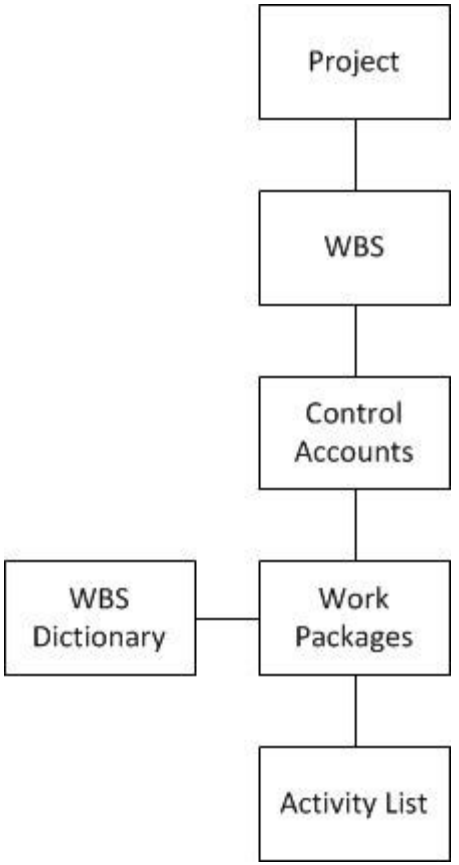
- A description of the work to be done for each WBS work package
- Helps the resulting work better matches what is needed
- Prevent scope creep
- Can be used as part of work authorization system to inform team members of when their work package is going to start, schedule milestones, etc.

# WBS Dictionary Contents

- Code of account identifier
- Description of work
- Assumptions and constraints
- Responsible organization
- Schedule milestones
- Associated schedule activities
- Resources required
- Cost estimates
- Quality requirements
- Acceptance criteria
- Technical references
- Agreement information

# The Importance of WBS

- WBS is the foundation (core tool used in PMBOK) for planning and controlling a project.



# Scope Baseline

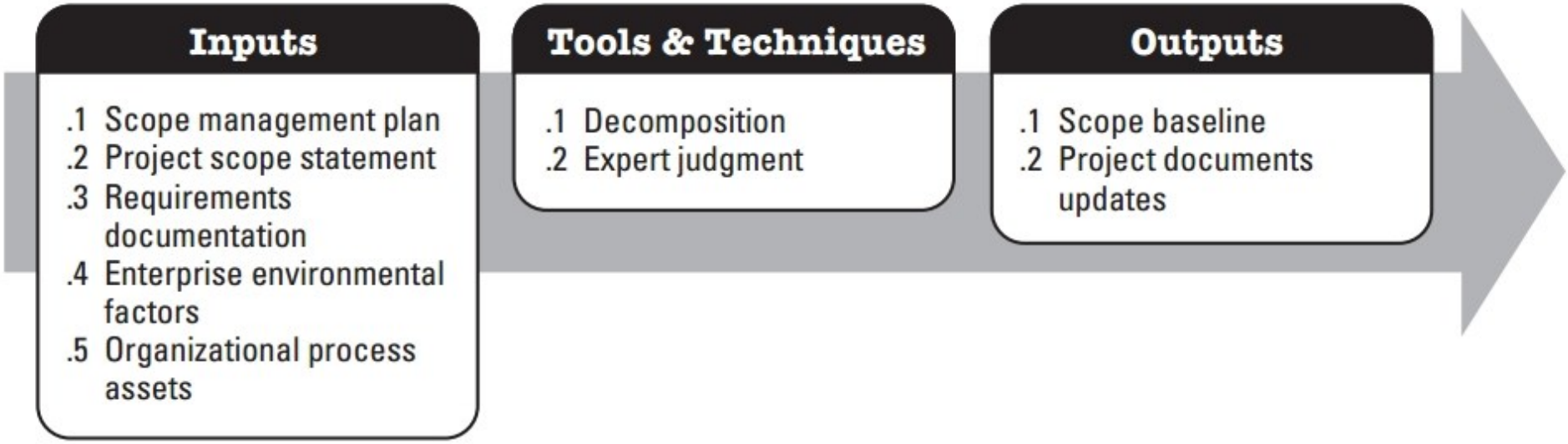
## Create WBS: Outputs

- It includes:
  - Project scope statement
  - WBS
  - WBS dictionary
- Scope baseline is contained in the project management plan

# Exam Notes

- Project Management Plan contains
  - Scope baseline includes
    - WBS contains
      - Work packages can be breakdown into
        - » Activities
- Updating activities, work packages, WBS, or Scope Baseline means updating Project Management Plan

# Create WBS
## (planning)



# Validate Scope

(monitoring and controlling)

# Validate Scope

- The process of formalizing acceptance of the completed project deliverables
- The key benefit of this process is that it brings objectivity to the acceptance process and increases the chance of final product, service, or result acceptance by validating each deliverable
- V4 name: Verify Scope

Validate Scope

# Inputs

- Validated Deliverables from the Control Quality process
- Requirements Traceability Matrix, to track where requirements came from, and proved they are achieved
- Requirements documentation

# Inspection

## Validate Scope: Tools and Techniques

- Measuring, examining, and validating to determine whether deliverables meet requirements and acceptance criteria
- May be called reviews, product reviews, audits, walkthroughs

Validate Scope

# Outputs

- Customer either accepts deliverables or request changes
- Thus outputs include:
  - Accepted deliverables
  - Change requests
  - Work performance information
  - Project document updates

# More about Validate Scope

- Done at the end of each phase, and during the monitoring and controlling process group
- Can be performed multiple times with customers
- Validate scope gets formal acceptance of interim deliverables, while Close Project process gets the final customer sign-off

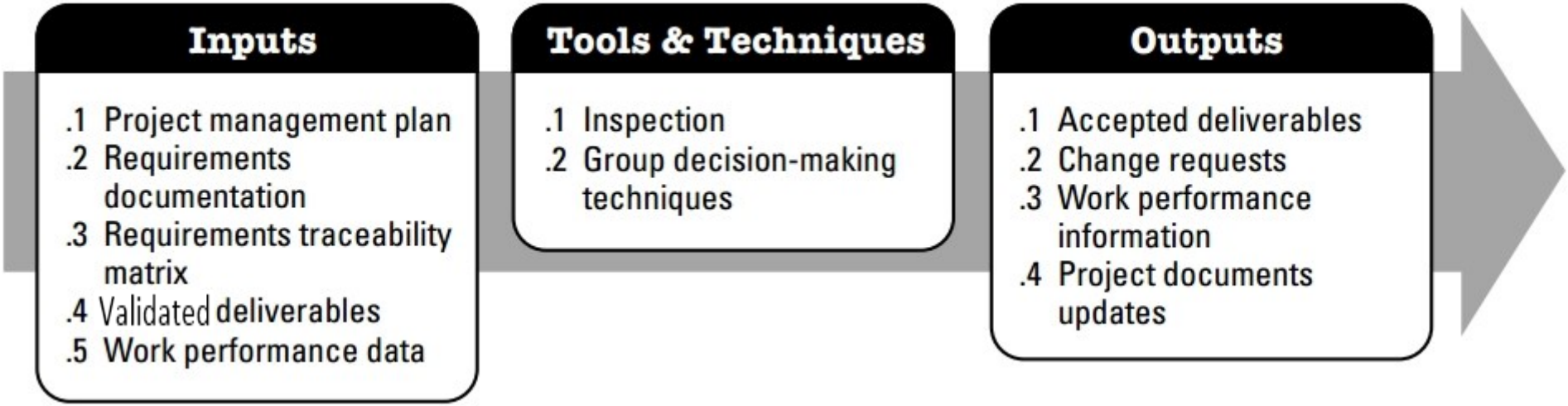
# Validate Scope and Control Quality

- Both processes involve checking for correctness of the work
- Control Quality: the quality control department checks to see if quality requirements are met
- Validate Scope: customer checks and hopefully accepts the deliverables

# On Deliverables Revisited

- Direct and Manage Project Work (process) → Deliverables (output)
- Deliverables (input) → Control Quality (process) → Validated Deliverables (output)
- Validated Deliverables (input) → Validate Scope (process) → Accepted Deliverables (output)
- Accepted Deliverables (input) → Close Project or Phase (process) → Final Product, Service, or Result transition (output)

# Validate Scope
## (monitoring and controlling)



# Control Scope

(monitoring and controlling)

# Control Scope

- The process of monitoring the status of the project and product scope and managing changes to the scope baseline
- The key benefit is that it allows the scope baseline to be maintained through out the project
- Ensures all requested changes and recommended corrective or preventive actions are processed through the Perform Integrated Change Control process
- Manage the actual changes when they occur, and is integrated with other control processes

# How to Control Scope?

- Have work completed and a clear definition of what the scope is (project scope baseline)
- Be aware of the original requirements in the requirements documentation and requirement traceability matrix
- Measure scope performance against the scope baseline to check variances and decide if corrective or preventive actions are needed
- Determine if updates to the scope baseline or other parts of the project management plan is needed
- Look for impact of scope change

# Variance Analysis

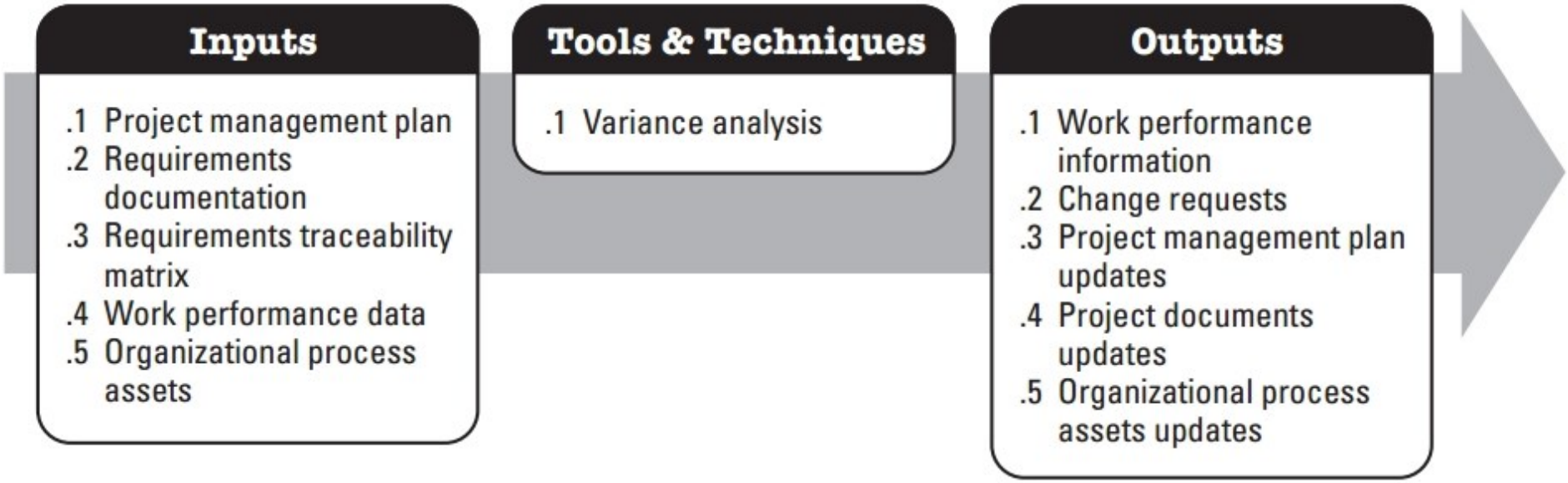
**Control Scope: Tools and Techniques:**

- Determining the cause and degree of difference between the baseline and actual performance.
- Project performance measurements are used to assess the magnitude of variation from the original scope baseline.
- Determining the cause and degree of variance relative to the scope baseline and deciding whether corrective or preventive action is required.

# Points to Note

- A proactive process: need to think about where changes to scope are coming from, and to prevent or remove the need for any more changes from that source
- PM must control scope:
  - Control the project according to the project management plan and to meet all baselines
  - Any changes must follow the approved change control process

# Control Scope
## (monitoring and controlling)



# Exercise

- Who determines the project scope requirements of a new project?

A. The customer
B. The stakeholders
C. The project manager
D. Senior management

Answer: B

- Which of the following BEST describes when the baseline can be changed?
  A. Only under emergency conditions
  B. The original baseline is always maintained throughout the project
  C. With any approved changes
  D. When the project sponsor determines it is appropriate

Answer: C

- Which of the following BEST describes how a work breakdown structure can be used to determine resources?

A. The WBS breaks the project into one-person activities.

B. The small work packages that the WBS provides make it easier to determine what expertise is needed.

C. It lists the names of the resources to be used.

D. It enables management to list the resource hierarchy.

Answer: B

- A software system was accepted by the customer, but has been found to give unexpected results. Which of the following BEST describes what the project manager should do FIRST?.

A. Review the customer's inspection process.
B. Change the activity sequencing.
C. Apologize to the customer.
D. Review the Validate Scope process

Answer: D

- Which of the following statement about work breakdown structures is FALSE:
  A. They are created by the project manager.
  B. They prevent work from slipping through the cracks.
  C. They provide a basis for estimating the project.
  D. They help to organize the work.

  Answer: A

- Which of the following is CORRECT in regard to the Control Scope process?

A. Effective scope definition can lead to a more complete project scope statement.
B. The Control Scope process must be done before scope planning.
C. The Control Scope process must be integrated with other control processes.
D. Controlling the schedule is the most effective way of controlling scope.

Answer: C

- During a walk-through of a work package, you discover that a team member is completing the work differently than stated in the WBS dictionary. How should you deal with this?

A. Replace the team member.
B. Determine if the alternative way is acceptable to the functional manager.
C. Ask the team member if the changes are necessary.
D. Determine if the changes also change the scope of the work package.

Answer: D

- The customer wants to expand the product scope after the performance measurement baseline has been established. Which document will the customer need to submit?

A. Change request
B. Project scope statement
C. Performance measurements
D. Activity attributes

Answer: A

- The work breakdown structure is created by:
  A. The team.
  B. The project manager.
  C. Management.
  D. The sponsor.

Answer: A

- To manage a project effectively, work should be broken down into small pieces. Which of the following does NOT describe how far to decompose the work?

A. Until it has a meaningful conclusion
B. Until it cannot be logically subdivided further
C. Until it can be done by one person
D. Until it can be realistically estimated

Answer: C

- A project manager is in the process of validate scope of a deliverable with the customer. What is the MOST important thing the project manager should ensure?
  A. Accuracy
  B. Timeliness
  C. Acceptance
  D. Completeness

Answer: C

- A work breakdown structure is an input to all of the following processes EXCEPT:
  A. Define Activities
  B. Estimate Costs
  C. Perform Quality Assurance
  D. Plan Procurements

Answer: C

- Which of the following is an output of the Collect Requirements process?
  A. Requirements traceability matrix
  B. Project scope statement
  C. Work breakdown structure
  D. Requested scope changes

Answer: A

- A project manager believes that modifying the project scope may provide added value for the customer. What should the project manager do?
  A. Change the scope baseline.
  B. Contact the customer to determine if the change adds value.
  C. Call a meeting of the change control board.
  D. Change the project's objectives.

Answer: B

- The project manager wishes to use the Delphi technique to obtain expert opinion on some difficult technical issues she's facing. What should she be careful to do?

A. Make sure the experts consulted are recognized for their input.
B. Compare information and work toward a single opinion.
C. Consult the stakeholders.
D. Meet together with the experts to obtain consensus.

Answer: B

- Over the last few weeks, the team has made three changes to the activities on the project. The project manager must be MOST careful to:

A. Record all the changes.
B. Provide documentation on all the changes to the sponsor.
C. Make sure the changes are reflected in the project scope baseline.
D. Prevent more changes from occurring.

Answer: C

# The End