Project Management Institute.

LESSON 7

Predictive, Plan-Based Project Methodology

Understanding the Traditional Approach to Project Management

Version 2.0 | June 2024 Release



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

In This Session:

7A Tailoring a Predictive Life Cycle

7B Developing a Project Management Plan—Scope and Schedule (Includes Resource and Cost Estimations)

7C Developing a Project Management Plan—Quality

7D Developing a Project Management Plan—Uncertainty and Risk

7E Project Integration

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



7A Tailoring a Predictive Life Cycle

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Factors to Consider When Tailoring a Project Life Cycle



Delivery time



Optimizing value



Quality of deliverables and processes



Costs and budget



Compliance with regulations and standards



Diversity of stakeholder expectations



Adapting to change

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Tailored Life Cycle Examples



Company A

I. Approvals
II. Land acquisition
III. Construction
IV. Interiors
V. Delivery/handover



Company B

I. Approvals
II. Vendor onboarding
III. Land acquisition
IV. Design and prototype
V. Construction
VI. Floors
VII. Interiors
VIII. Delivery/handover

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



7B Developing a Project Management Plan—Scope and Schedule

Includes Resource and Cost Estimates

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Developing a Project Management Plan



Process Group
Planning

Processes	
• Collect Requirements	• Estimate Cost
• Define Scope	• Develop Schedule
• Create WBS	• Plan Quality Management
• Define Activities	• Plan Resource Management
• Sequence Activities	• Identify Risks
• Estimate Activity Durations	• Plan Risk Responses
• Estimate Resources	

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

What Is a Project Management Plan?

ALL projects should have a project management plan

Definition:



A document that describes how the project will be executed, monitored and controlled, and closed.

Explanation from *PMBOK® Guide*—Seventh Edition:

A plan is a proposed means of accomplishing something. Project teams develop plans for individual aspects of a project and/or combine all of that information into an overarching project management plan. Plans generally are written documents but may also be reflected on visual/ virtual whiteboards.

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

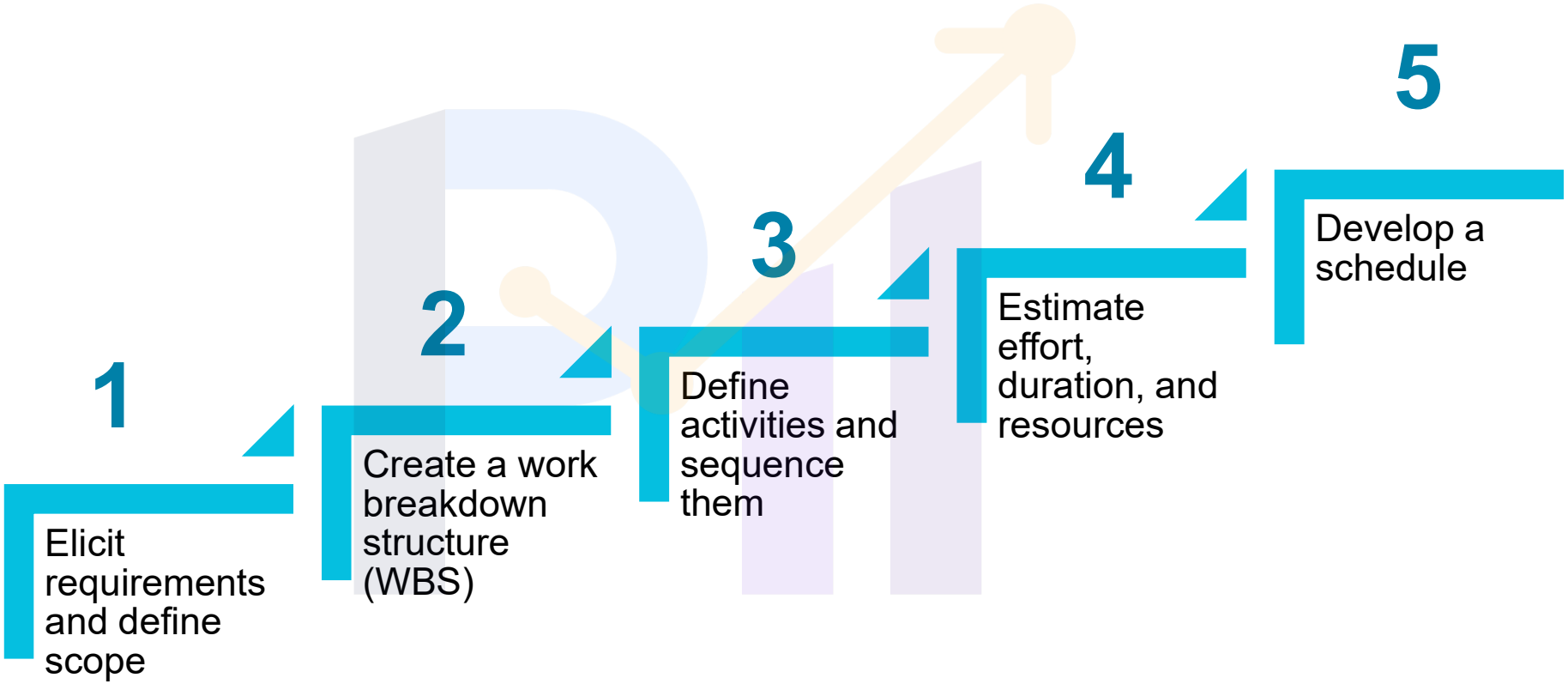
Project Management Plan Components

- **Requirements management plan**—Describes how requirements will be analyzed, documented, and managed
- **Scope management plan**—Describes how the scope will be defined, developed, monitored, controlled, and validated
- **Schedule management plan**—Establishes the criteria and the activities for developing, monitoring, and controlling the schedule



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI ® Workshop.

Steps to Developing a Project Management Plan



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Step 1: Elicit Requirements and Define Scope

1

Elicit requirements and define scope

Requirements elicitation leads to a defined scope, delivered in a **scope statement.**

- Includes all products, services, and results to be delivered
- Aims to ensure customer satisfaction
- Helps us avoid scope creep

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Concepts Related to Scope and Requirements



Requirement— A measurable condition or capability that must be present in a product, service, or result to satisfy a business need

Scope—The sum of the products, services, and results to be provided as a project

Scope baseline—The approved version of a scope statement, work breakdown structure (WBS), and its associated WBS dictionary that can be changed using formal change control procedures and is used as the basis for comparison to actual results

Scope statement—Details about project deliverables and the major objectives of a project, including measurable outcomes

Scope creep—The uncontrolled expansion of project scope without adjustments to time, cost, and resources.

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Elicit Requirements



Ask well-thought-out questions of stakeholders



Assist stakeholders in formulating requirements



Use appropriate techniques to elicit information



Focus on “what,” not “how”

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Elicitation Techniques (1 of 3)

Technique	What Is It?	Advantages	Disadvantages
Brainstorming	Asking a group to consider new or different solutions	Can quickly generate a lot of ideas with multiple perspectives	Groups tend to discover only high-level ideas and don't explore needs or solutions in depth
Document Analysis	Analyzing existing documentation and identifying information relevant to requirements	Fast approach to gathering insights about the current state or future solution	Documentation might be outdated, nonexistent, or inaccurate; review is time-consuming
Requirements Workshop	Facilitated, focused sessions with cross-functional stakeholders to define product requirements	Large, structured, cross-functional groups from different departments can participate	Workshop length can be burdensome; excellent facilitation is required

PMI Guide to Business Analysis (2017) Section 6.3.2

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Elicitation Techniques (2 of 3)

Technique	What Is It?	Advantages	Disadvantages
Focus Groups	Prequalified stakeholders and subject matter experts discuss a proposed product, service, or result	Provides an opportunity to validate ideas from experts or eventual customers	Requirements gathered tend to be limited to the immediate discussion
Interview	Elicit information from stakeholders with questions and document responses	Works well with a small number of stakeholders or to reduce confusion	Single perspective might be biased
Observation	Directly viewing people in their environment to see how they perform their jobs or tasks and carry out processes	Observing nonverbal behavior allows visualization of needs	Observation requires access to stakeholders and can be intrusive

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Elicitation Techniques (3 of 3)

Technique	What Is It?	Advantages	Disadvantages
Surveys	Written questions to elicit information from large groups over a short time	Information can be quantified easily; suitable for benchmarking against a large pool of stakeholders; fast and easy to implement and deliver	Requires competence in crafting questions correctly to prevent skewing results; user fatigue; low response rates
Prototyping or Storyboarding	Obtaining early feedback on requirements by providing a working model of the expected product before building	Enables clear understanding of requirements	Can get very technical as information is captured and modeled; limited value beyond the project

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Selection of Elicitation Techniques by Number of Participants

Technique	Number of Participants				
	1	2–5	6–10	11–20	> 20
Brainstorming	✓	✓	✓		
Document analysis	✓	✓	✓		
Facilitated workshops		✓	✓	✓	
Focus Groups				✓	✓
Interviews	✓	✓	✓	✓	
Observation	✓	✓	✓	✓	
Prototyping/storyboarding	✓	✓	✓		
Surveys				✓	✓

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Use Benchmarking to Compare With Industry Standards



The comparison of actual or planned products, processes, and practices to those of comparable organizations to identify good practices, generate ideas for improvement, and provide a basis for measuring performance

How

Benchmarking compares your organization's practices, processes, and measurements of results against **established standards** or **"best in class" organizations**

When

When **data can't be collected** or insufficient information exists within an organization to understand a current state, benchmarking results may be used to provide information

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Analyze and Trace Requirements

Objectives of Requirements Analysis:

- Ensure stakeholders understand the requirements
- Present the **requirements in sufficient detail** for the technical team **to implement the planned solution**

- Traceability is the **ability to track** product requirements from their **origin to the deliverables** that satisfy them
- Record approved requirements in a **traceability matrix**
- **Manage any changes** to requirements because they **affect scope**

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Requirements Traceability Matrix

A grid that links product requirements from their origins to the deliverables that satisfy them

Project Management Institute. Process Groups: A Practice Guide. 2022ç

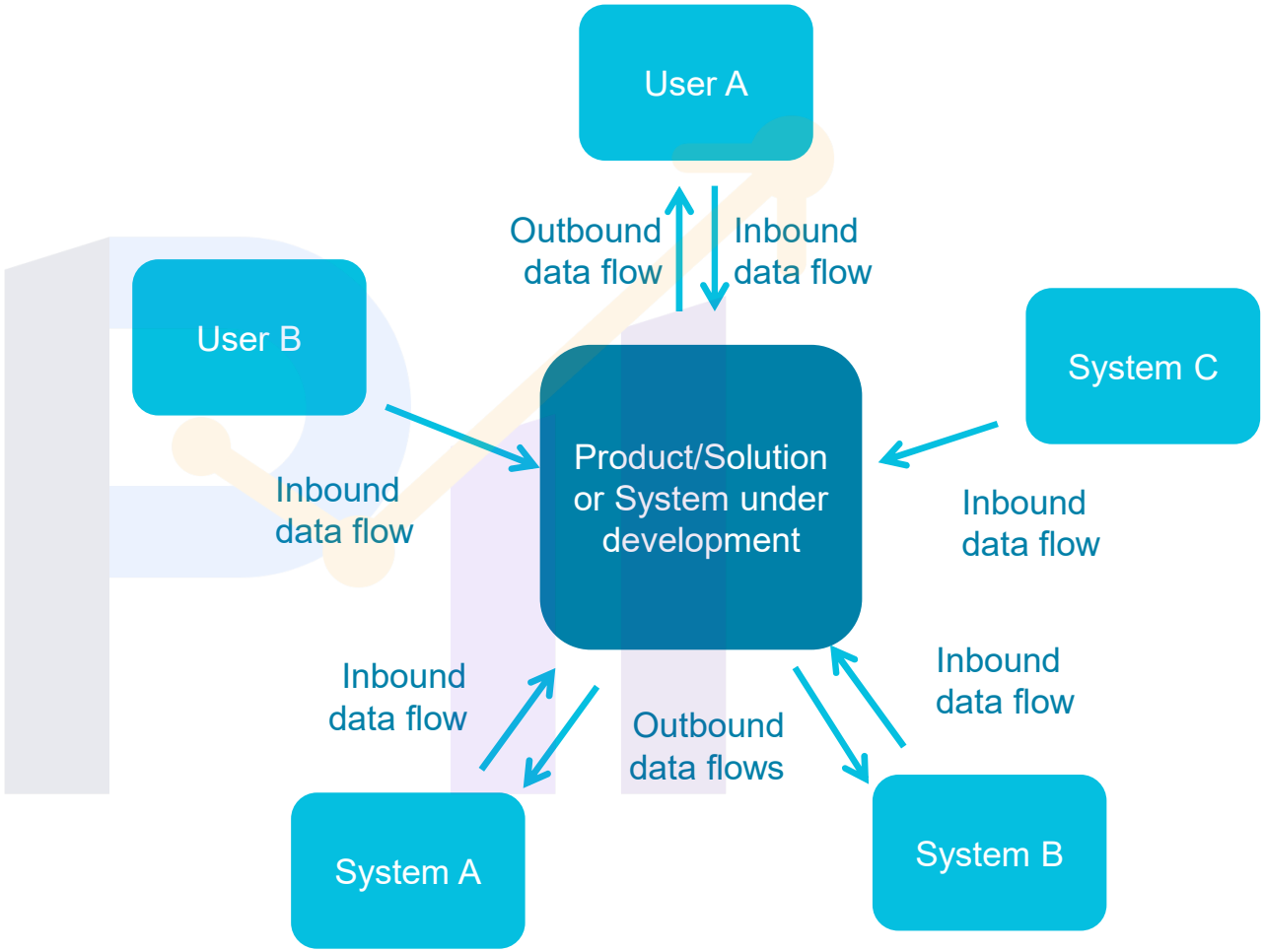
Requirements Traceability Matrix

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							

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

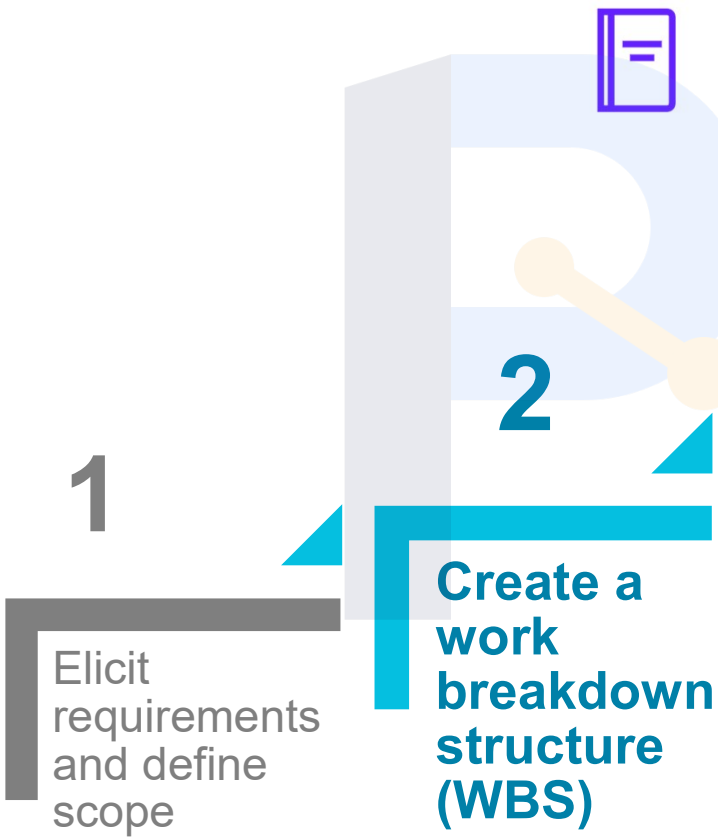
Context Diagram:

A Graphical Way to Represent Requirements



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Step 2: Create a Work Breakdown Structure (WBS)



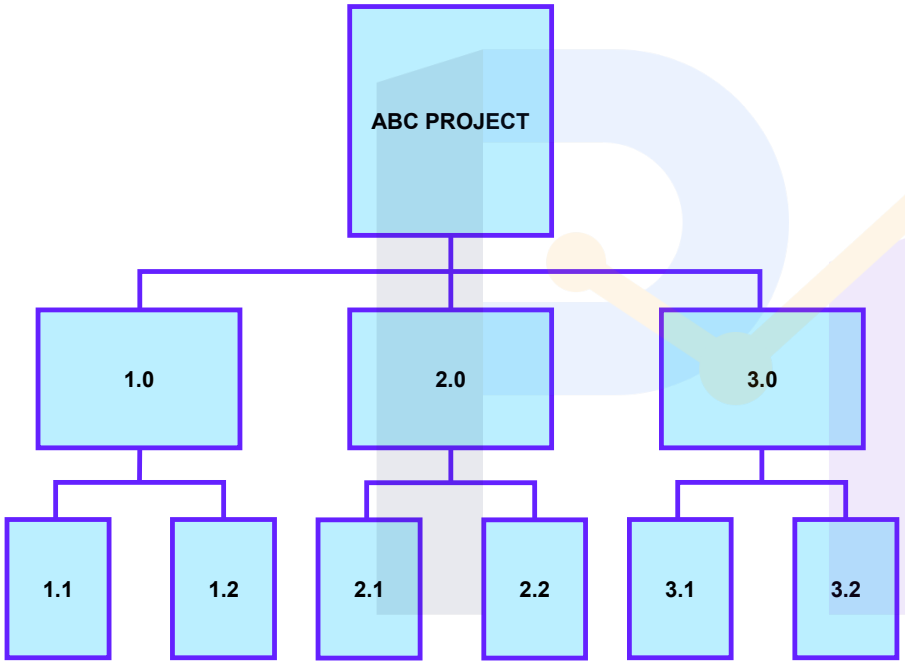
WBS—Hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables

Decomposition is the subdivision of the scope into smaller, more manageable pieces

A **work package** is the work defined at the lowest level of the work breakdown structure (WBS) for which cost and duration are estimated and managed

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Creating a Work Breakdown Structure (WBS)



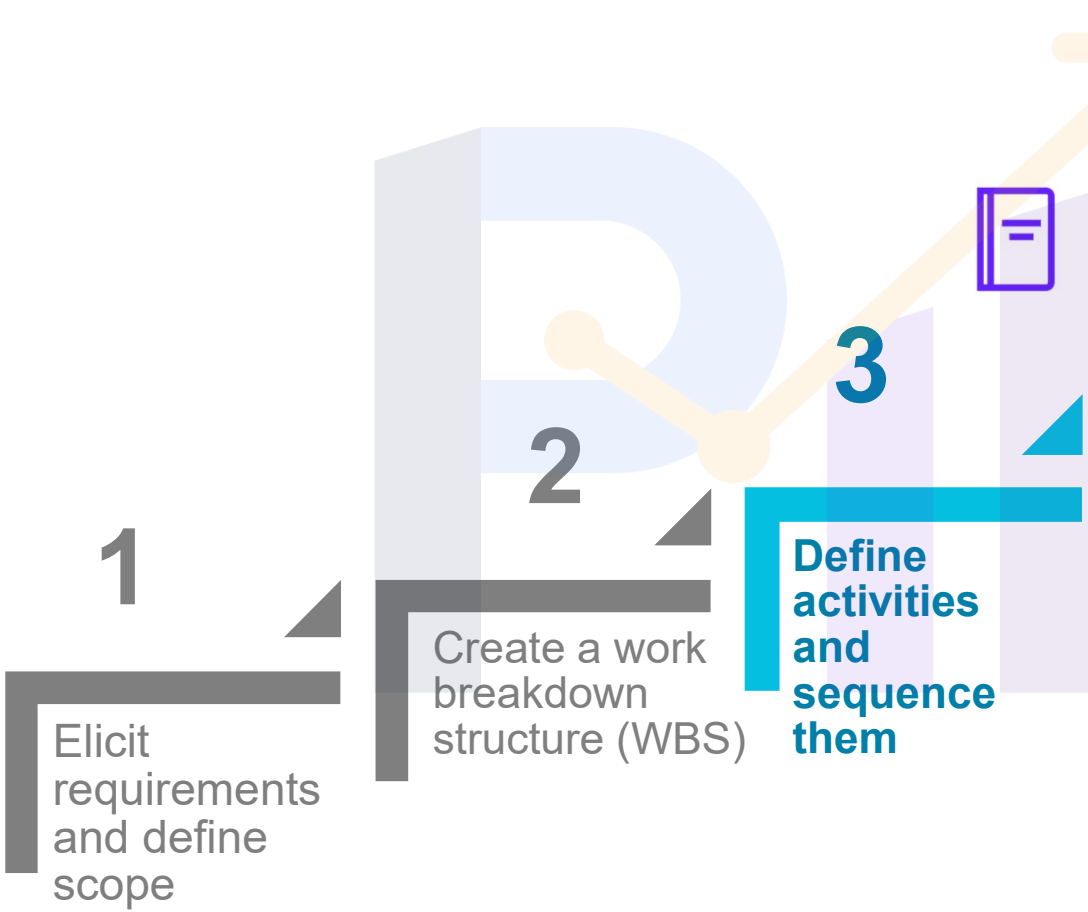
Decompose requirements into smaller deliverables—notice the **hierarchy**

Assign responsibility to a team member

Specify the smallest deliverable (**work package**)

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Step 3: Define Activities and Sequence them



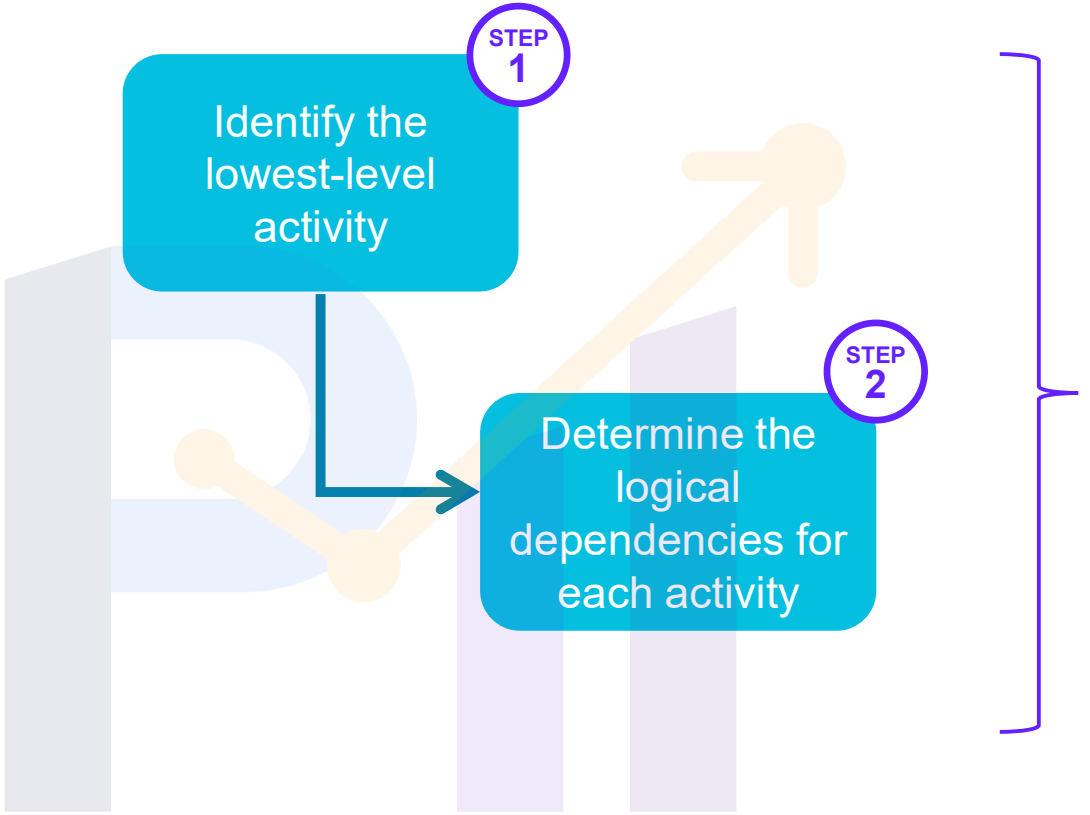
Fill in the work breakdown structure applying the **100% rule.**

Use the **Define Activities** and **Sequence Activity** processes.

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Developing a Schedule:

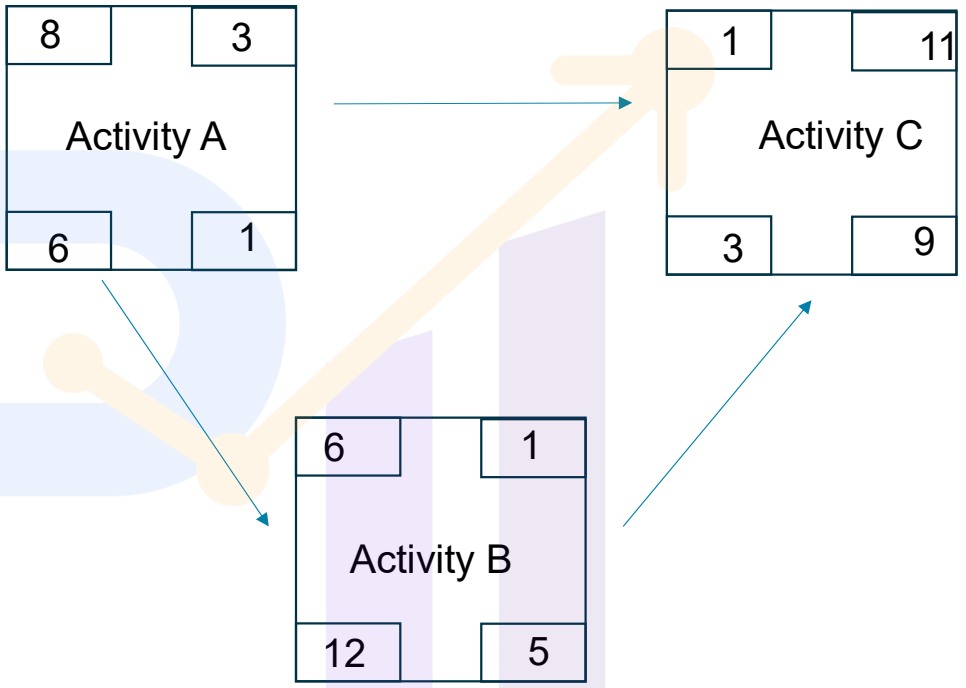
Define Activities and Sequence Activities Processes



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

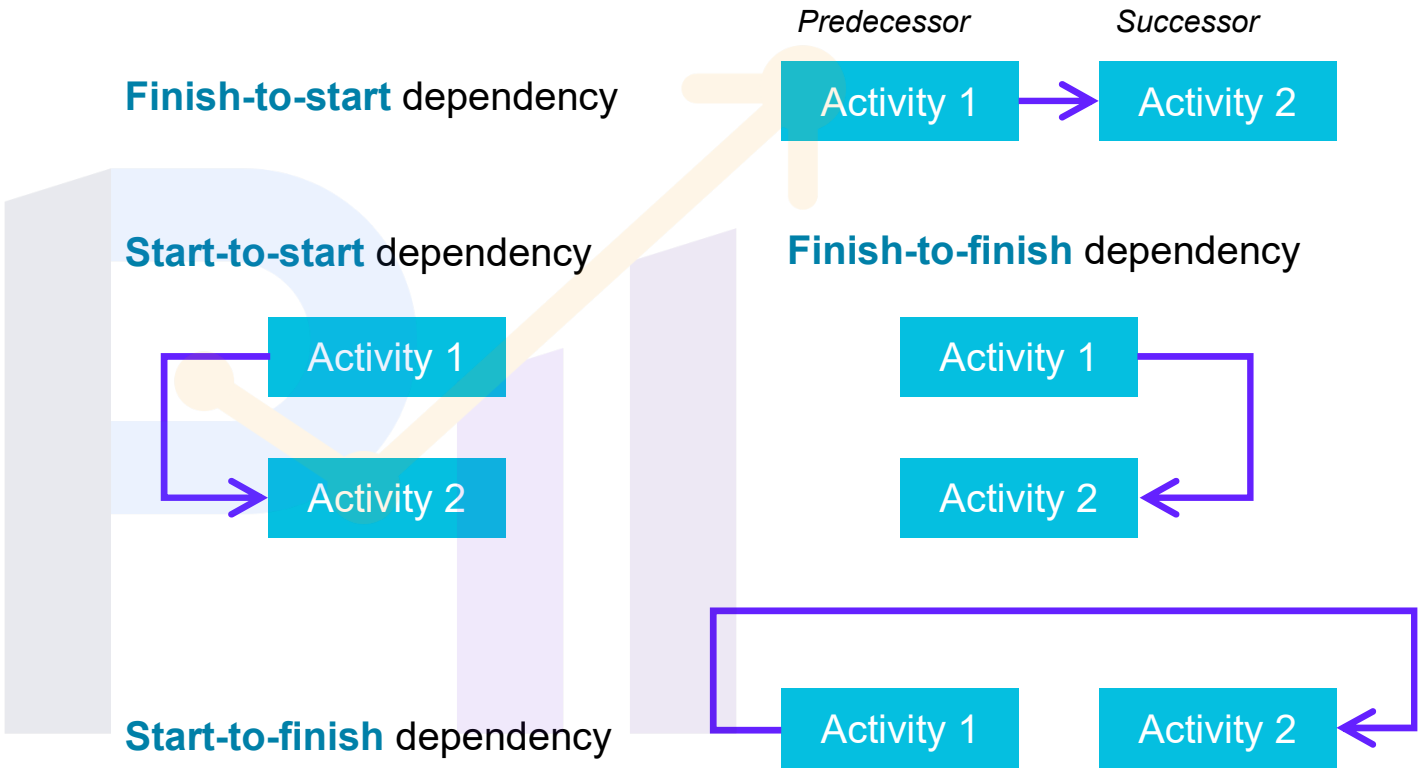
Network Diagram

A graph that shows the activities, duration, and interdependencies of tasks within a project



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

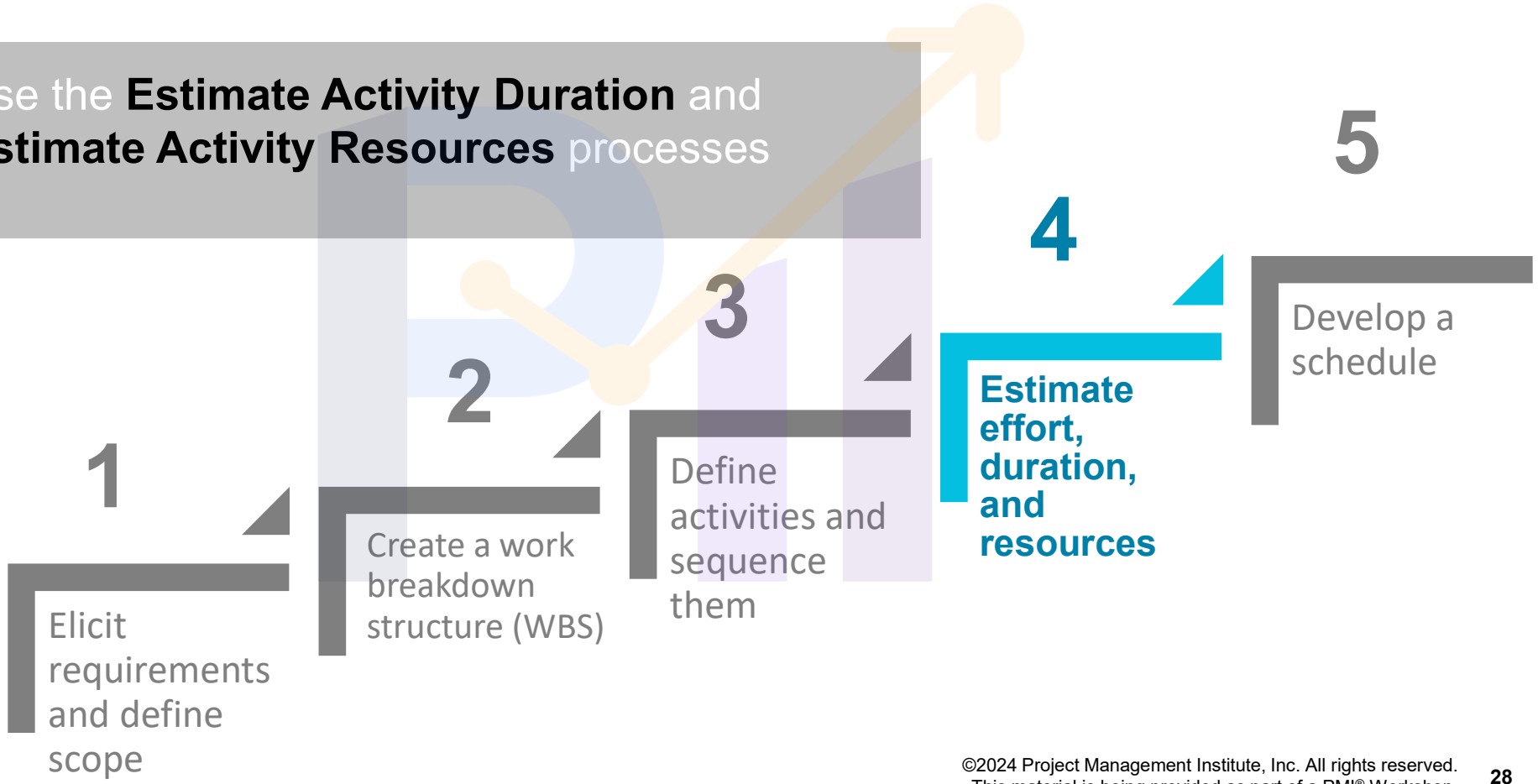
Understanding Dependencies



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Step 4: Estimate Effort, Duration, and Resources

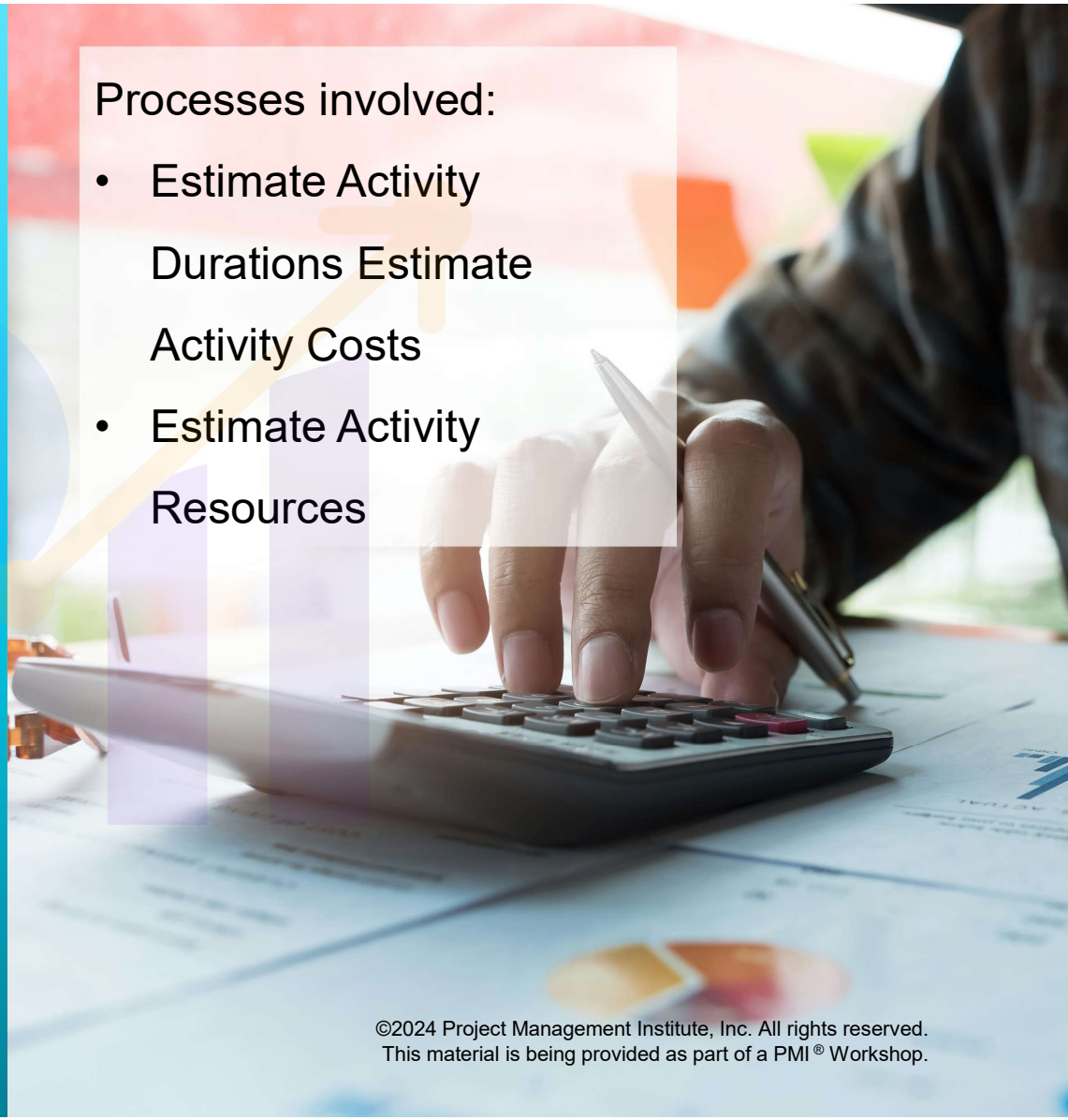
Use the **Estimate Activity Duration** and **Estimate Activity Resources** processes



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Estimate Duration, Effort, and Resources

In this step, the project team helps the project manager estimate the **duration and effort** required for each of the project **activities**, then rolls them up to the **work breakdown structure**.



Processes involved:

- Estimate Activity Durations Estimate Activity Costs
- Estimate Activity Resources

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI ® Workshop.

Use Work Packages to Estimate Time, Effort, and Cost



As a benefit, this work enables you to reasonably measure **progress** against **expectations**.

Assess and **measure** proposed deliverables by decomposing project scope in the WBS

Assign an available resource (team member) to each work package

Estimate the **level of effort, time** and **cost** to produce each work package

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Estimate Activity Durations



Questions to Ask

- **How much effort** will be required to complete the activity in a work package?
- What about required **resources**—team members, specialists, project management team, equipment—to complete the activity? How many of each will be required?

Actions

- ✓ Approximate the number of work periods—e.g., days, weeks—needed to complete the activity.
- ✓ Identify the number of available team members (resources), and consider their skill level to help determine the **duration.**

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Estimate Activity Resources Then Estimate Costs



Estimation processes are performed continuously, throughout the project. After the schedule is created, changes, if needed, can be requested

Estimate Activity Resources

- **How many resources**—team members, specialists, project management team, supplies, and equipment—are needed to perform the project?
- Identify type, quantity, and characteristics of required resources (**Resource requirements**)

Estimate Costs

- **What is the cost of resources** —team members, specialists, project management team, supplies, and equipment—to complete the project?

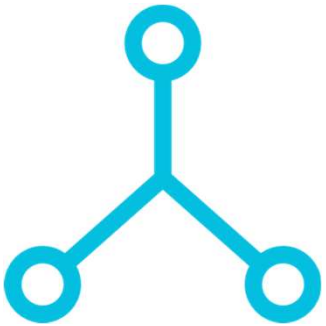
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Estimation Techniques

- Use expert judgment and critical thinking
- Review experience and lessons learned
- Ask a subject matter expert (SME)
- Gather data—e.g., research







Analogous estimation

Parametric estimation

Three-point estimation

Beta Distribution (PERT formula)

$$\text{Estimate} = \frac{(\text{Optimistic} + (4 \times \text{Most Likely}) + }{6}$$

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Planning for Resources: Exercise

- **Project**: Install an oven in a commercial bakery
- **Deliverable**: Update ventilation and cooling system
- **Your job:** **Estimate effort, duration, and cost!**



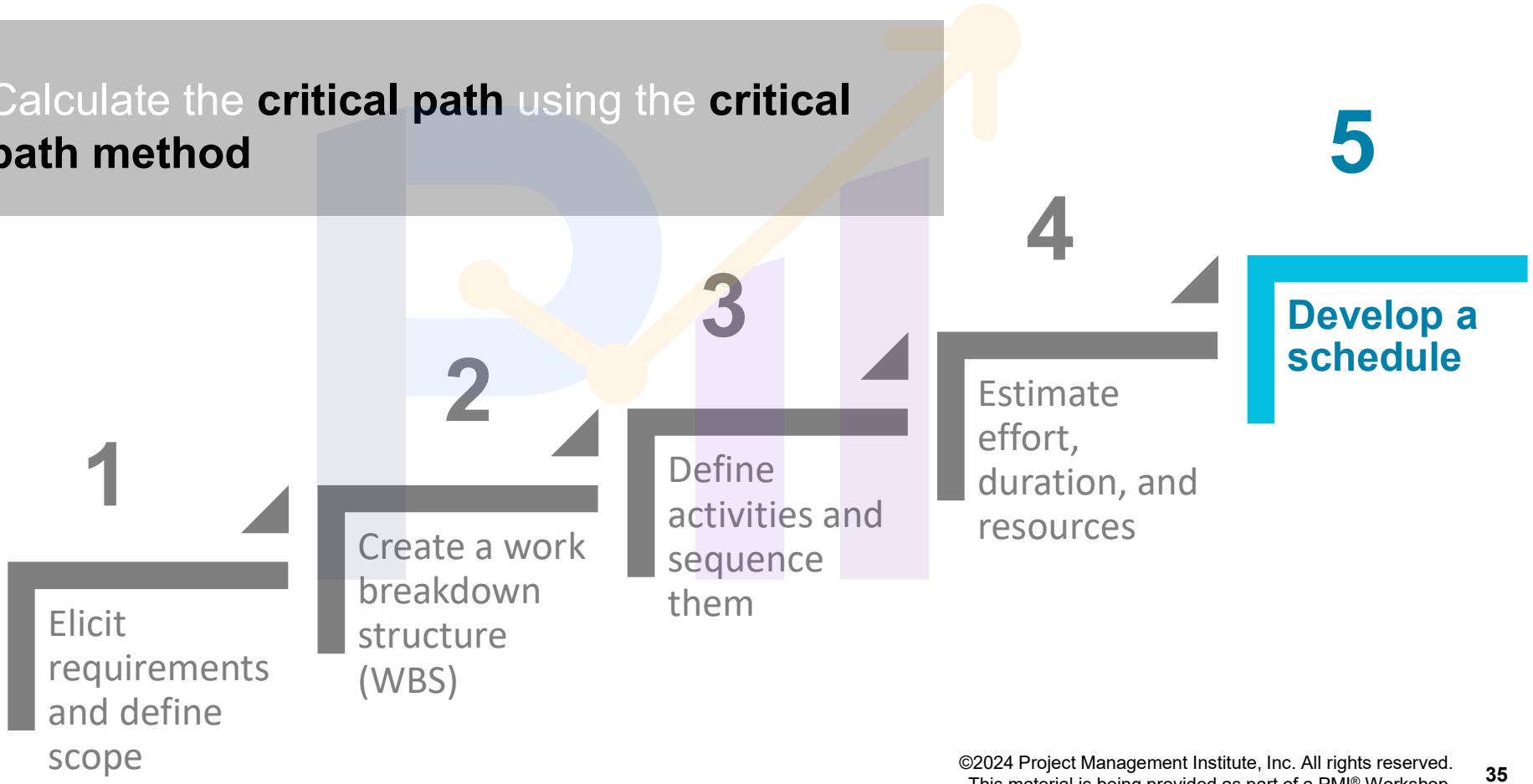
How would you answer these questions?

- Who will do the work?
  - Qualified team members or vendors?
  - Are the resources available?
  - How many of them do we need?
  - What do the resources cost?
- What needs to be procured—bought/rented/leased—to complete the activity?
- What are the **procurement** costs? *Include service costs and labor charges, too!*

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Step 5: Develop a Schedule

Calculate the **critical path** using the **critical path method**



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Identifying the Critical Path



The sequence of activities that represents the longest path through a project, which determines the shortest possible duration.

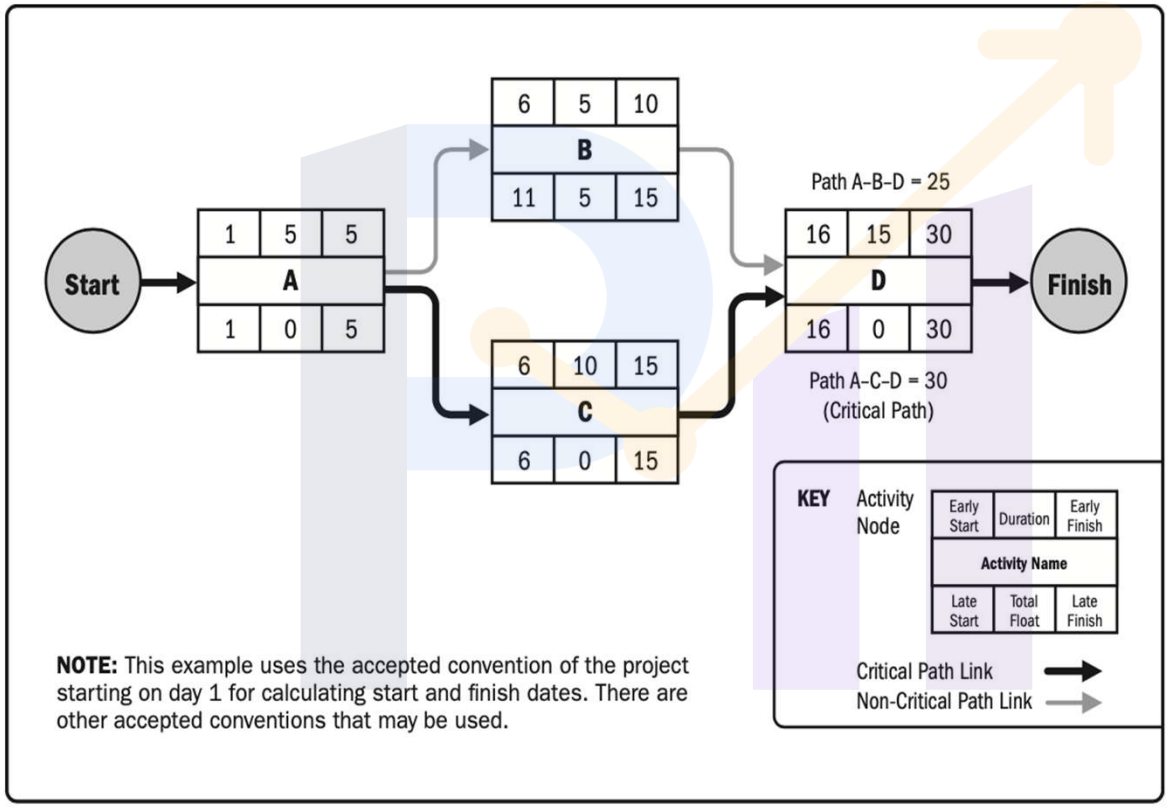
The **critical path** provides an **estimate** of the **earliest finish date** of the project.

How?

The **critical path method** is a schedule analysis technique in which the schedule activities are evaluated to determine the **float** or slack for each activity and the overall schedule. To calculate critical path, use the forward and backward pass along with float analysis to identify all network paths, including critical.

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Critical Path Example

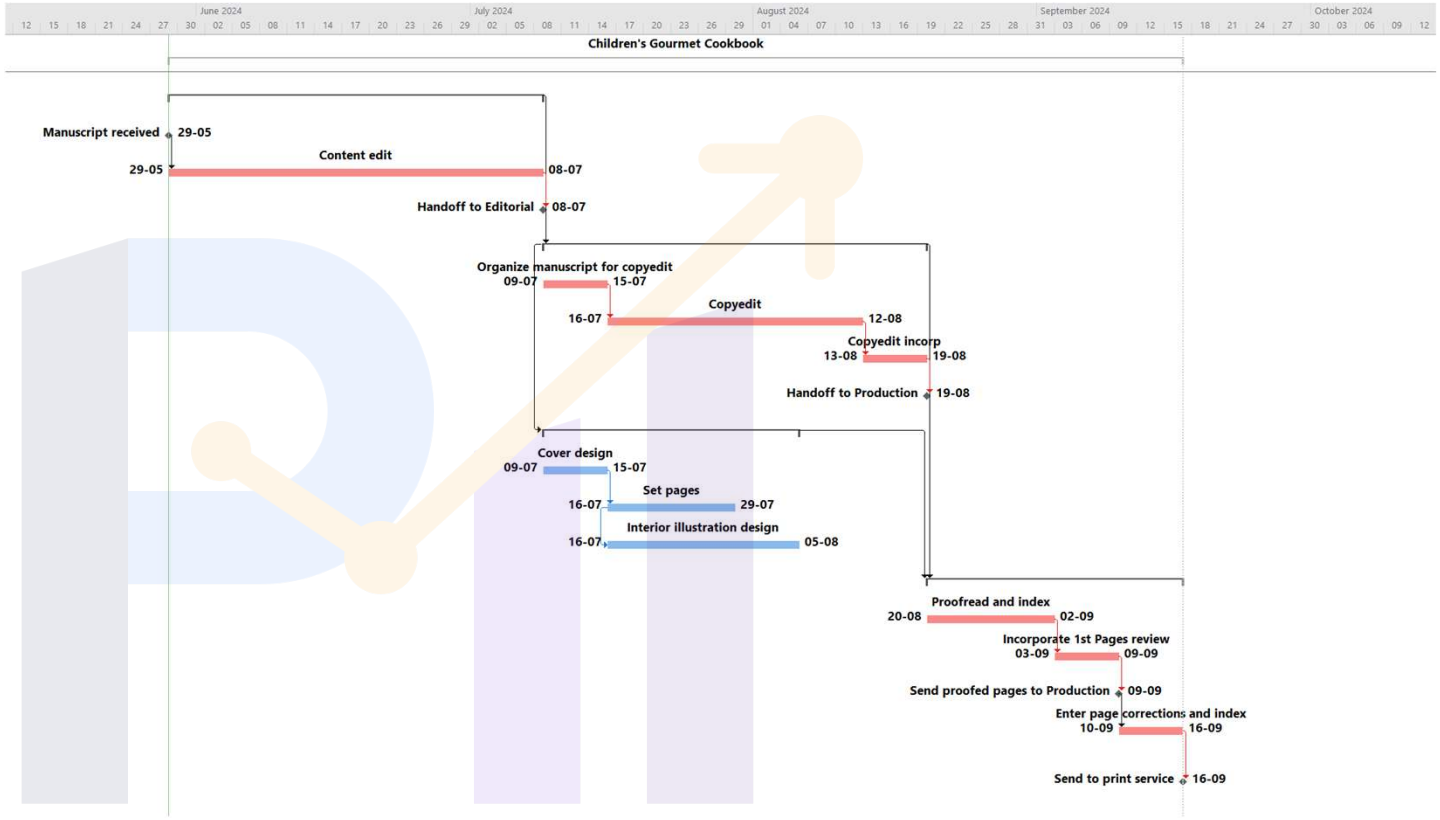


Project Management Institute. Process Groups: A Practice Guide. 2022

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Project Schedule

An output of a schedule model that presents linked activities with planned dates, durations, milestones, and resources



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Resource Assignments: Responsibility Assignment Matrix (RACI)

Responsible—Owns the project, task, or work

Accountable—Approves the work, judging completion and match to quality standards

Consulted—Has the ability or knowledge needed to complete the work

Informed—Kept informed of the work but not necessarily consulted

	Project manager	Analyst	Designer	Front-end developer
Design site map	C	R	R	I
Create style guide	A	C	R	C
Code templates	A	I	R	R

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Baselines Are Complete!

- **Scope, cost,** and **schedule baselines** are created
- Request changes during the project using a change request and the change control process—**Perform Integrated Change Control**



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI ® Workshop.



7C Developing a Project Management Plan—Quality

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

What Is Quality?

The degree to which a set of inherent characteristics fulfills requirements.



Processes Associated with Quality Management

Let's brainstorm some specific activities you think are performed during these project management processes. Use the questions to get started!



Plan Quality Management

- What standards need to be met for the product?
- What standards or regulations apply to our work?

Manage Quality

- What kind of quality management activities should the project have—for both the product under development and the project itself?

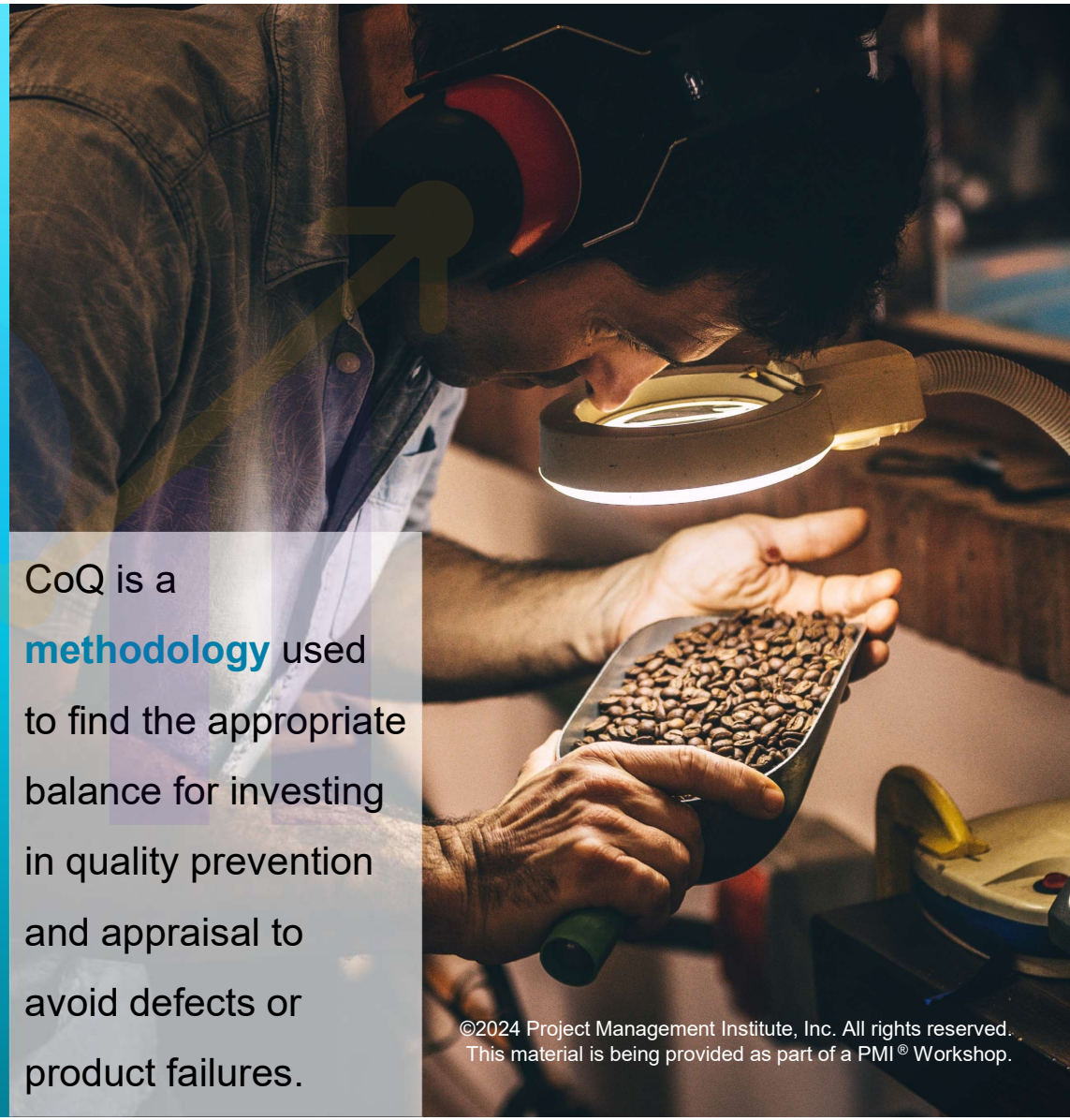
Control Quality

- How will we ensure the deliverable and the project meet relevant quality standards?

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

What Is the Cost of Quality (CoQ)?

All costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraisal of the product or service for conformance to requirements, and failure to meet requirements



CoQ is a **methodology** used to find the appropriate balance for investing in quality prevention and appraisal to avoid defects or product failures.

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Cost of Quality(CoQ) Methodology

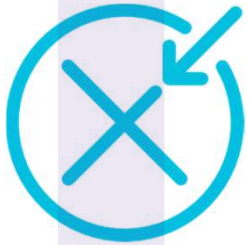
- Prevention and appraisal costs are associated with the cost of compliance with quality requirements
- Internal and external failure costs are associated with the cost of noncompliance



Prevention costs



Appraisal costs



Internal failure costs

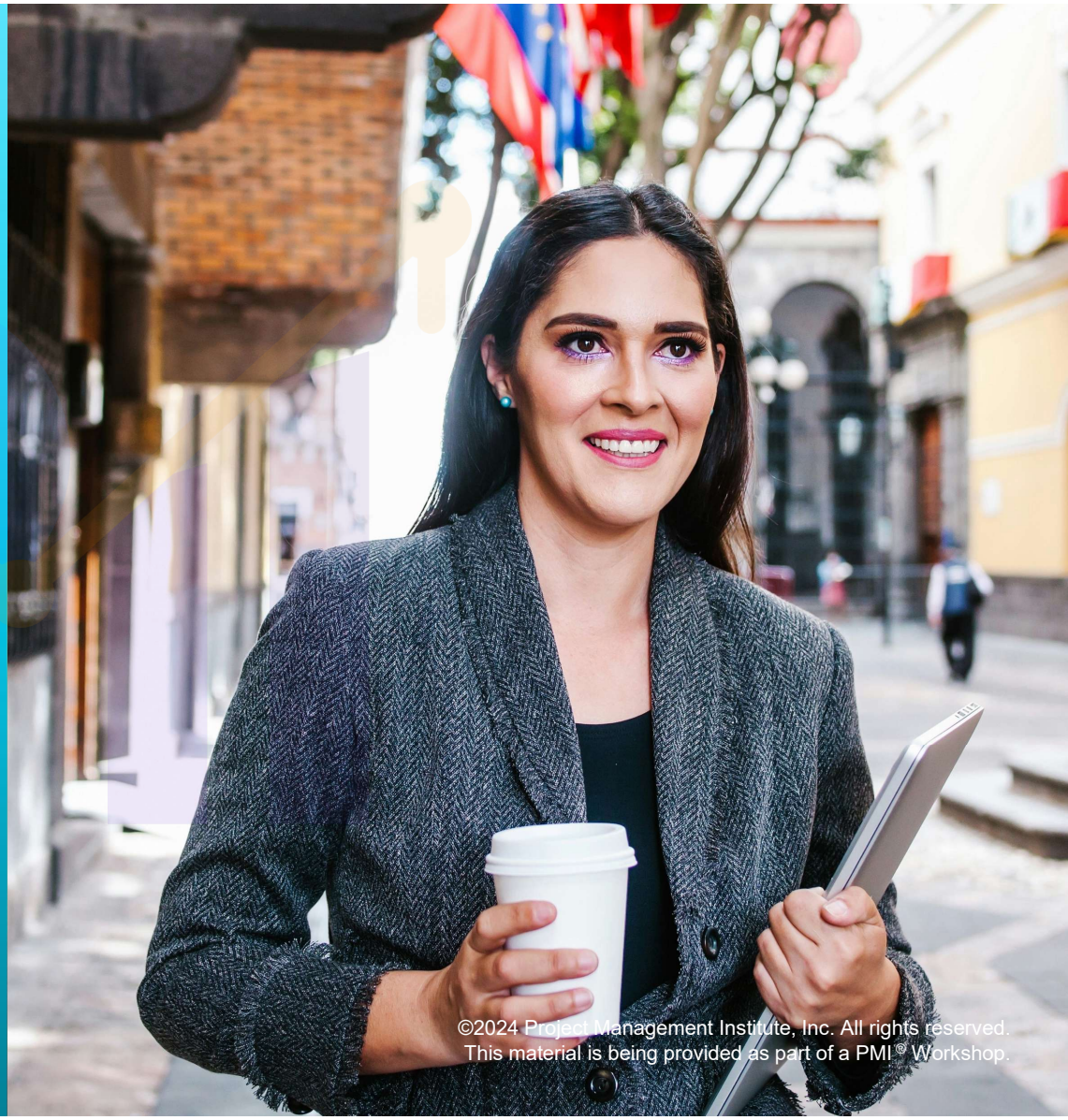


External failure costs

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Quality Management Plan

A component of the project or program management plan that describes how applicable policies, procedures, and guidelines will be implemented to achieve the quality objectives



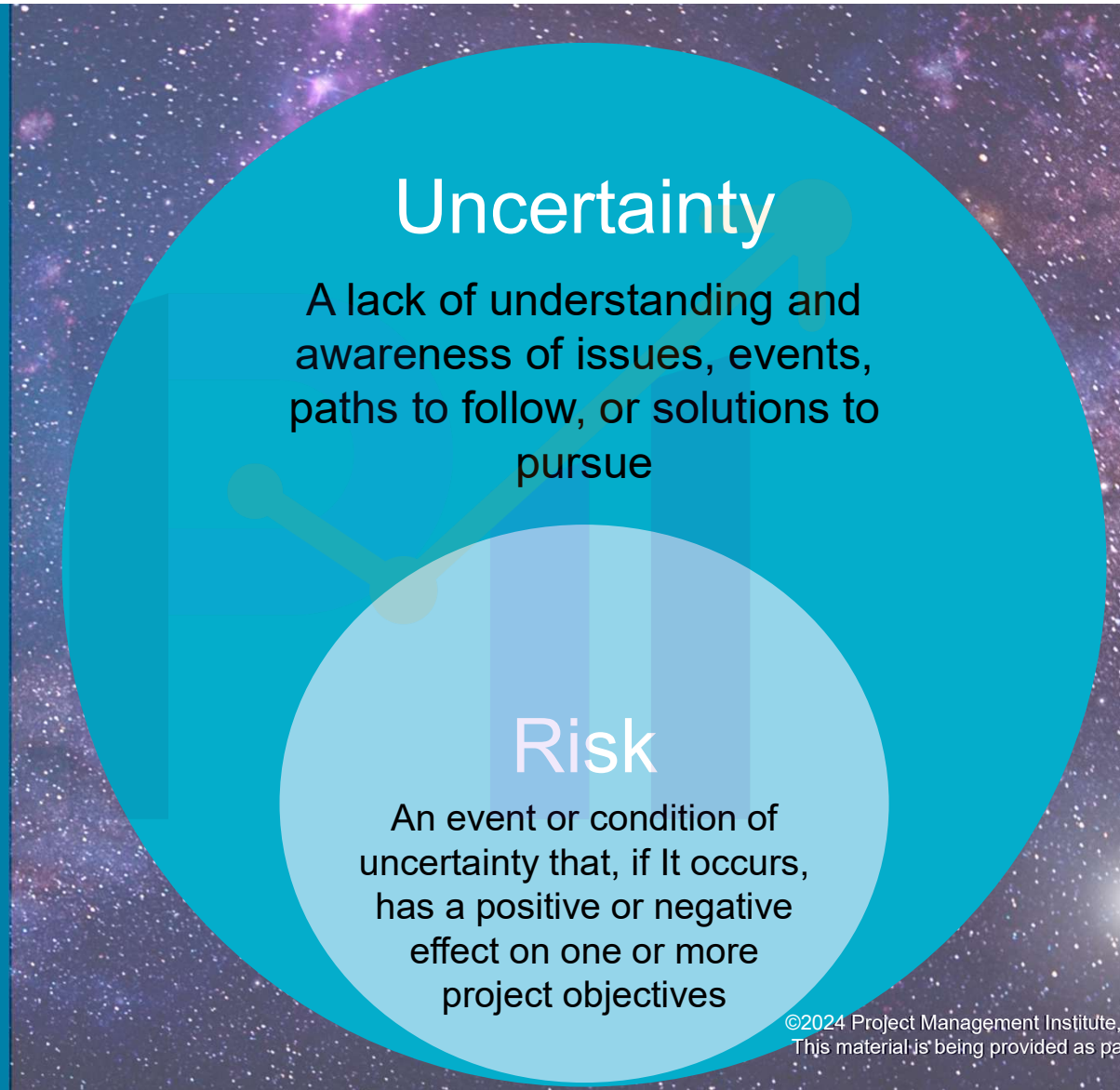
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



7D Developing a Project Management Plan—Uncertainty and Risk

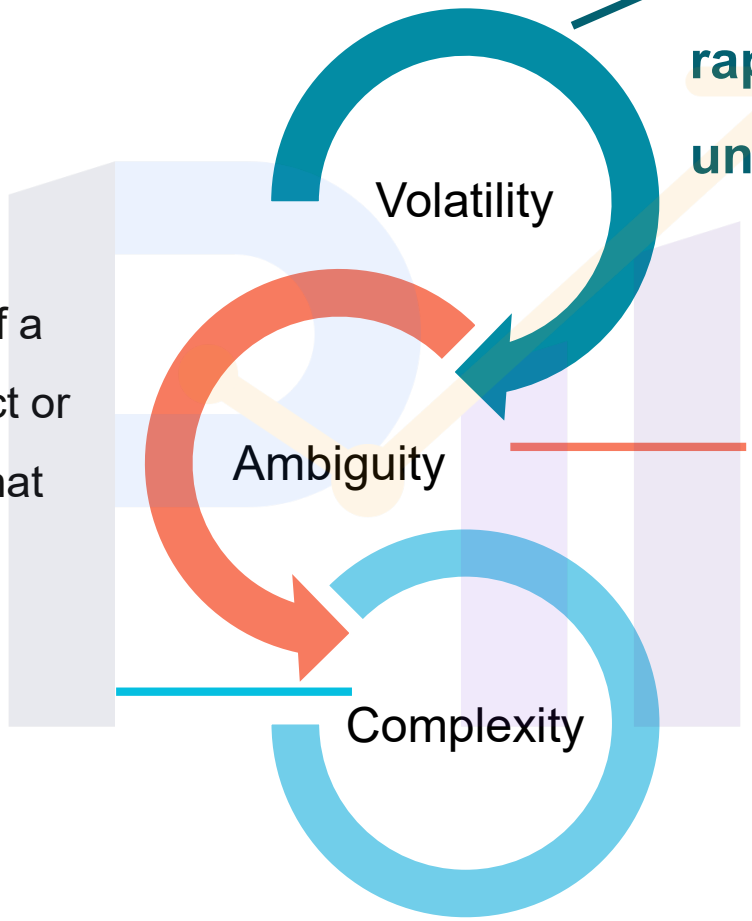
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

To Plan for Risk, We Should Understand Uncertainty



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Conditions of Uncertainty



The possibility for **rapid** and **unpredictable change**

A state of being **unclear**, having difficulty in identifying the cause of events, or having **multiple options** from which to choose

A characteristic of a program or project or its environment that is **difficult to manage** due to human behavior, system behavior, and **ambiguity**

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Where Should We Look for Uncertainty and Risks?

PESTLE is the political, economic, social, technological, legal, and environmental context of the project







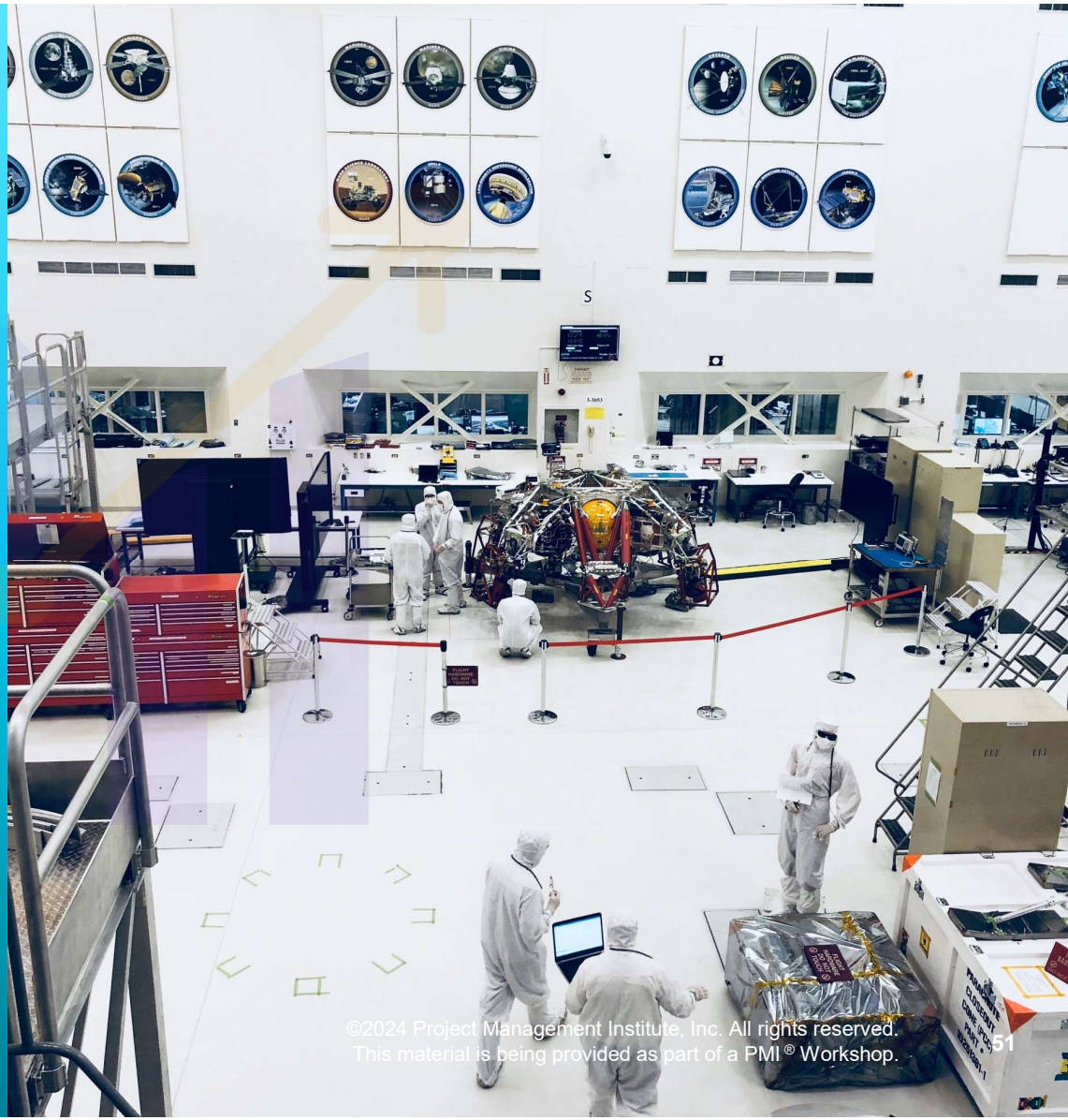
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Identifying and Responding to Uncertainty and Risk

In uncertain conditions:

- Identify threats (negative risks)
- Find opportunities (positive risks)

Use a **risk management plan**—describes how risk management activities will be structured and performed—and a **risk register**



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Strategies for Ambiguity, Complexity, and Volatility

If you …	Try using …	To …
Discover an **ambiguous** requirement?	Progressive elaboration	Build in incremental steps to decrease ambiguity
	Experiments	Identify cause-and-effect relationships
	Prototypes	Build alternative prototypes
Have process-based **complexity**	Iterative development	Build in incremental steps
	Engagement	Collaborate with stakeholders
	A fail-safe	Build system redundancy
Volatility	Alternative analysis	Create alternatives for technical solutions and processes
	Review of contingency reserves	Plan for cost and schedule reserves

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Planning for Risk Using a Framework

1. Create a risk management plan
2. Identify risks
3. Conduct impact analysis
4. Record risk information in the risk register, including trigger conditions and responses
5. Assign someone on the team to watch for trigger conditions
6. Continually review, update, and modify the list throughout the life of the project



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

How Risky is a Risk?

Calculating Severity on a Risk Register

A **risk register** is a repository in which outputs of risk management processes are recorded.

- Is the central planning document for project risk analysis and control
- Contains a list of the most important risks to the project's completion
- Identifies the likelihood of occurrence, the impact to the project, the priority, and the applicable response plans—for each risk

Risk Severity = Impact ✕ Probability

Severity is an indicator to help plan our monitoring and response!

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Risk Register

Risk Description	Impact Description	Impact Level Score	Probability Level Score	Risk Score *(probability and impact multiplied)*	Trigger Condition	Planned Response	Owner
	What will happen if the risk is not mitigated or eliminated	*Rate 1 (LOW) to 5 (HIGH)*	*Rate 1 (LOW) to 5 (HIGH)*	*(IMPACT ✕ PROBABILITY) Address highest first.*	*What indicates the risk will occur.*	*Action plan*	*Who is responsible*
Supplier delay		5	1	5	Supplier notification	Contact backup vendor	L. Delano
Launch failure		5	2	10	Prechecks fail	Cancel launch	M Freud
Accidents in space		5	3	15	Radar alert	Initiate emergency response	T Gupta

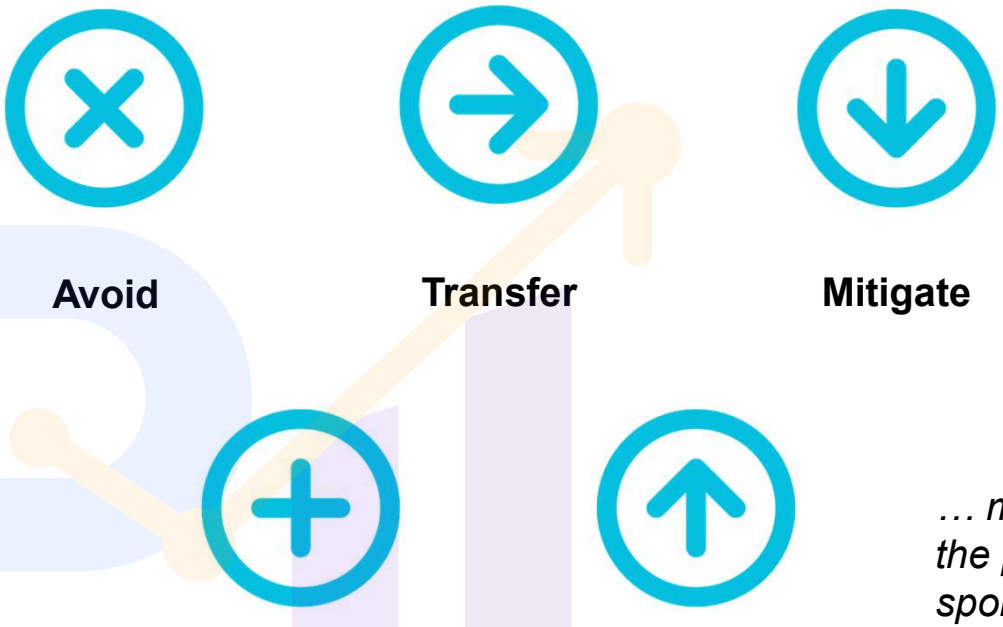
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Strategies for Risk

- Know the available responses for negative and positive risk
- Plan for risk to have a successful project journey



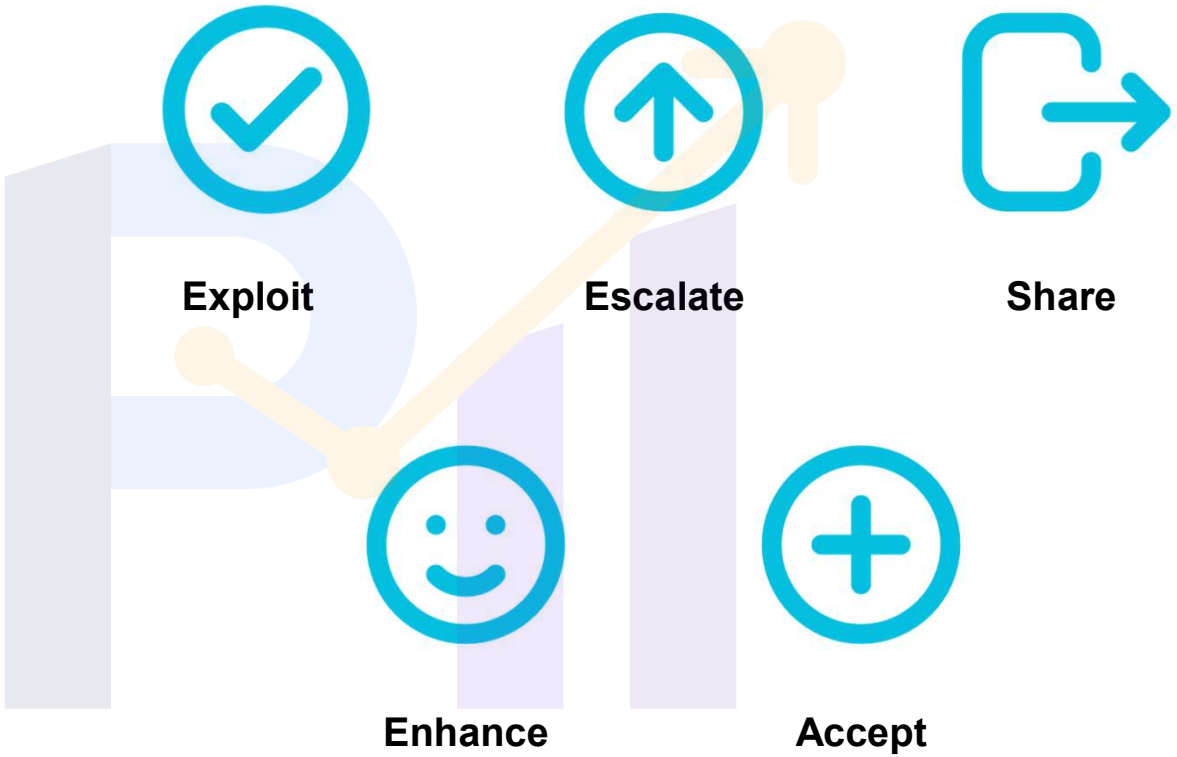
Deal with Threats



… management or the project sponsor—this is a function of project governance!

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Take Advantage of Opportunities



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Threat or Opportunity?

During the next planned voyage of our space vehicle, we'll encounter a lot of "space junk," but the cargo bay will be empty for the return to Earth.



Threat



Opportunity

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Additional Risk Planning Considerations



Secondary risk—*Arises as a direct result of implementing a risk response*

Residual risk—*Risk remains after risk responses have been implemented*

- Will **residual risk** remain after the team responds?
- Do the risk management plans trigger any **secondary risk**?
- **Repeat** response planning until **residual risk** is compatible with the risk appetite of the organization, project, and stakeholders

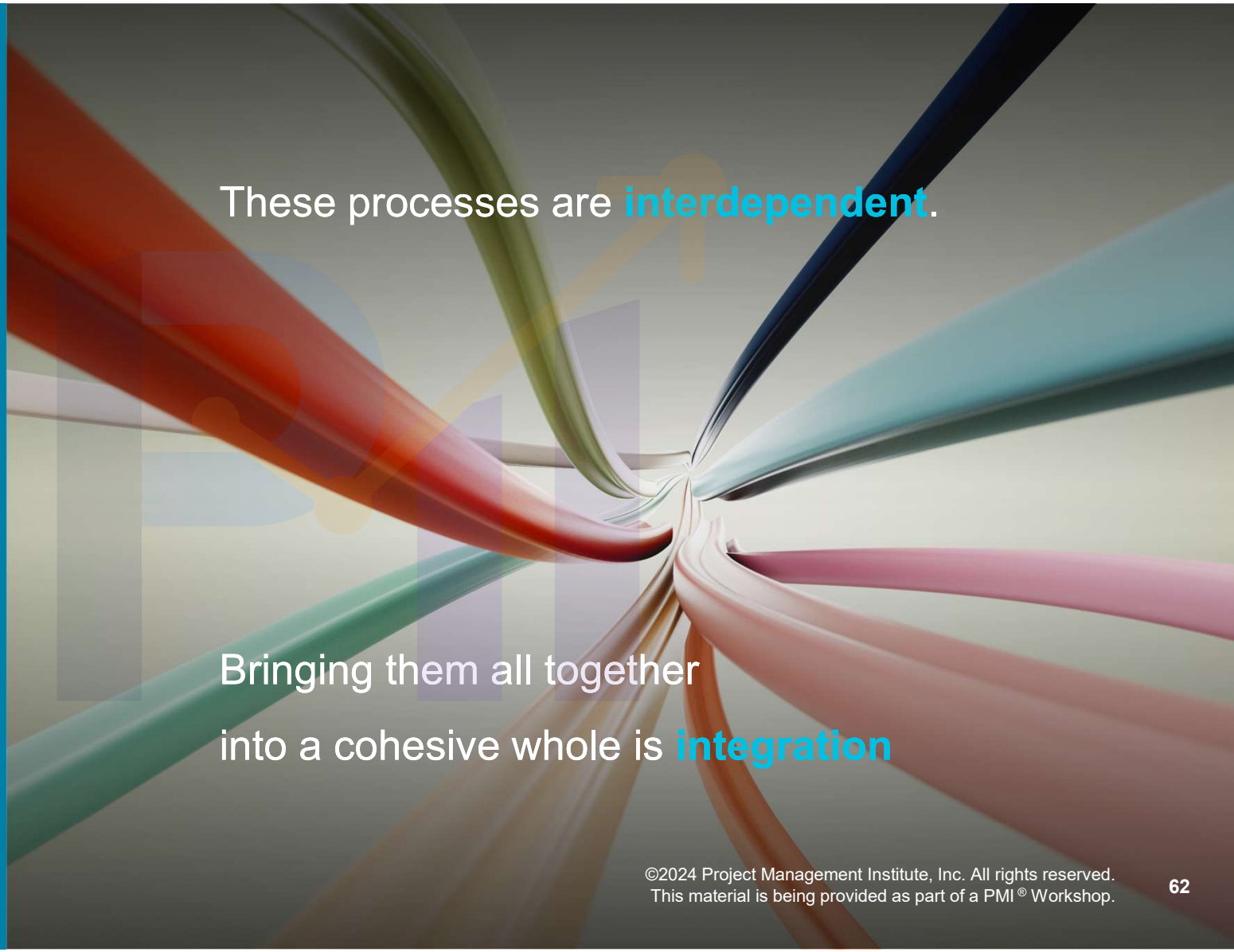
©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



7E Project Integration

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Bringing It All Together

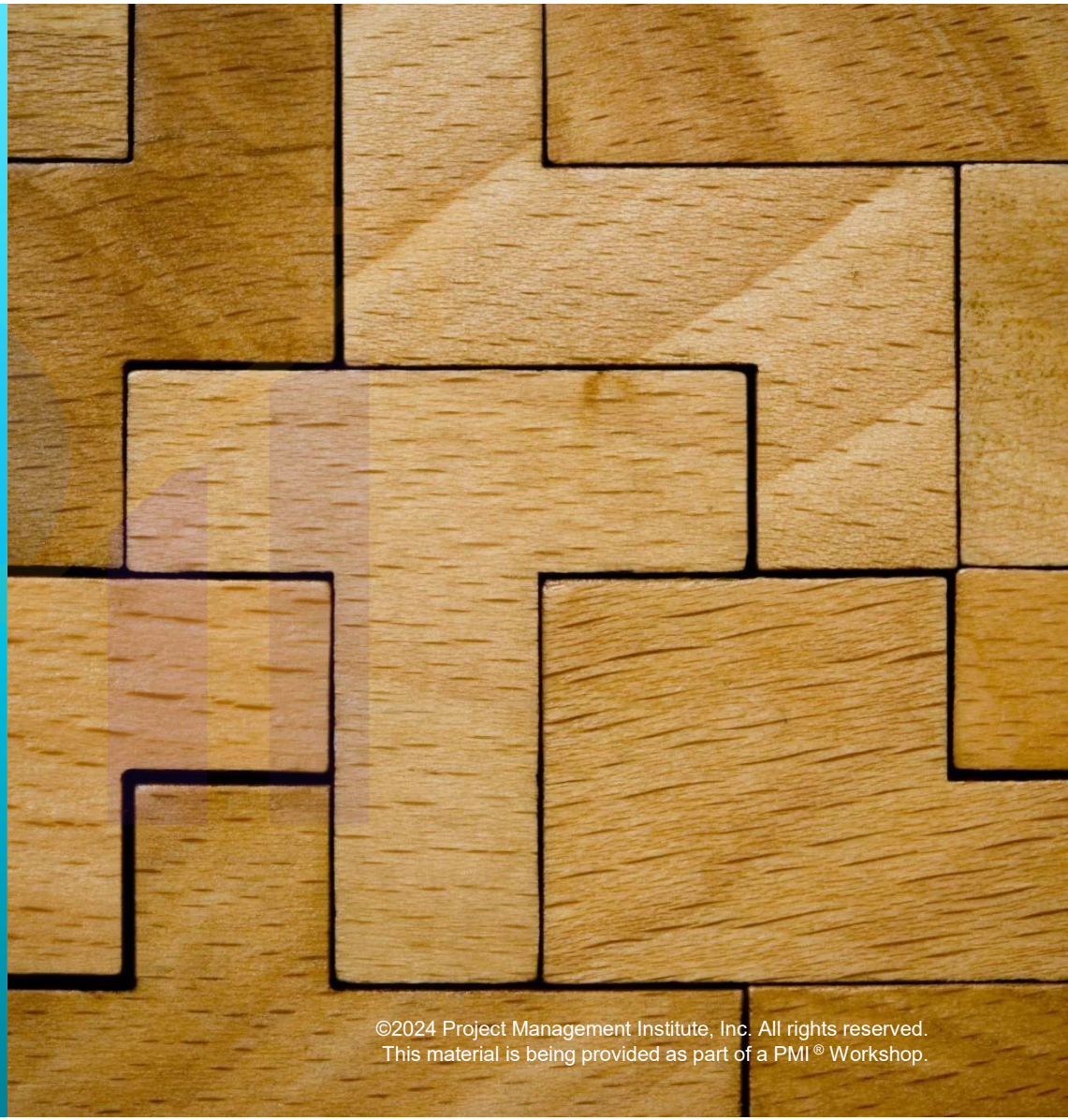


©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI ® Workshop.

Integrate Plans

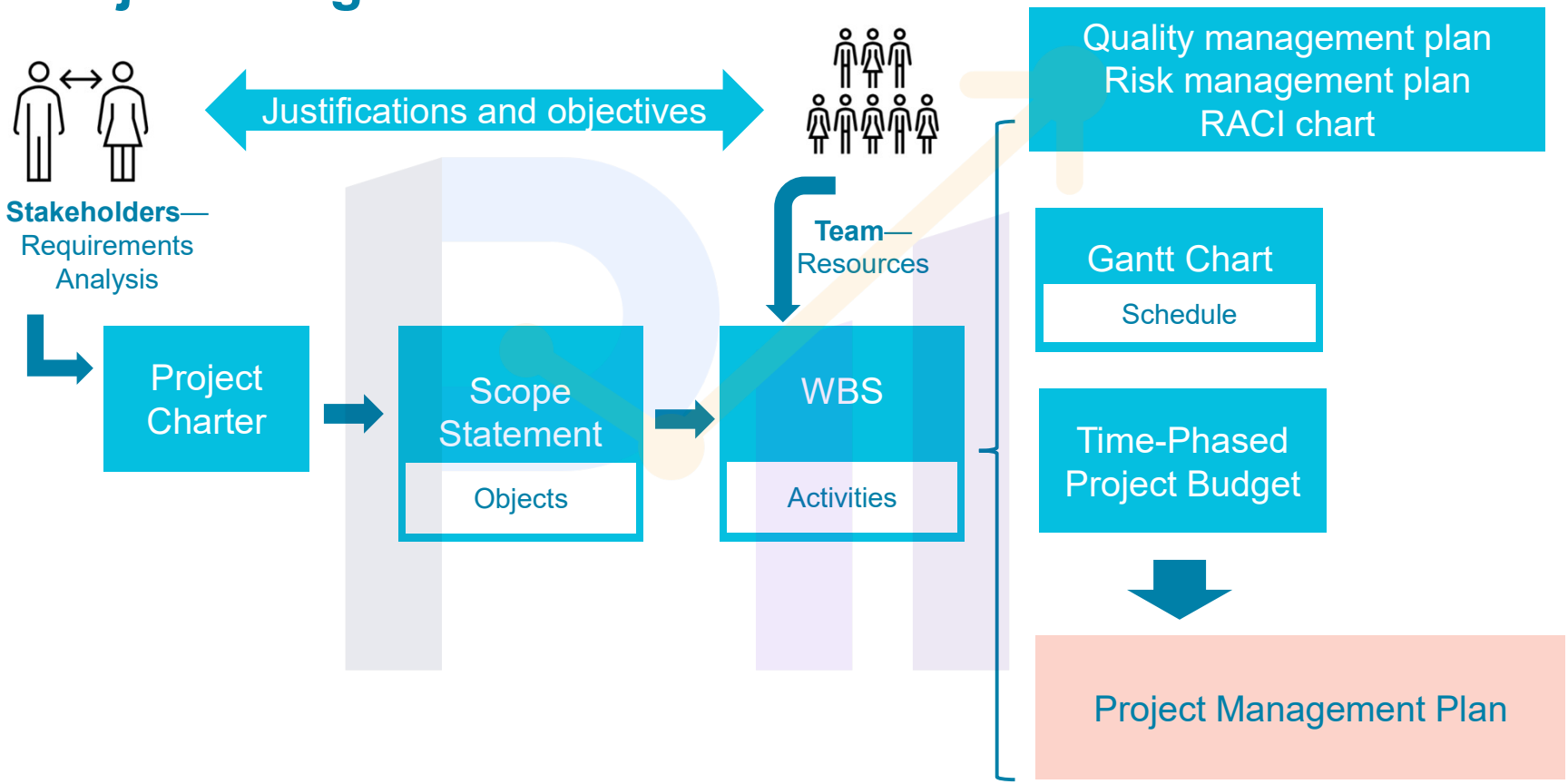
Integrating a project management plan can:

- Identify and correct gaps or discrepancies in any area
- Align efforts and highlight how they depend on each other—so your team works better
- Help assess and coordinate the project during its life cycle



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI ® Workshop.

Project Integration



©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



Knowledge Checks

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Question 1

Which process can a project manager use to determine which activities have the greatest potential impact on the project timeline if they are not completed on time?

1. Collect requirements and define the scope statement

2. Define and sequence activities

3. Estimate effort, duration, and resources

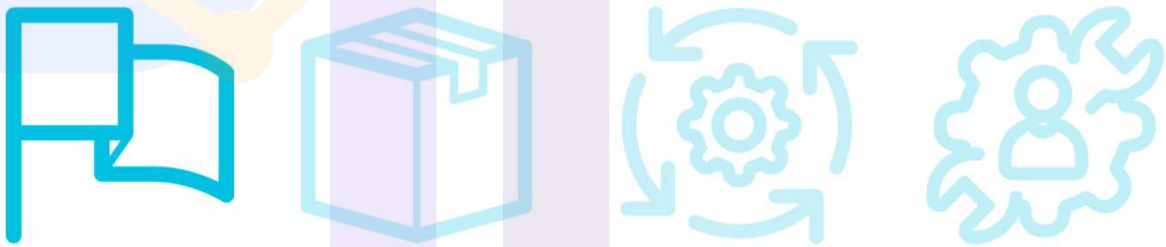


4. Identify the critical path

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Question 2

Although a(n) _____ is scheduled in a project plan, it has no estimated duration and is used to provide information about progress through the major segments.



1. Milestone

2. Deliverable

3. Phase

4. Activity

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Question 3

Establishing the scope of a project, refining the objectives, and defining the course of action required to attain those objectives fall under which Project Management Process Group?



1. Initiating
2. Planning
3. Executing
4. Monitoring & Controlling
5. Closing

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.



Wrapping Up

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Summary

7A Tailoring a Predictive Life Cycle

7B Developing a Project Management Plan: Scope and Schedule (Includes Resource and Cost Estimations)

7C Developing a Project Management Plan: Quality

7D Developing a Project Management Plan: Uncertainty and Risk

7E Project Integration



© 2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.

Up Next:
Adaptive Approaches

©2024 Project Management Institute, Inc. All rights reserved.
This material is being provided as part of a PMI® Workshop.