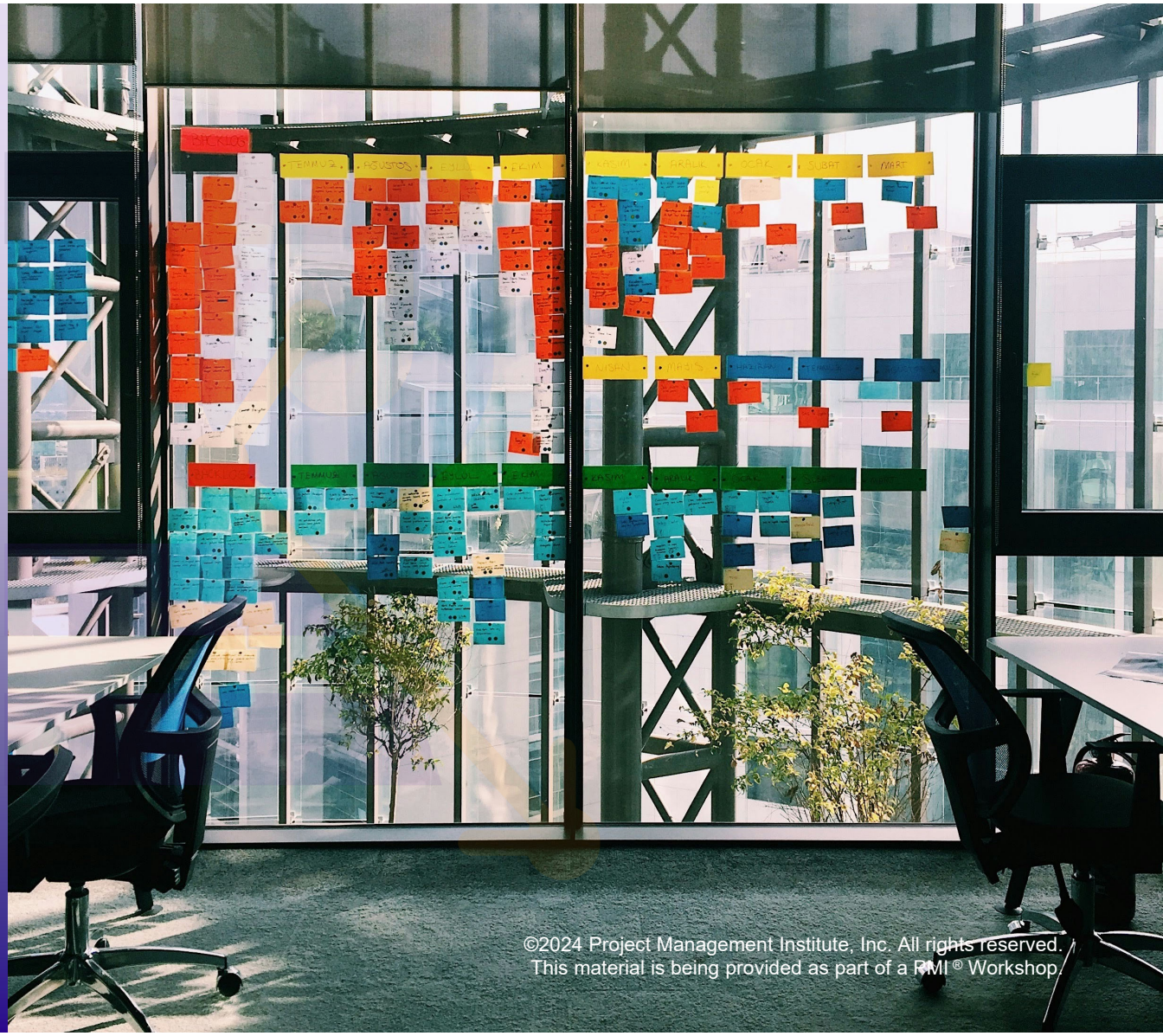
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LESSON 9

Project Work and Delivery

Executing, Monitoring, Tracking, and Optimizing Work Through Delivery and Closing

Version 2.0 | June 2024 Release



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In This Session:



Look for the predictive icon to learn about documenting project controls and actions, tools, and techniques related to activities in the Executing, Monitoring and Controlling, and Closing process groups!



Look for the adaptive icon to learn about artifacts and actions related to project controls!

9A Engaging Stakeholders

9B Monitoring and Controlling Processes

9C Detecting and Solving Problems

9D Measuring Performance

9E Applying Project Controls and Forecasting

9F Validating Requirements Through Project Delivery

9G Closing and Transitioning

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9A Engaging Stakeholders

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Importance of Stakeholders as the Project Progresses

- Project advocates
- Information sources
- They validate, approve, and accept the deliverables



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Levels of Engagement



Unaware—Does not know about the project or its benefits and other impacts



Resistant—Aware of project, resistant to objectives or changes the project will introduce



Neutral—Aware of project, but neither resistant nor supportive



Supportive—Aware of project and supports objectives, changes, and outcome



Leading—Aware and engaged, a “champion” of the project

Project Management Institute, Inc. (2023). Process Groups: A Practice Guide.

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Stakeholder Engagement Plan

A component of the project management plan that identifies the strategies and actions required to promote productive involvement of stakeholders in project decision-making and execution.



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Stakeholder Engagement Assessment Matrix (SEAM)

A matrix that compares current and desired stakeholder engagement levels.

Name	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder F				C	D
Stakeholder CC			C	D	
Stakeholder B		C	D		
Stakeholder E	C		D		

Key:
C = Current level of engagement
D = Desired level of engagement

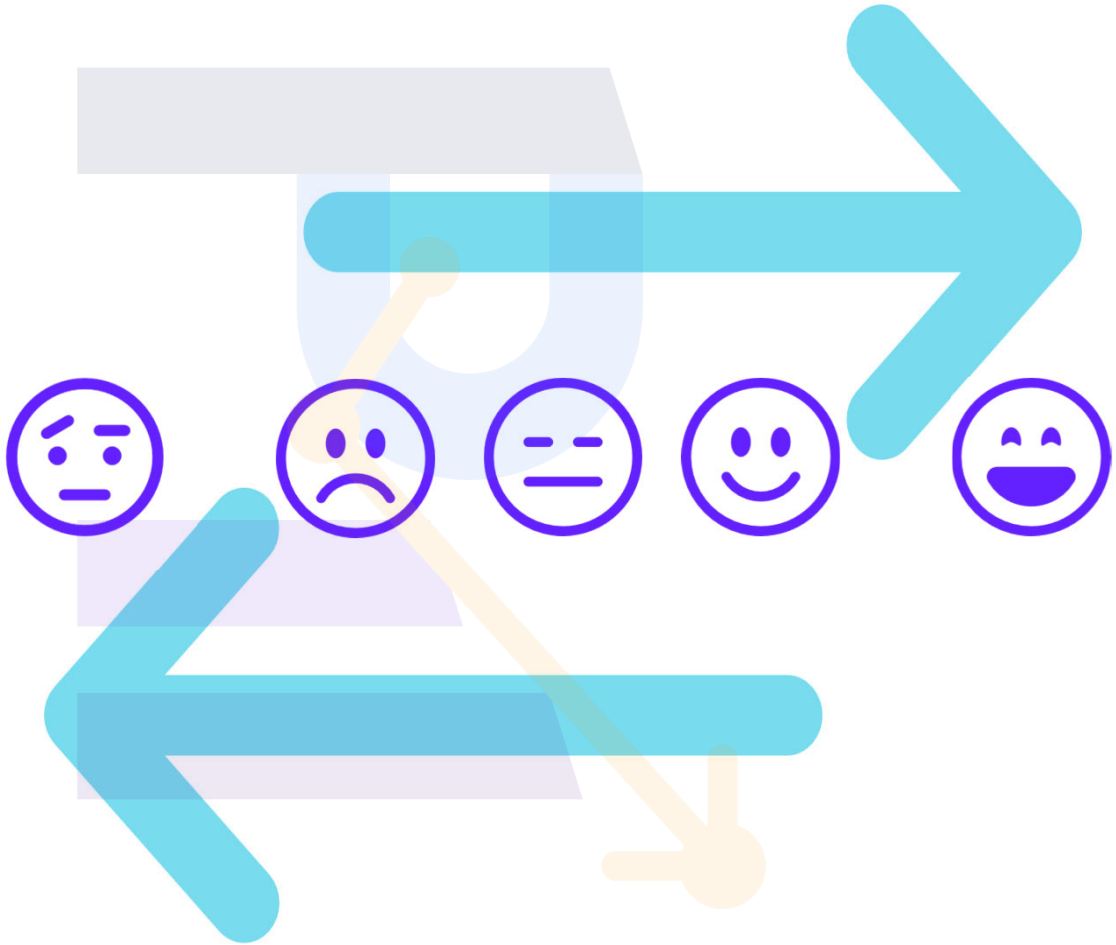
What mistake have we potentially made on this SEAM?

We should NOT put names on public stakeholder documents.

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Influencing Stakeholder Levels of Engagement

What are some techniques for influencing or changing the level of stakeholder engagement?



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9B Monitoring and Controlling Project Work



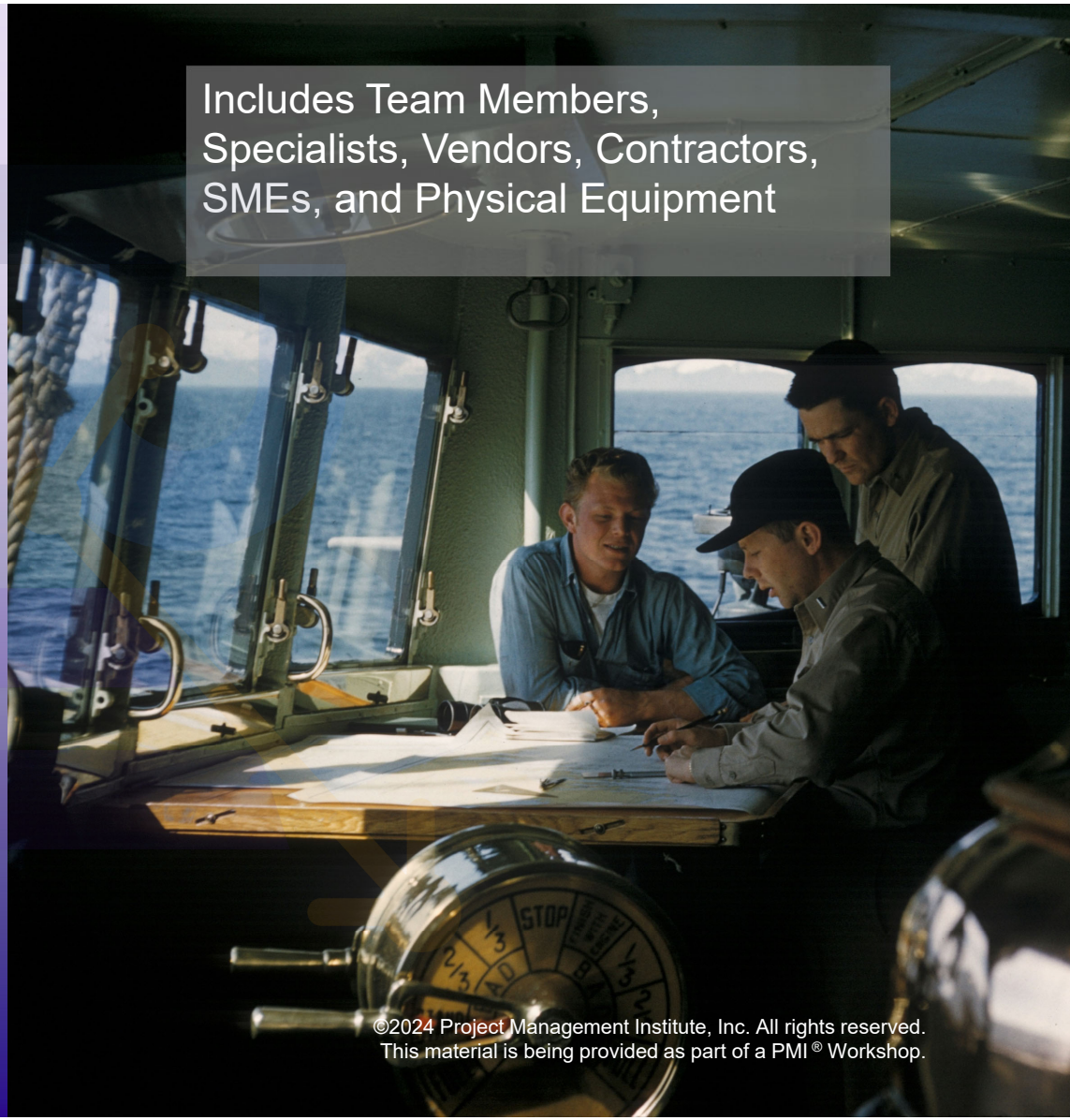
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Monitoring and Controlling Overview



Resources

A skilled individual, team, or the equipment, services, supplies, commodities, materials, budgets, or funds required to accomplish the defined work.



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Maintain the Team and Human Resources

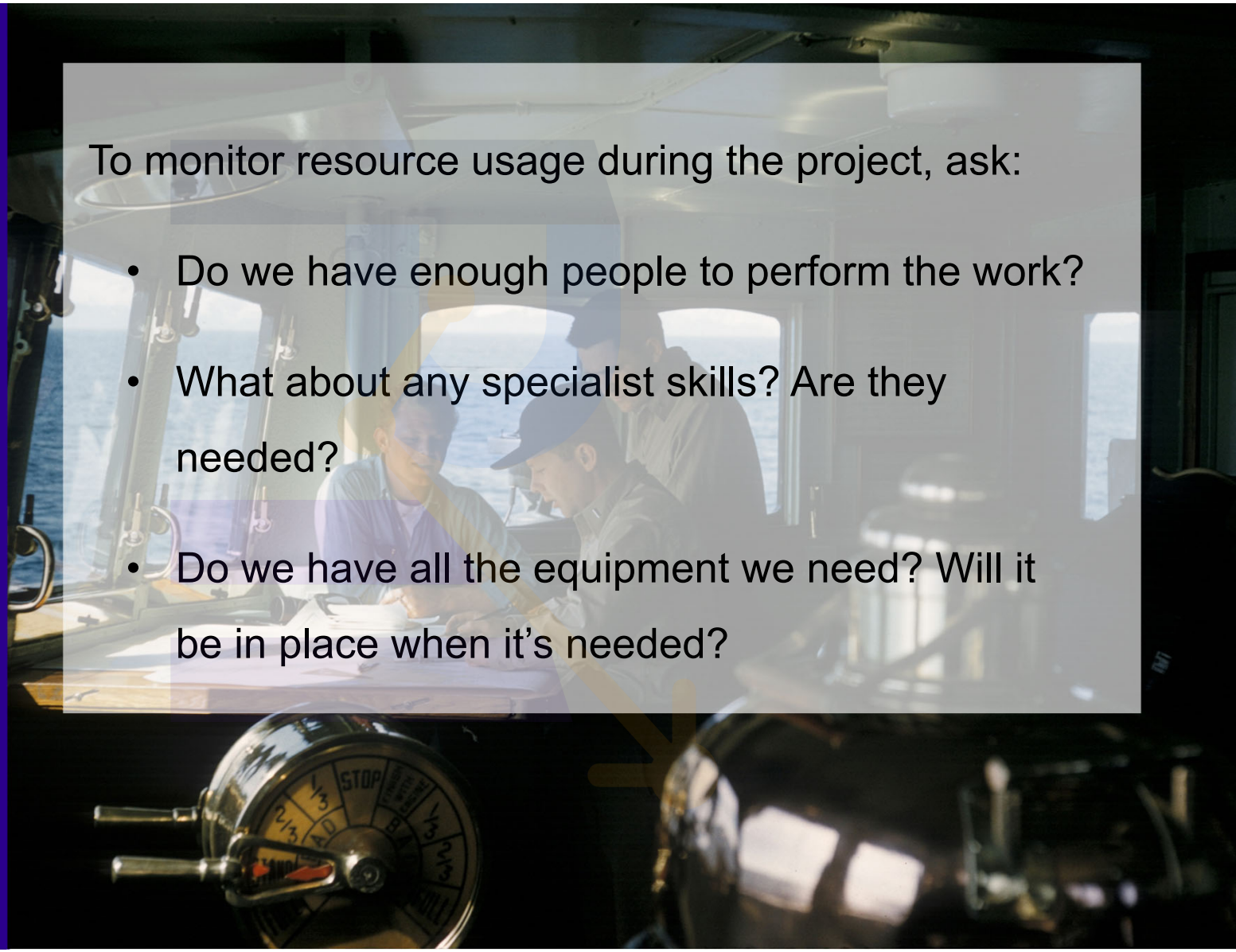
Human resource management procurement, and contract administration are typically organizational functions.

- Remove impediments
- Keep team focused and productive
- Motivate and inspire
- Manage conflict
- Manage procurements and contracts
- Conduct team performance assessments
- Team (project manager, team lead, other) self-organizes to facilitate resource procurement
- Team conducts retrospectives to optimize performance

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Update Resource Allocations

Teams typically use a **resource calendar** to track peoples' availability



To monitor resource usage during the project, ask:

- Do we have enough people to perform the work?
- What about any specialist skills? Are they needed?
- Do we have all the equipment we need? Will it be in place when it's needed?

Quality

Continuously verify the quality of deliverables and processes

Verification—*The evaluation of whether or not a product, service, or result complies with a regulation, requirement, specification, or imposed condition*



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Evaluate and Manage Quality

Project manager	Uses the Control Quality process to: • **Verify** that deliverables meet requirements • **Verify** compliance is met • Oversee and suggest improvements to team's quality practices • Continuously monitor quality and issue reports

Project team, which includes the **product owner**, who is the voice of the **customer**	• Sets and meet quality goals and metrics
	• Quality metrics can be found in:
	  • Service-level agreements (SLAs)
	  • Contracts
	  • Definition of done (DoD)
	• Provides and uses feedback during iterations to continuously monitor quality

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Quality Audit

A structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures

Typical in highly regulated environments that require operational standards—e.g., government, scientific, engineering, civic organizations

What is audited:

- Project's quality management policy—Is it suitable?
- Collection and use of information—Data security protocols
- Analytical methods—Are they fair or using reputable standards?

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Risks and Issues

- Update risk register or matrix regularly
- Monitor known risks
- Be prepared for issues at any time

Ensure you understand the difference between a risk and an issue



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Monitor Risks

Trigger condition—*An event or a condition that indicates a risk will become an issue*



- Continuously monitor risk status in the **risk register**
  - Each risk typically has a **trigger condition**. Watch out for those!
- Enact risk response if a risk is triggered

- Maintain risk management practices
  - Update probability and impact scores and risk responses
  - Identify new risks
  - Reassess current risks
  - Close outdated risks

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Tracking and Managing Risk in Adaptive Projects



- Establish a regular rhythm of feedback
- Identify potential threats and obstacles in daily standup/coordination meetings
- Demonstrate product or service increments frequently
- Test the effectiveness of potential solutions with short proof-of-concept experiments or “**spikes**”
- Conduct retrospectives to identify threats to team cohesion

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Managing Issues

*An **issue** is a current condition or situation that may have an impact on the project objectives*

Issues should be addressed as soon as possible.

1. Record the issue in the issue/impediment log
2. Assign the issue to an owner
3. Research the issue
4. Propose a solution
5. Close the issue

Issue No	Raised by	Date Opened	Description	Impact	Resolution	Assigned to	Date Closed
001.	KM.	9/9/23.	Engine failure	4.5/5	New engine	P.Sand	9/24/23

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Cost and Schedule

- Earned value analysis (EVA)
- Short-term or incremental budgeting and timeboxed development



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Define Scope

- Adaptive projects use a **product backlog** to document and control the evolution of product scope
- As the team works, they—together with the customer—discover the scope of the product





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Control Scope

- Keep scope aligned with the **requirements traceability matrix** and **scope baseline**
- Any scope changes must be approved by the **change control board (CCB)**
- Avoid **scope creep**!



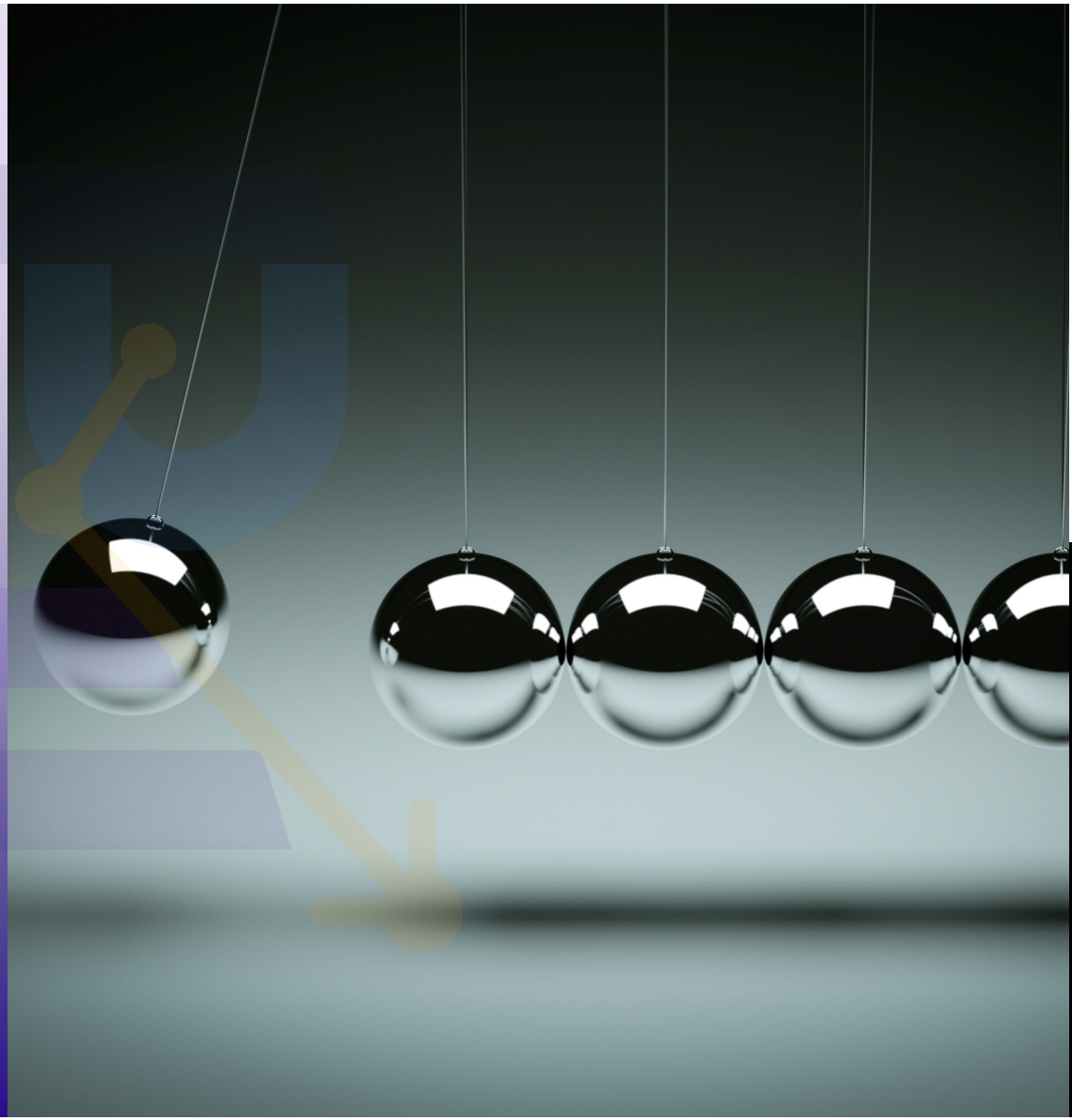
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Managing Change

Follow a process to facilitate change while maintaining scope, cost, and schedule baselines

— OR —

Let change be the engine of your project



Perform Integrated Change Control

The process of reviewing all change requests; approving changes and managing changes to deliverables, organizational process assets, project documents, and the project management plan; and communicating the decisions

Change Control Process

1. Clarify the need for the change
2. Log the change in the **change log**
3. Conduct an **impact analysis**—Evaluate the change and its impact on the project
4. Prepare a change request and send it to the **change control board (CCB)** for a decision
5. If the change is approved, update the project management plan and the affected baseline(s)
6. Communicate the change to the team and impacted stakeholders

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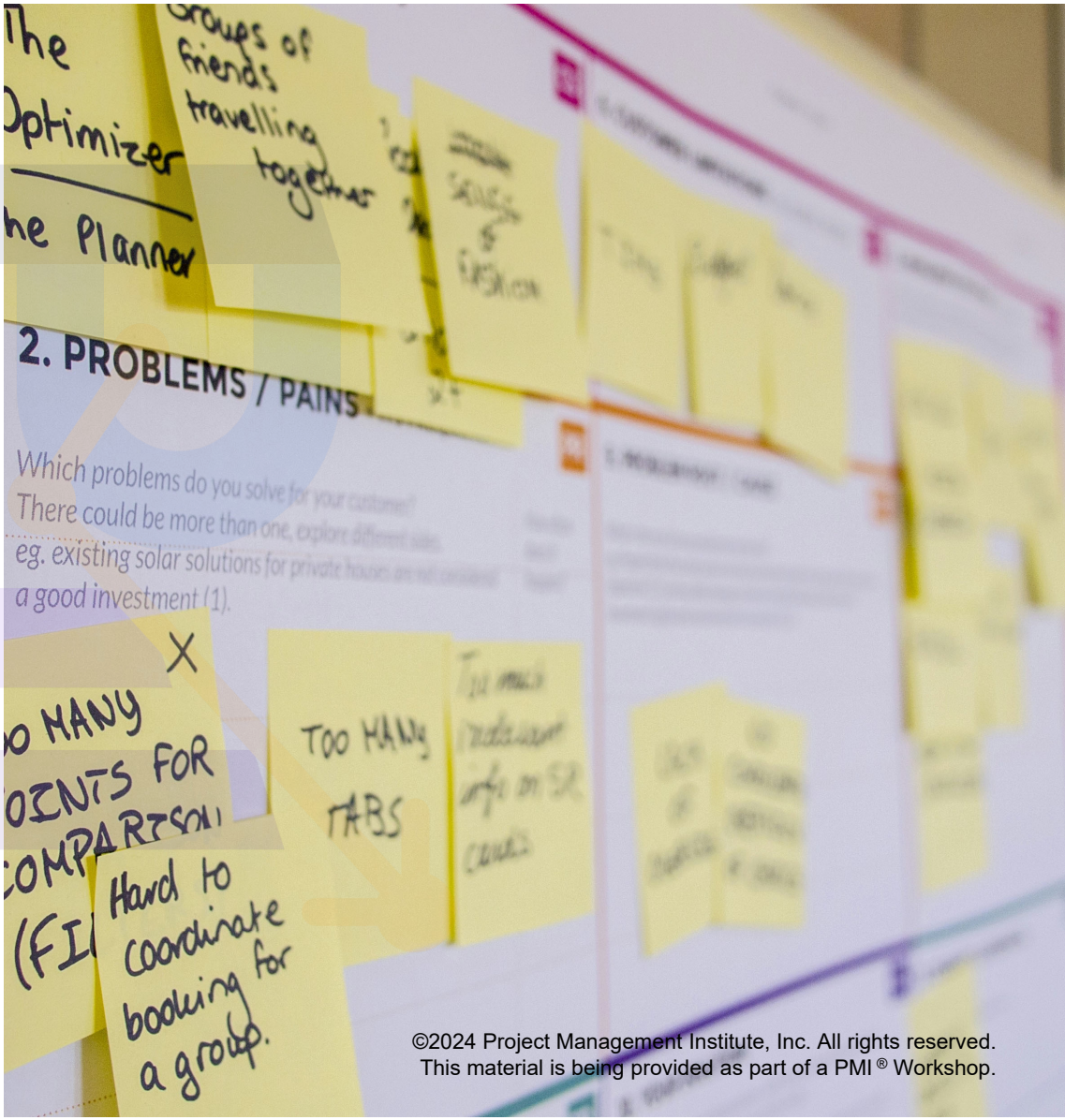
9C Detecting and Resolving Problems

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Identifying Problems

- Use **critical thinking**, active listening, and observation skills

- Review and update the **risk register** continuously
- Discuss work during **daily standup/coordination/ scrum** to maintain vigilance for obstacles



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Critical Thinking

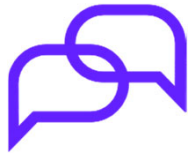
- Includes disciplined, rational, logical, evidence-based thinking
- Requires an open mind and the ability to analyze objectively

Project practitioners:

- Recognize bias
- Identify the root cause of problems
- Consider challenging issues—e.g., ambiguity, complexity

Project team members apply critical thinking to:

- Research and gather unbiased, well-balanced information
- Recognize, analyze, and resolve problems
- Analyze data and evidence
- Observe events to identify patterns and relationships
- Apply inductive, deductive, and abductive reasoning appropriately

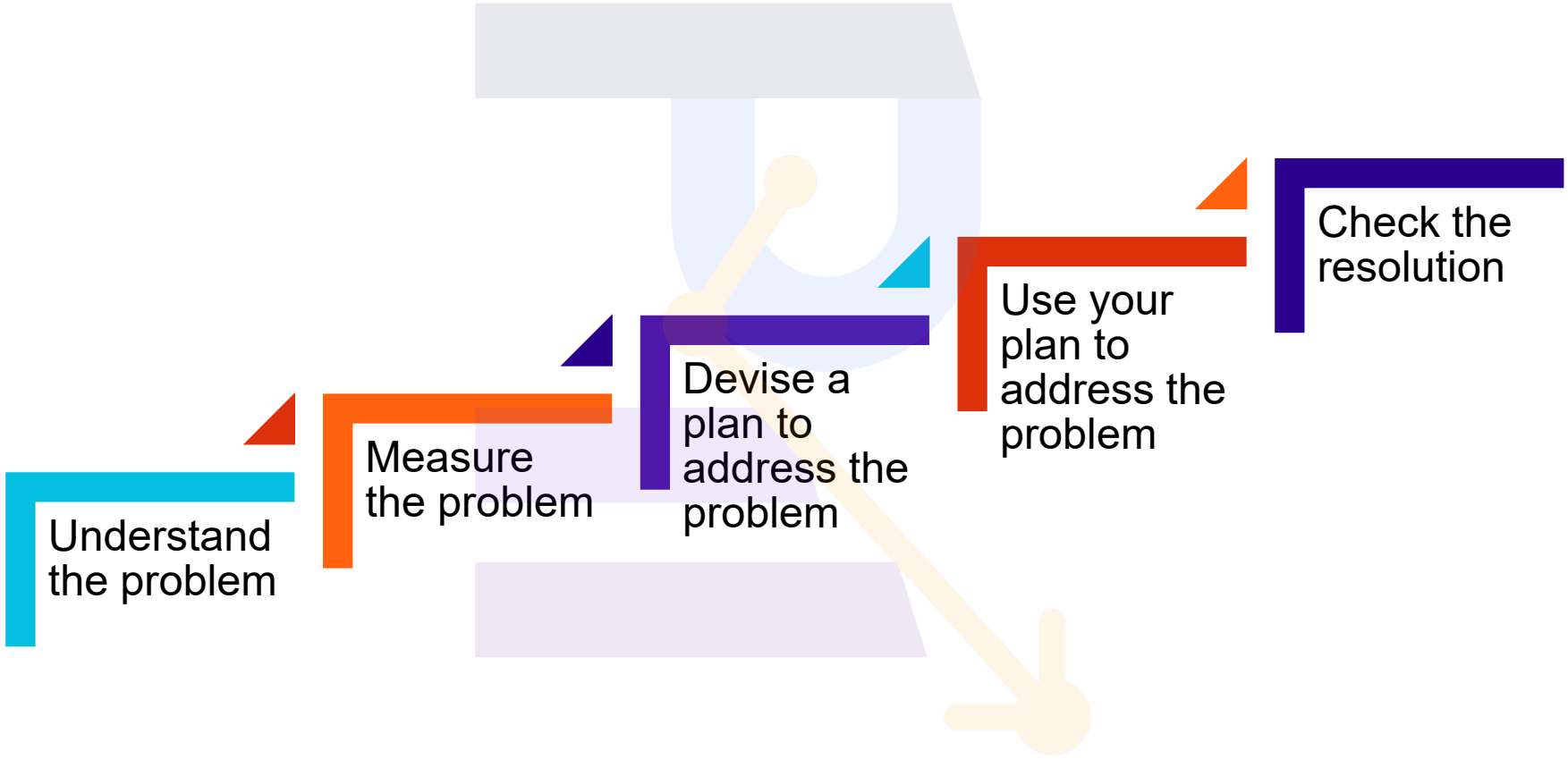


Also includes reflective thinking and metacognition (thinking about thinking and being aware of one's awareness)

Project Management Institute. 2021. A Guide to the Project Management Body of Knowledge (PMBOK® Guide — Seventh Edition). Section 2.4.2.2

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Problem-Solving Process: Understanding to Resolution



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Tools for Addressing Problems

- General analysis
- Data representation

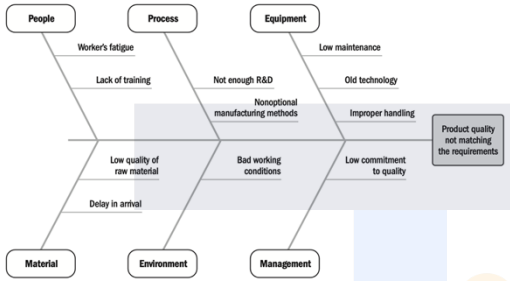


- **SWOT (Strengths, weaknesses, opportunities, and threats) Analysis**—Assesses the strengths, weaknesses, opportunities, and threats of an organization, project, or option
- **Brainstorming**—A simple technique used to generate then analyze a list of ideas
- **Mind Mapping**—A graphic technique used to consolidate ideas from individual brainstorming sessions into a single map. The map display reflects similarities and differences in understanding generate new ideas
- **Expert Judgment**—Judgment based upon expertise in a given application area, knowledge area, discipline, or industry—e.g., a subject matter expert

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Root-Cause Analysis: Tools and Data Representation

- Discussion, brainstorming, use of critical thinking or a tool
- Apply to risk, variances, and defects (quality)



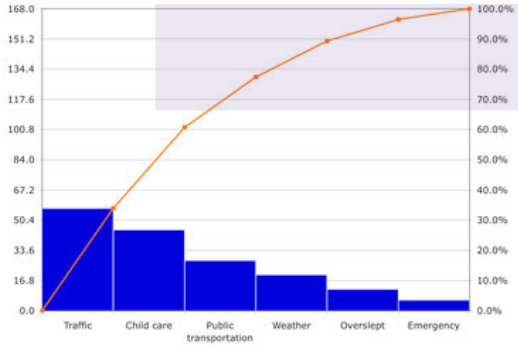
Ishikawa or Fishbone Diagram

- Problem statement is head of fish
- Break down causes into bones or branches for analysis

?????

Five Whys Method

Ask why something happened and then why that happened and then why that happened … as many times until we find the root cause



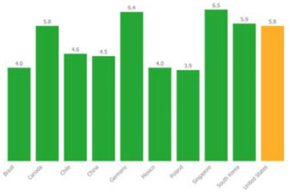
Pareto Chart

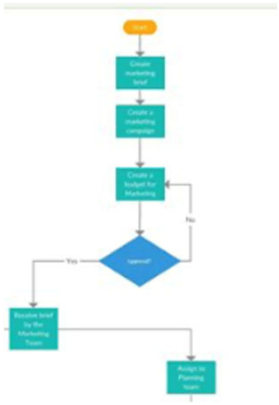
- Displays results of root-cause analysis
- Applies **80/20 rule**

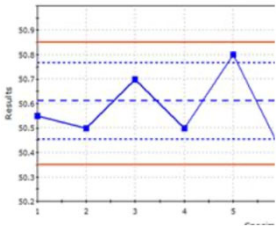
Bar graph that visually represents the most significant problems

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Data Representation Tools for Addressing Problems







Histogram—A bar or column chart that graphically represents numerical data. Pareto is a type of histogram.

Process Flow Diagram—A visual representation of the steps involved in a process or workflow. It is used to identify the sequence of events and the relationships between different steps in a process.

Value Stream Map—Similar to a process flow diagram, this tool can be used to identify process steps that add value (value stream) and those that do not add value (waste).

Control Charts—A graphic display of process data over time and against established control limits; a center line assists in detecting a trend of plotted values toward either control limit.

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9D Measuring Performance

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Why Do We Use Metrics?

They constitute a description of a project or product attribute and how to measure it.

Metrics should:

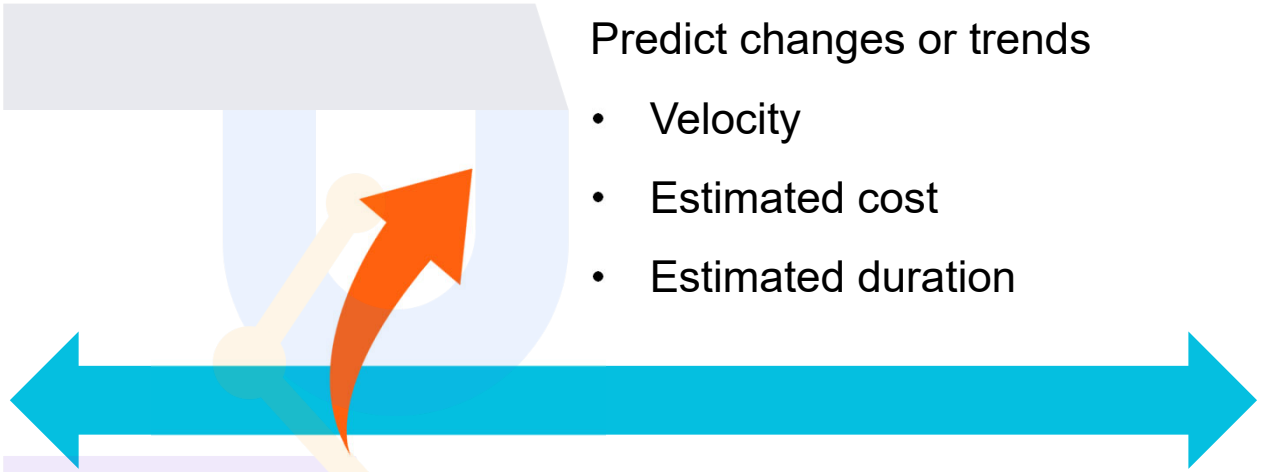
- Be SMART—specific, measurable, achievable, relevant, timely
- Support decision-making



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Lagging and Leading Indicators

- Provide visibility into project progress and keep the team on track toward project goals
- Use data from lagging indicators to create leading indicators!



Leading Indicators

Predict changes or trends

- Velocity
- Estimated cost
- Estimated duration

Lagging Indicators

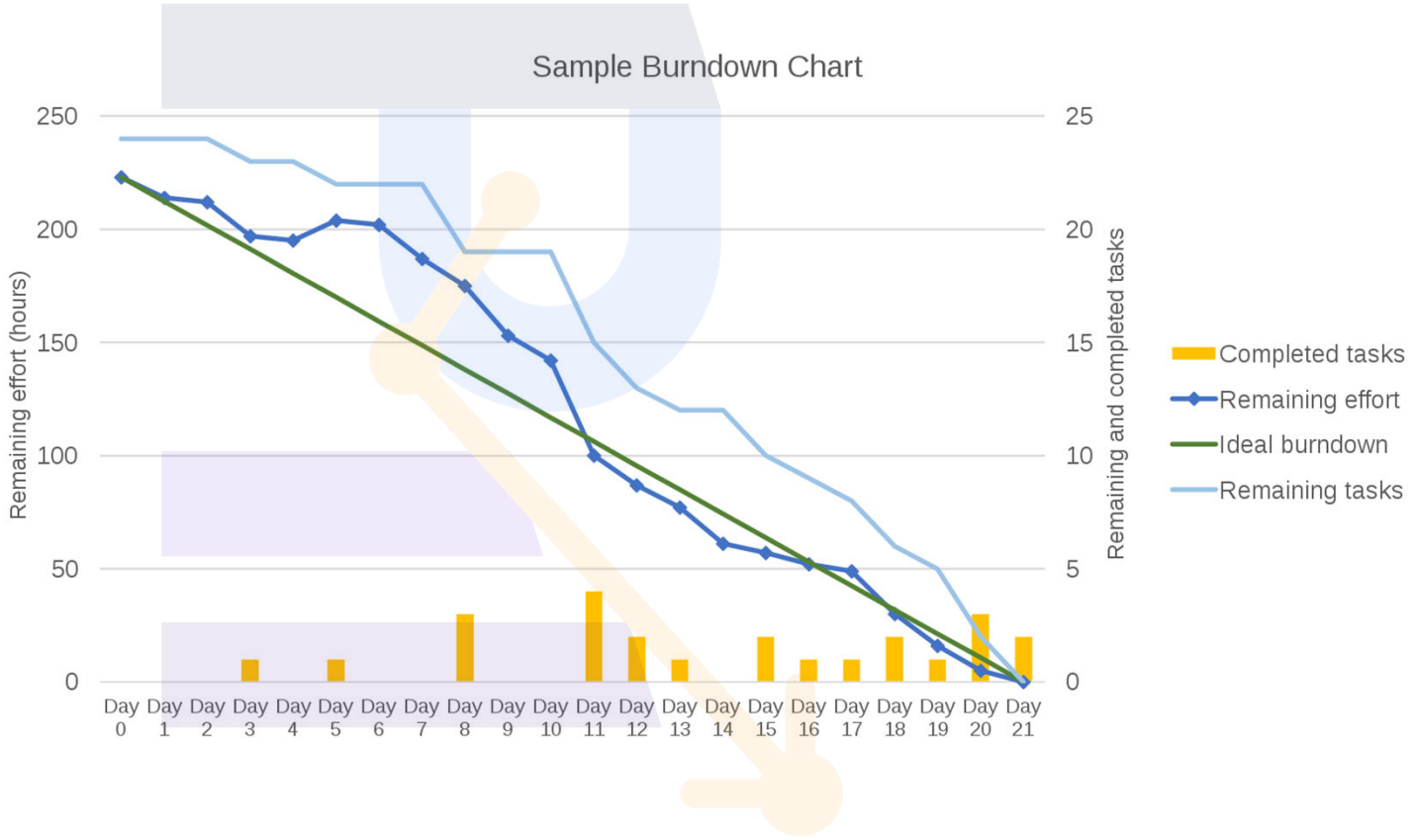
Measure past performance

- Number of user stories or deliverables completed
- Cost variance
- Schedule variance

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Metrics Overview

- Burndown chart
- Burnup chart
- Velocity chart
- Cumulative flow diagram

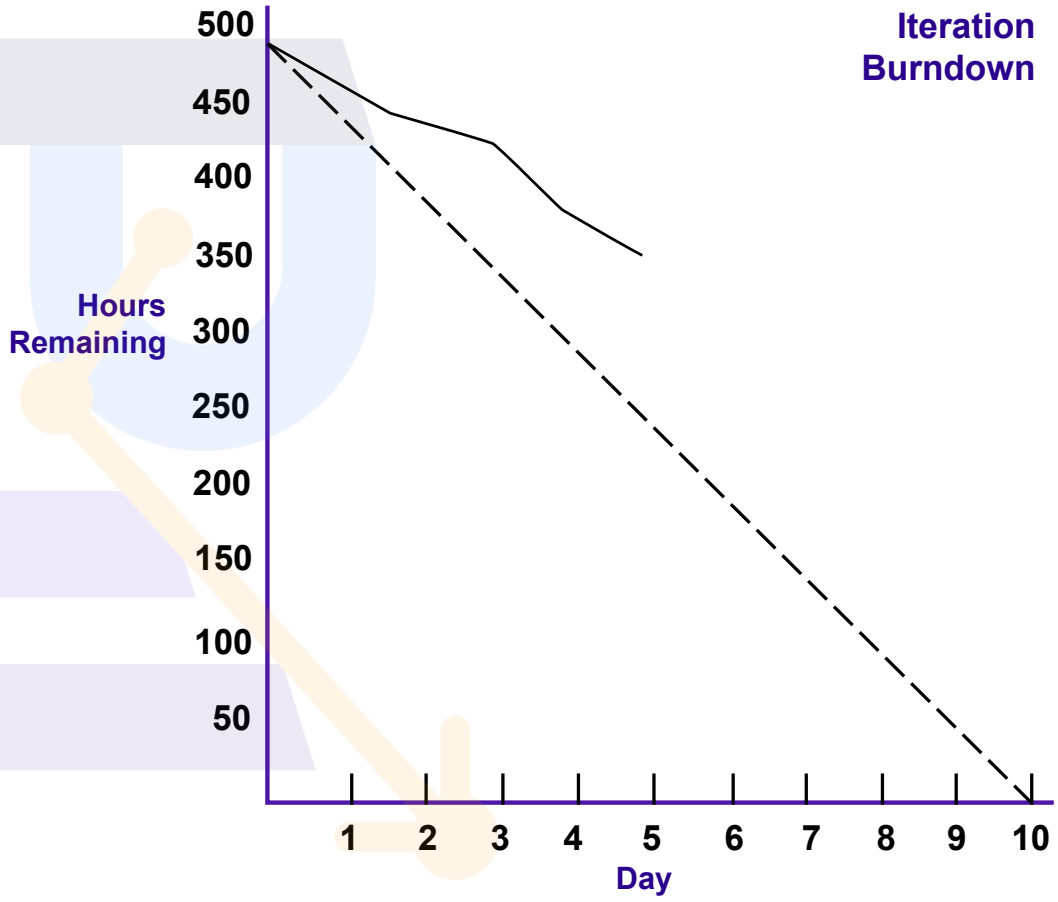


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Burn Charts

Burndown chart—*A graphic representation of work remaining versus the time left in a timebox (iteration or release)*

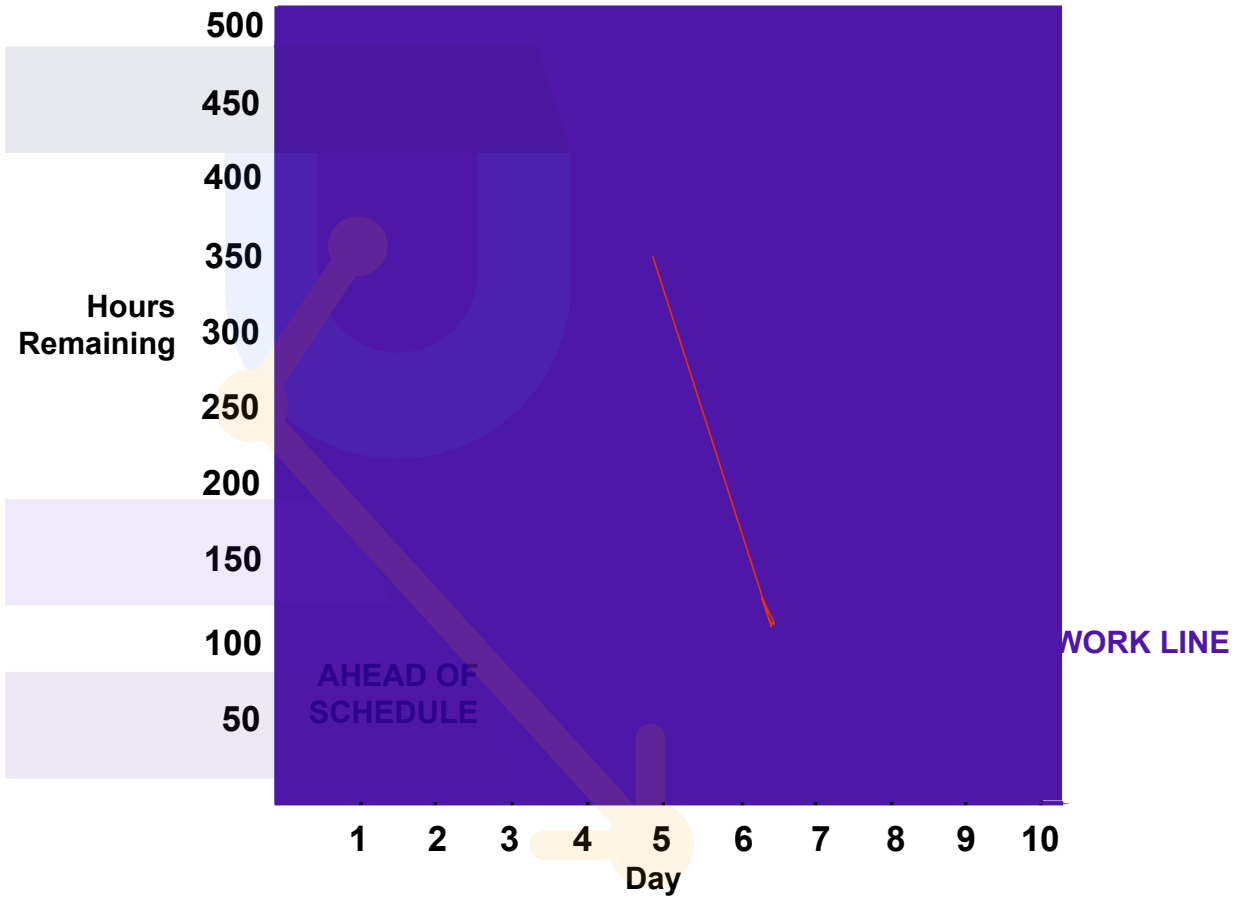
Burnup chart—*A graphic representation of work completed toward the release of a product*



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Reading the Burndown Chart

Ideal Work Line

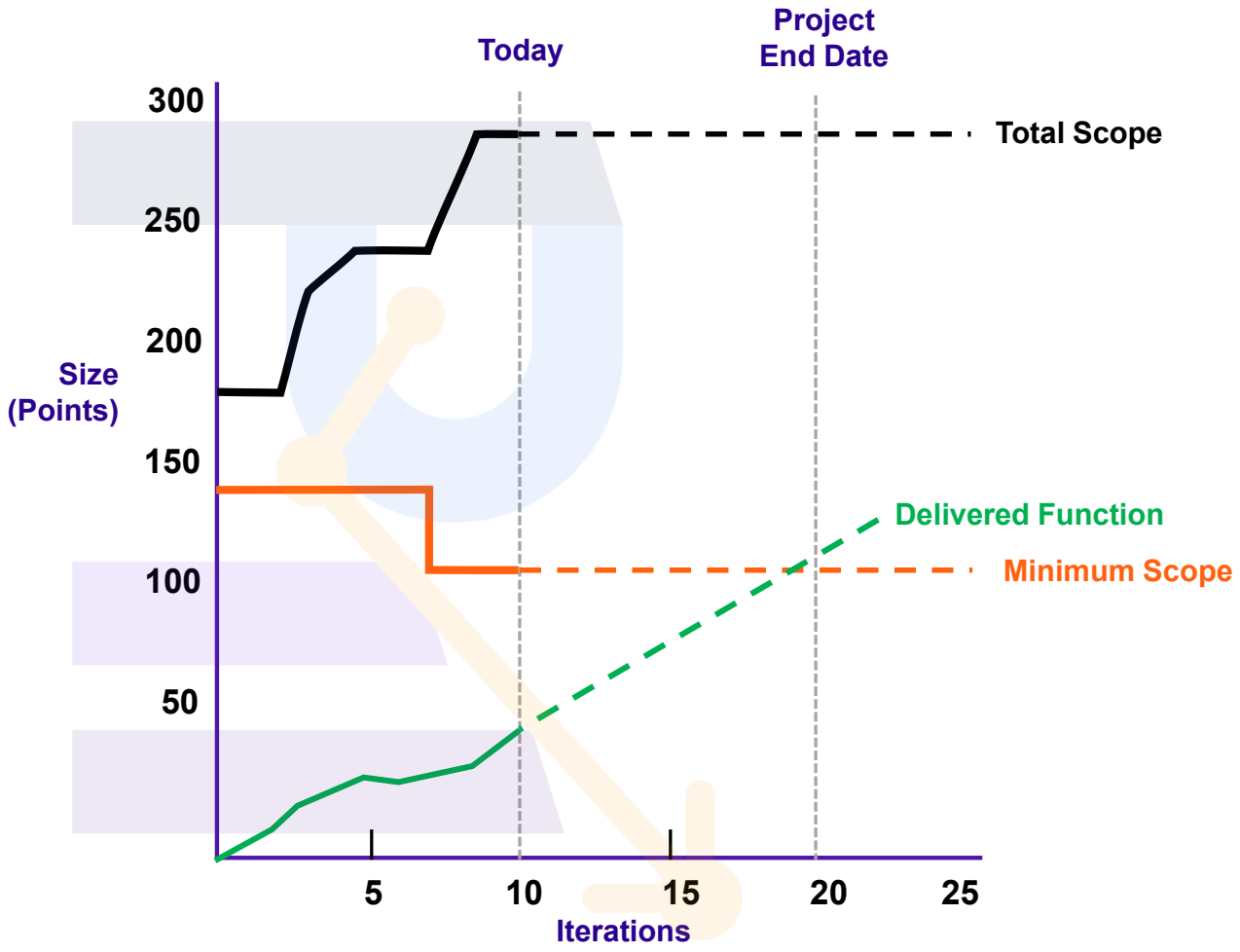


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Burnup Chart

Shows work completed during a release

How can a burnup chart help detect and solve problems?

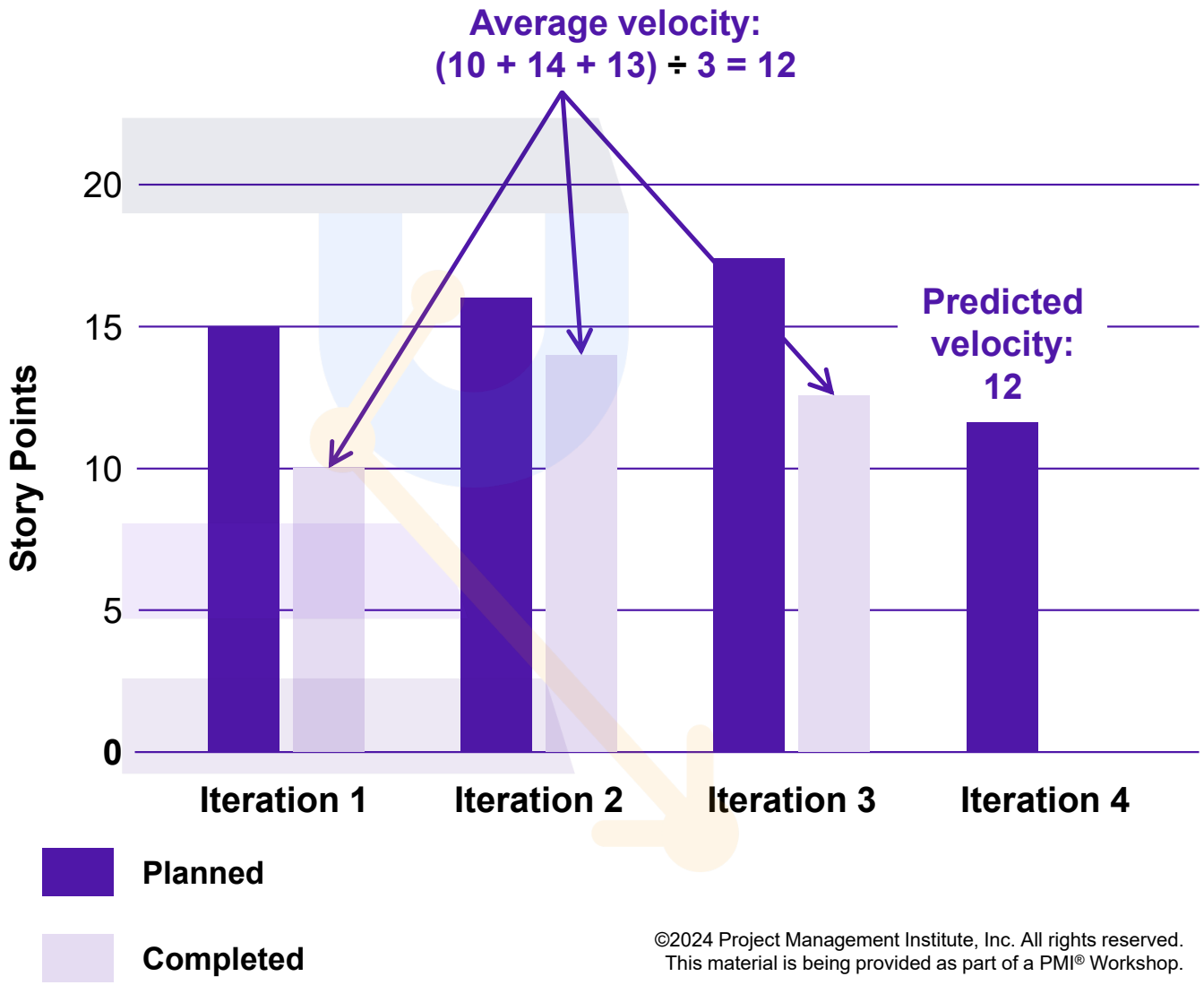


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Velocity

Velocity is a measure—normally in points—of a team's capacity during each iteration

The velocity metric is unique to a team. It should not be used to compare one team with another.

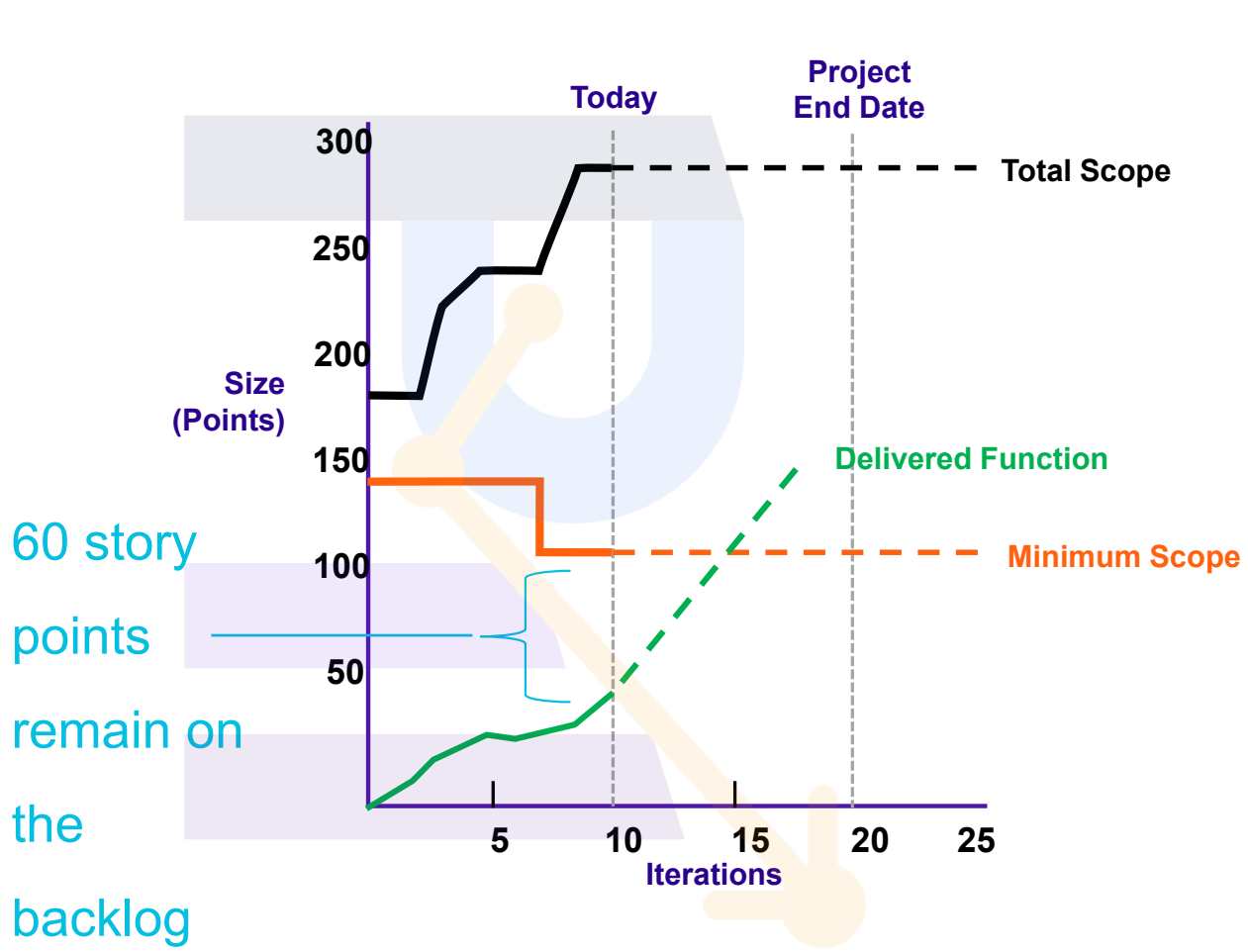


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Forecasting Work Using Velocity

- 60 story points remain on the backlog to complete minimum scope
- Average velocity is 12
- How many more iterations does the team need?

60 ÷ 12 = 5

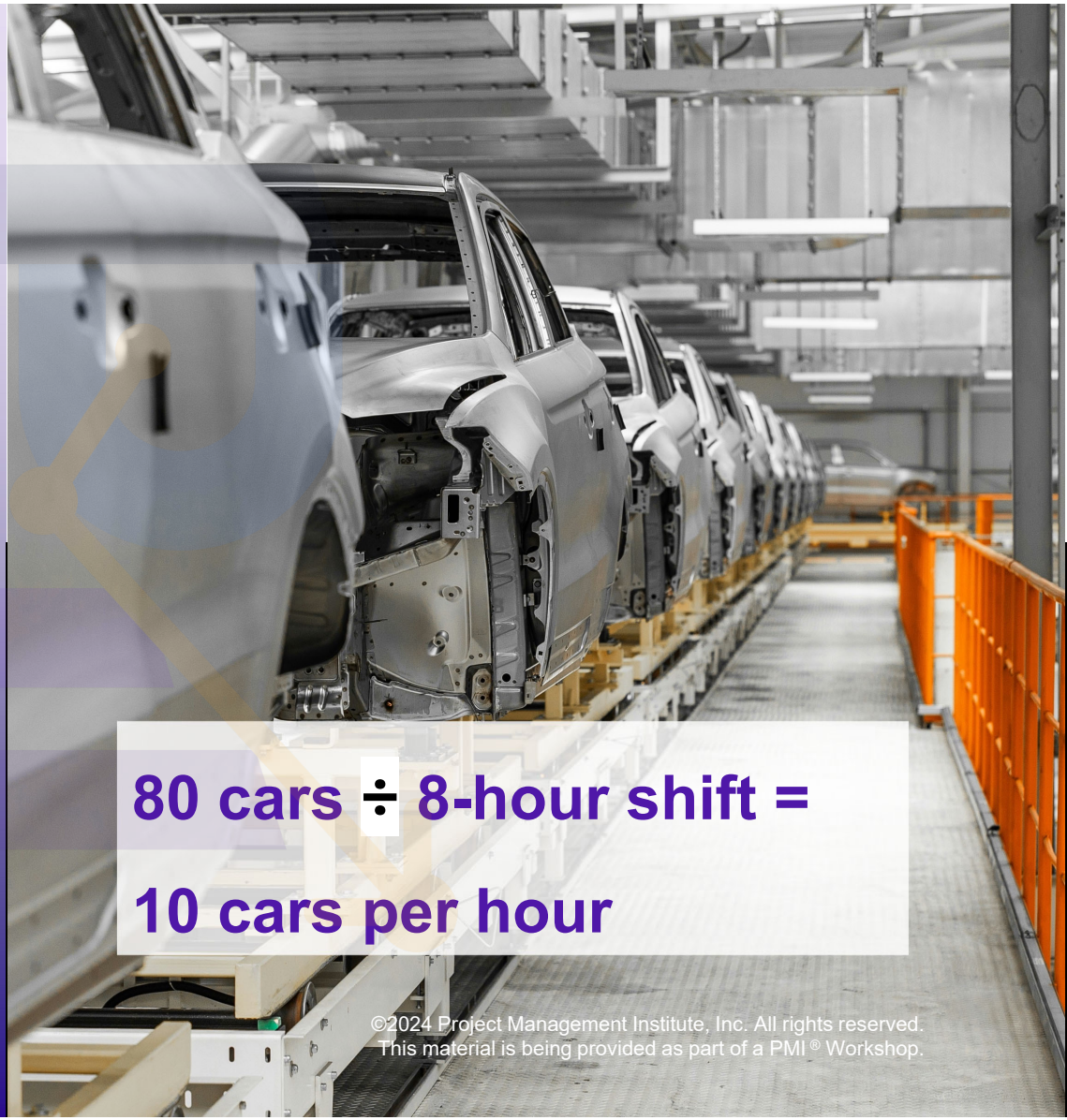


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Throughput

Throughput refers to the number of units produced during a specific interval

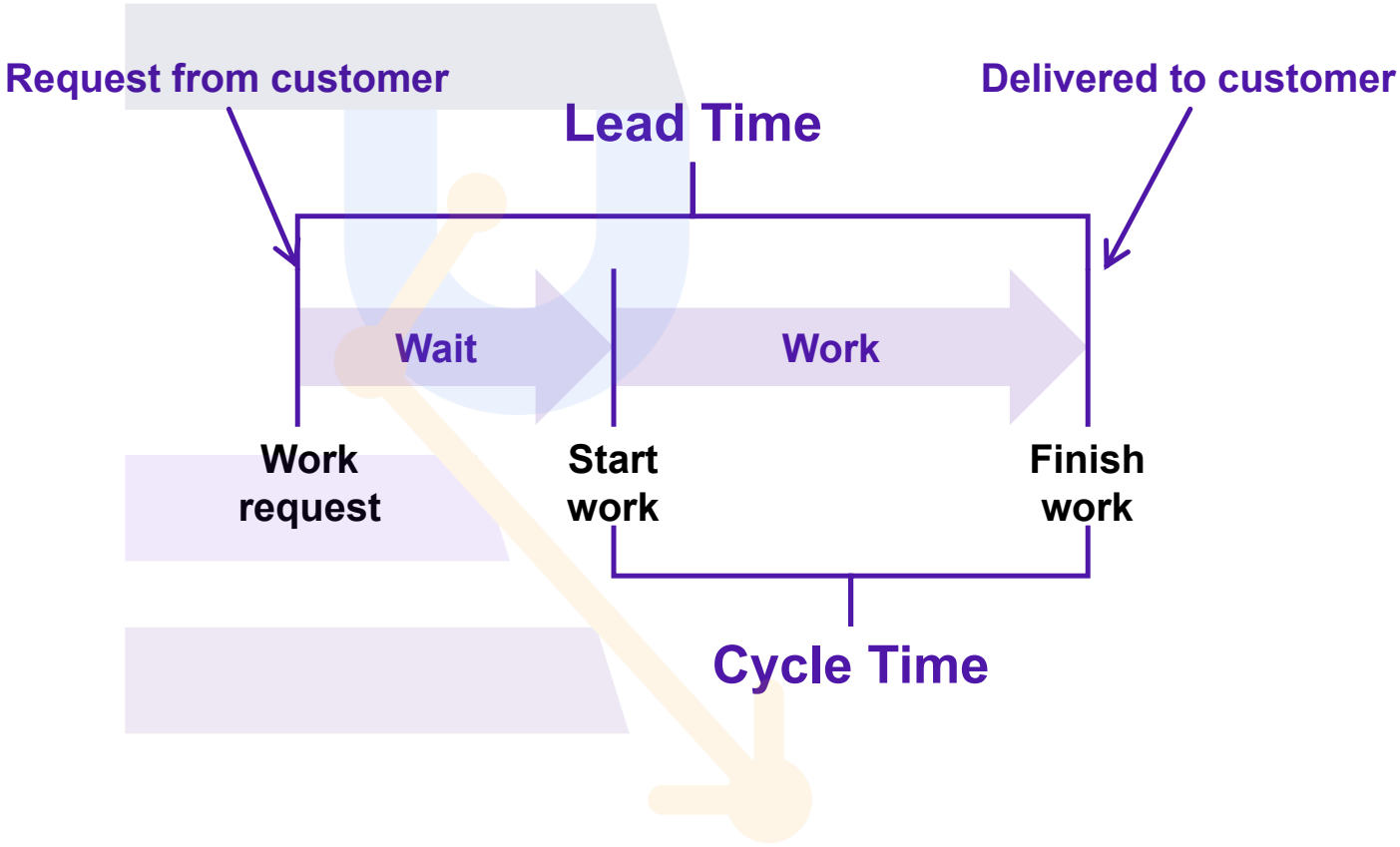
An example of a system with efficient throughput is a street or highway lane dedicated to buses or other high-occupancy vehicles



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Cycle Time and Lead Time

Important for continuous flow approaches

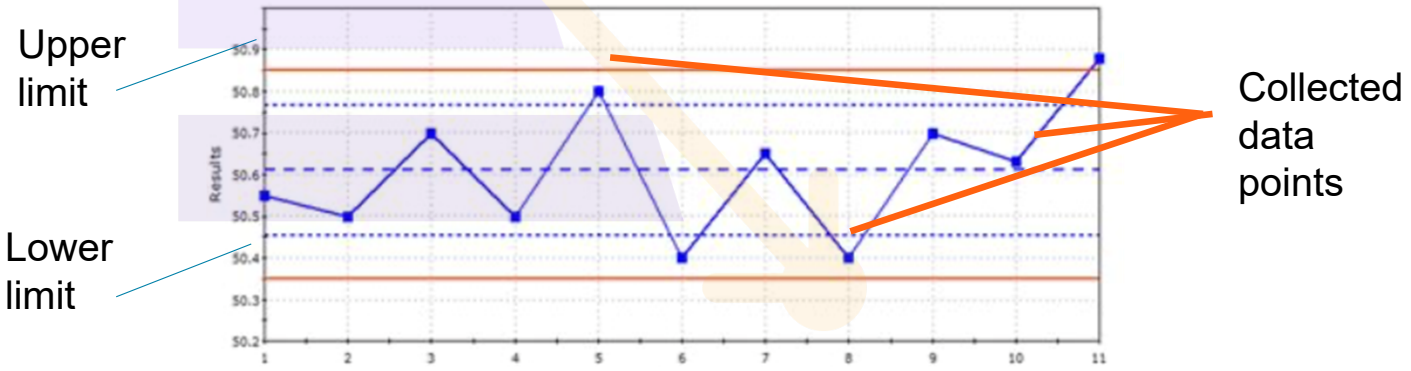


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Use Control Charts to Monitor Cycle Time and Resolve Problems

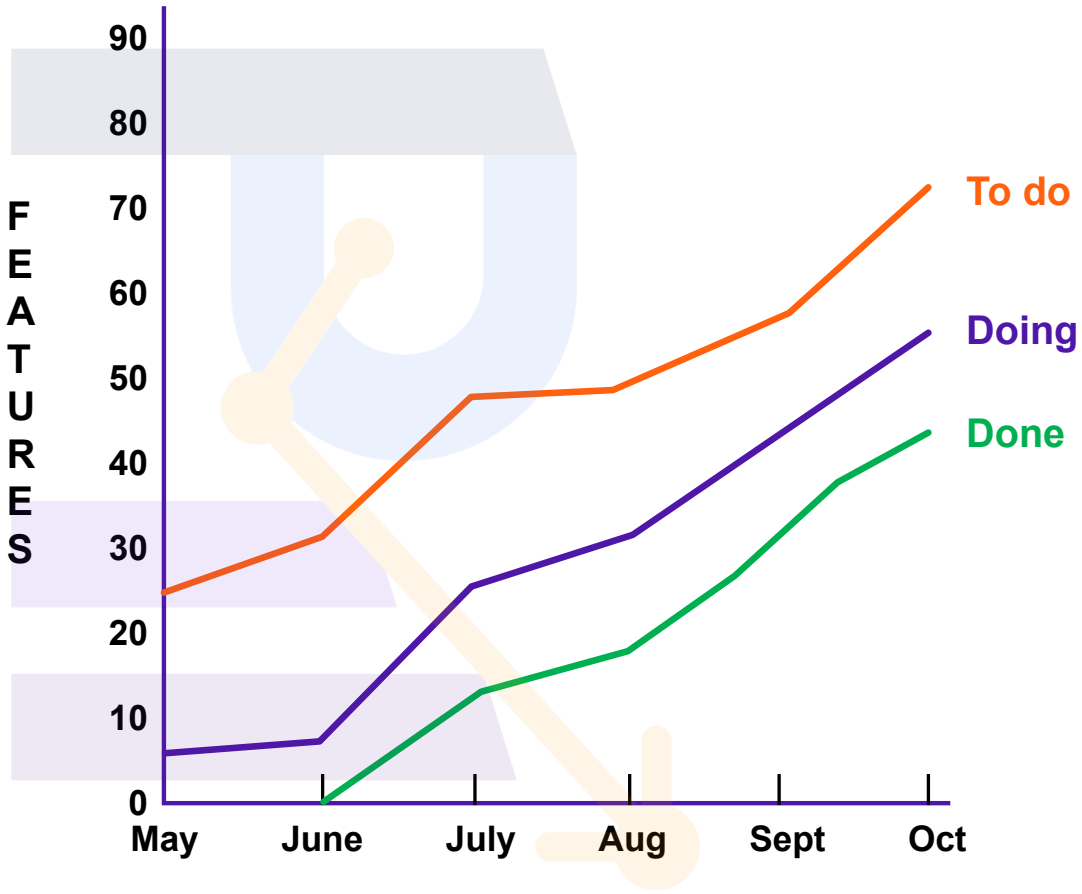
Cycle time is closely associated with **work in process (WIP)**, which is a count of all started tasks that have not yet been finished

1. Calculate the average cycle time and the upper and lower control limits based on data collected from the project
2. Monitor the data over time and look for any points that fall outside the control limits or any patterns or trends in the data
3. Investigate any points that fall outside the control limits or any patterns or trends in the data to identify the root cause of the variation
4. Take corrective action to address the root cause of the variation and bring the process back into control



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Cumulative Flow Diagram



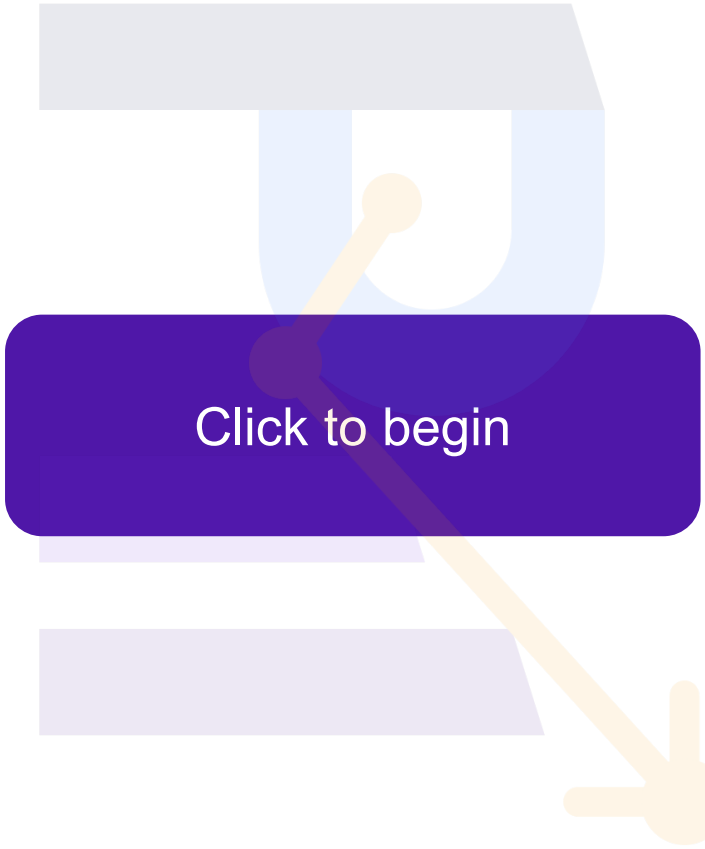
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Information Radiators



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Matching Activity: Metrics Terms



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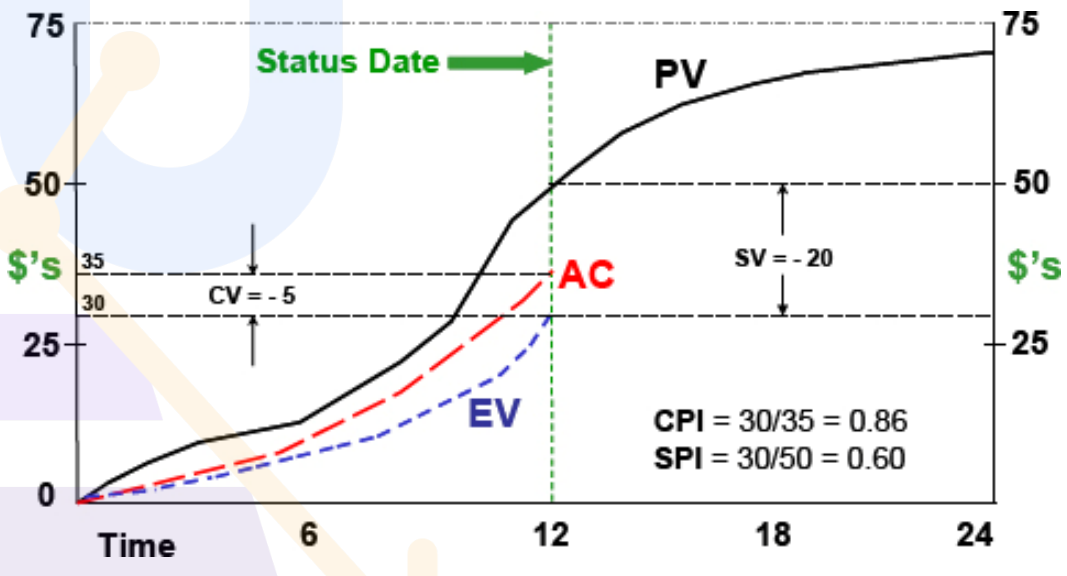


9E Applying Project Controls and Forecasting

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Earned Value Analysis (EVA) and Earned Value Management (EVM)

- **EVA**—*An **analysis method** that uses a set of measures associated with scope, schedule, and cost to determine the cost and schedule performance of a project.*
- **EVM**—*A **methodology** that combines scope, schedule, and resource measurements to assess project performance and progress.*



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Earned Value Analysis (EVA) Components

	Definition	How Used
Planned Value **(PV)**	The authorized budget assigned to scheduled work.	The value of the work planned to be completed to a point in time, usually the data date*, or project completion
Earned Value **(EV)**	The measure of work performed expressed in terms of the budget authorized for that work.	The planned value of all the work completed (earned) to a point in time, usually the data date*, without reference to actual costs
Actual Cost **(AC)**	The realized cost incurred for the work performed on an activity during a specific time period.	The actual cost of all the work completed to a point in time, usually the data date
Budget at Completion **(BAC)**	The sum of all budgets established for the work to be performed.	The value of total planned work, the project cost baseline

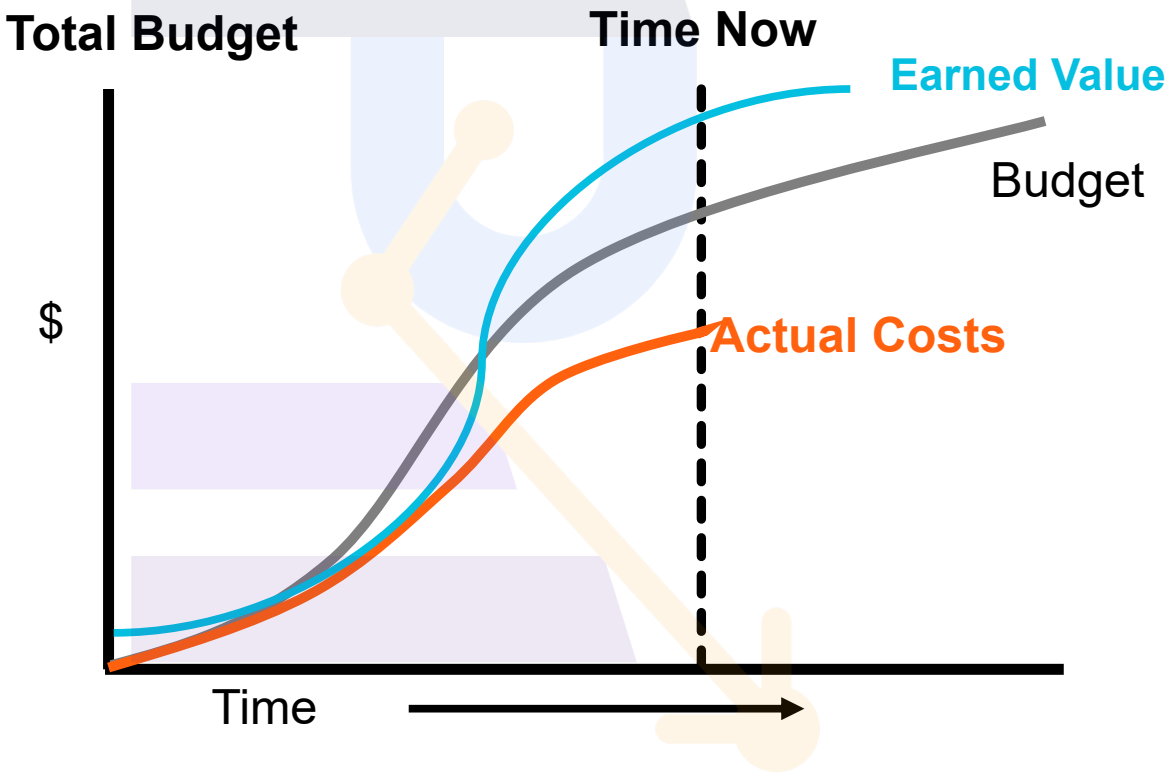
**Data date refers to a point in time when the status of a project is recorded.*

Project Management Institute (PMI). (2022). *Process Groups: A Practice Guide.* PMI.

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Significance of Earned Value Analysis (EVA)

Combines scope, schedule, and cost metrics and therefore is the **performance measurement baseline**



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Understanding Cost Variance

The amount of budget deficit or surplus at a given point in time, expressed as the difference between the earned value and the actual cost

EV – AC = CV

If the value is …	Then the project is performing …
Greater than 0 (positive)	Under planned cost by [$ amount]
0 (neutral)	At planned cost
Less than 0 (negative)	Over planned cost by [$ amount]

We use cost variance …

When we want to know the difference between the value of work completed to a date and the actual costs or expenditure made up to that date

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Calculate Cost Variance

A project to build a fishpond is scheduled for completion in 6 months with a budget of US$100,000. After 3 months, the project team captures these metrics:

- Planned value (PV) is US$50,000
- Earned value (EV) is US$80,000
- Actual cost (AC) is US$85,000

What is the cost variance (CV) for this project?

EV – AC = CV

80,000 – 85,000 = – $5,000

Answer and explanation: The earned value is USD$80,000. This is the amount they budgeted to spend on work up to this date. However, they spent USD$85,000 (the actual cost).

Therefore, halfway through the project, there is a cost overrun of USD$5,000.

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Understanding Schedule Variance

The amount by which the project is ahead or behind the planned delivery date, at a given point in time, expressed as the difference between the earned value and the planned value

EV – PV = SV

If the value is …	Then the project is …
Greater than 0 (positive)	Ahead of schedule by X amount
0 (neutral)	Precisely on schedule
Less than 0 (negative)	Behind schedule by X amount

Another way to think about schedule variance is …

The difference between the work completed to date and the work you planned to be completed on that date

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Calculate Schedule Variance



A project to build a fishpond is scheduled to run for 6 months with a budget of US$100,000. After 3 months, the project team captures these metrics:

- Planned value (PV) is US$50,000
- Earned value (EV) is US$80,000
- Actual cost (AC) is US$85,000

What is the schedule variance (SV) for this project?

EV – PV = SV

80,000 – 50,000 = 30,000

Answer and explanation: The earned value is USD$80,000 and the planned value is USD$50,000.

Halfway through the project, the team seems to be ahead of schedule by USD$30,000.

As per the schedule, the team should have completed USD$50,000 worth of work to this date. However, the team was able to complete USD$80,000 worth of work.

The project is running ahead of schedule as the team has completed USD$30,000 worth of work more than planned.

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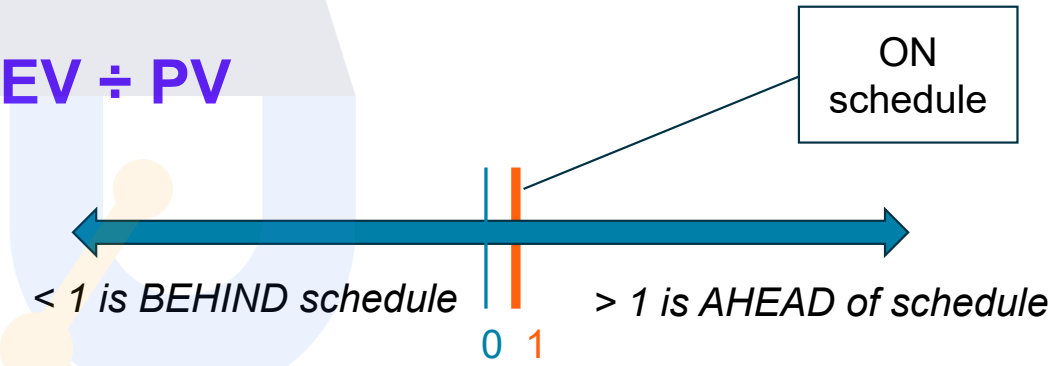
Cost and Schedule Performance Index (CPI and SPI)

SV and CV measure **variance**, or difference between actual and planned or earned value; SPI and CPI measure **efficiency**, or how well the project is using the time or budget

SPI—a measure of the schedule efficiency

- *Ratio of earned value to planned value*

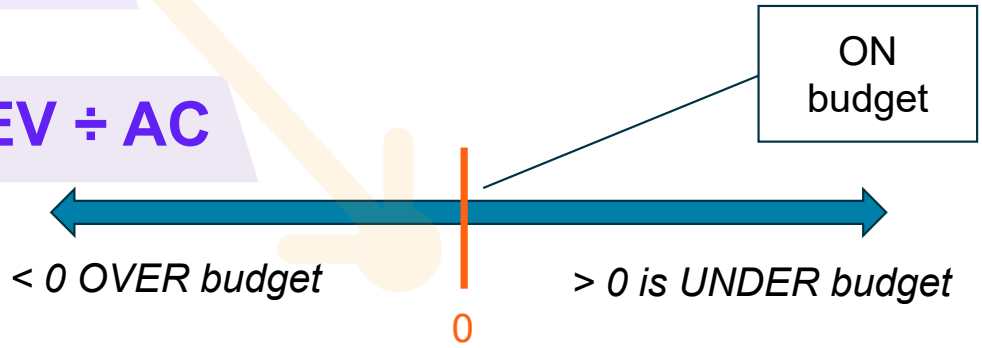
SPI = EV ÷ PV



CPI—a measure of the cost efficiency of budgeted resources

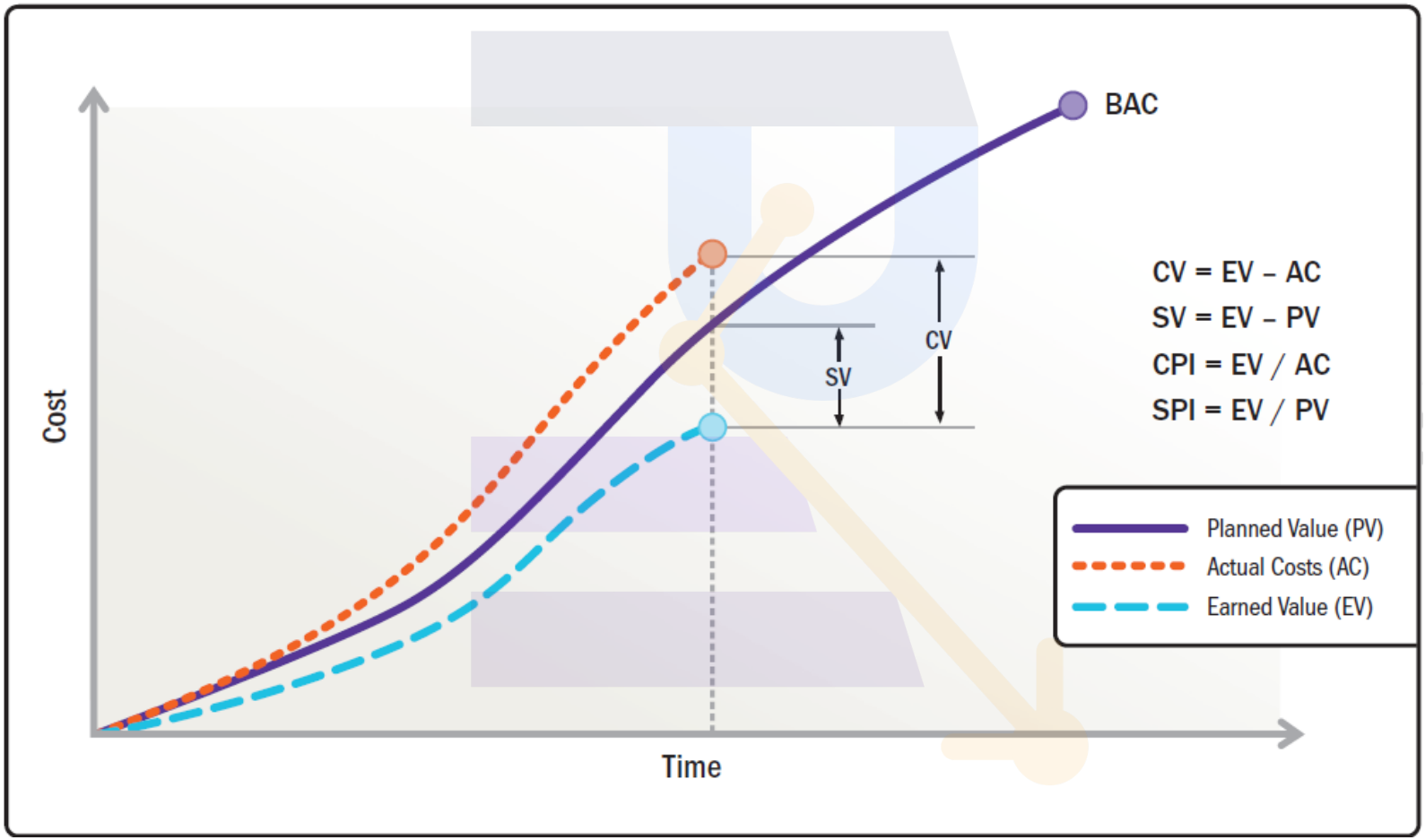
- *Ratio of earned value to actual cost*

CPI = EV ÷ AC



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Putting EVM Metrics Together



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9F Validating Requirements Through Project Delivery

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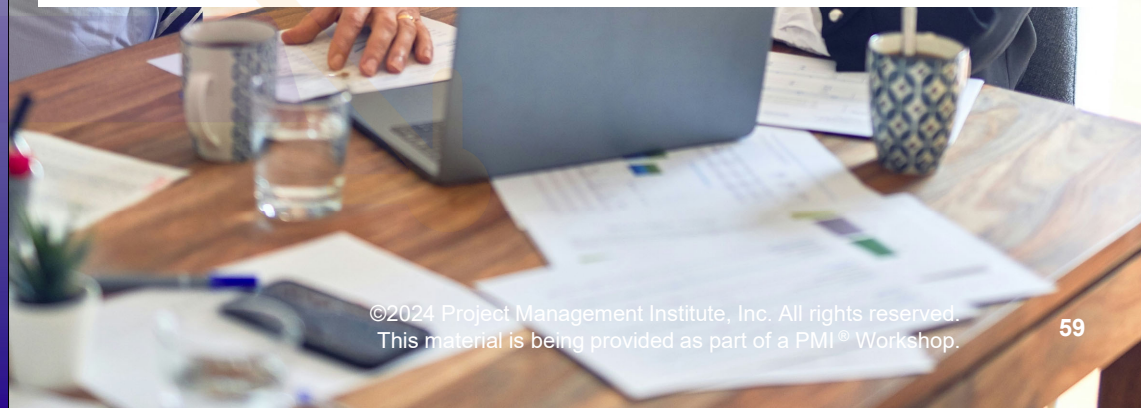
Evaluating the Solution or Product

"**Solution Evaluation** includes the processes to validate a full solution or a segment of a solution that is about to be or has already been implemented. Evaluation determines how well a solution meets the business needs expressed by stakeholders, including delivering value to the customer."

—PMI Guide to Business Analysis



Solution Evaluation is led by the **business analyst role**.



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Requirements Analysis and Traceability

TRACEABILITY MATRIX

Project Name:	[redacted]
Center:	
Project Manager Name:	
Project Description:	

Document Number: 0027420B

Revision: 2

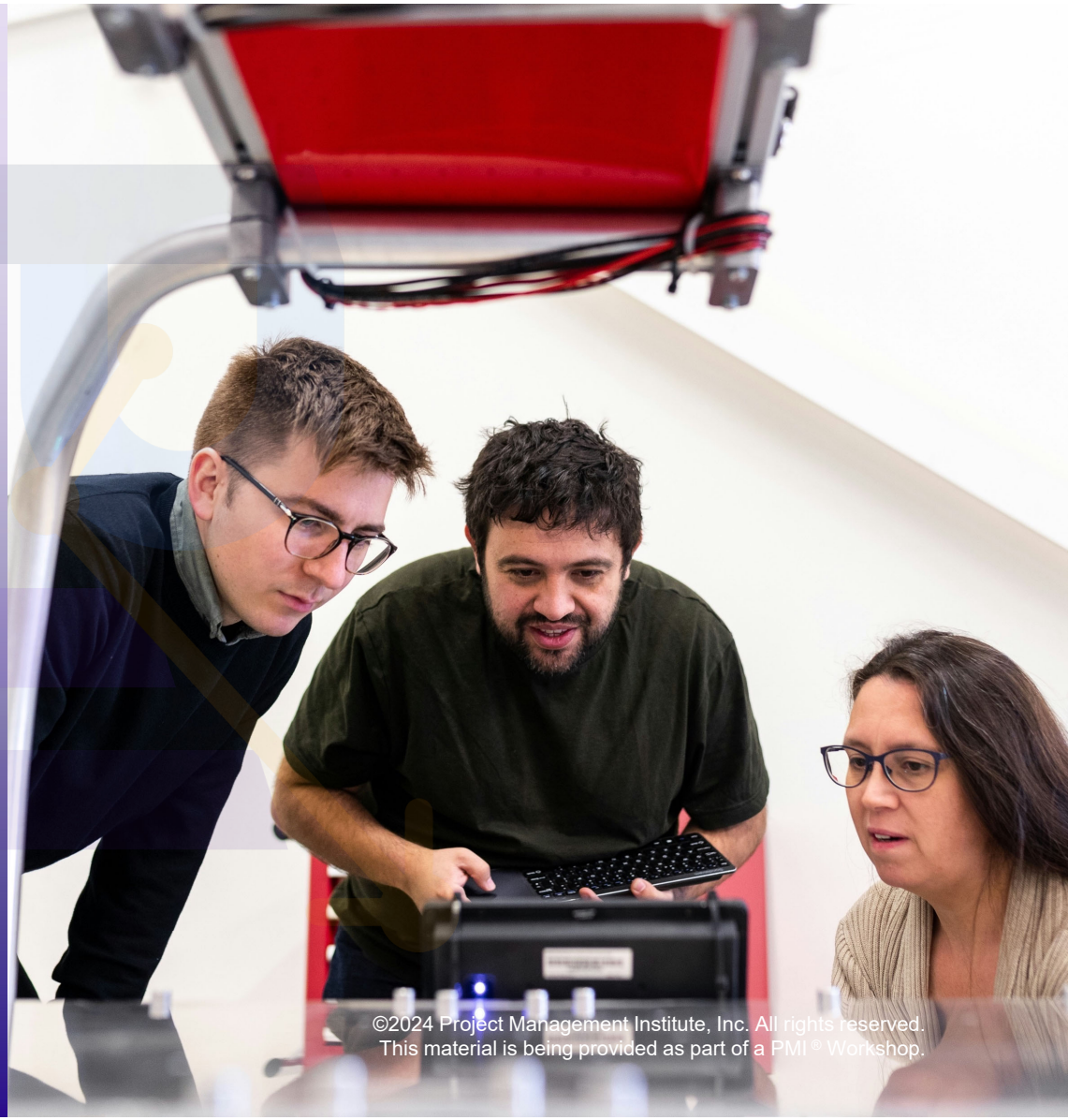
				Verification Test								Validation
Trace ID	Document ID	Requirement ID	Requirement	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	Stakeholder Need ID
TR001	0027420B(7)	2.1.1	Identification and Model Number	X								
TR002	0027420B(7)	2.1.2	Version, and Build	X								
TR003	0027420B(7)	2.1.3	Summit RDK Libraries	X								
TR004	0027420B(7)	2.1.4	User Limitation	X								
TR005	0027420B(7)	2.1.5	Investigational Device	X								
TR006	0027420B(7)	3.1.1	Bluetooth	X								
TR007	0027420B(7)	3.1.2	USB Ports	X								
TR008	0027420B(7)	3.1.3	Touch Screen Interface	X								
TR009	0027420B(7)	3.2.1	File System		X							
TR010	0027420B(7)	3.2.2	Log File		X							
TR011	0027420B(7)	3.2.3	ECG Data Files		X							
TR012	0027420B(7)	3.2.4	Annotation Files		X							
TR013	0027420B(7)	3.3.1	Main-form (Home screen		X							
TR014	0027420B(7)	4.1.1	Initialization Mode		X							
TR015	0027420B(7)	4.1.2	Home Mode	X								
TR016	0027420B(7)	4.1.3	Password Validation		X							
TR017	0027420B(7)	4.1.4	User Role		X							
TR018	0027420B(7)	4.1.5	User Privileges		X							
TR019	0027420B(7)	4.1.6	Entry to Patient Mode		X							
TR020	0027420B(7)	4.1.7	Exit from Patient Mode									
TR021	0027420B(7)	4.1.8	Entry to Physician Mode		X							
TR022	0027420B(7)	4.1.9	Exit from Physician Mode									
TR023	0027420B(7)	4.1.10	Display Statistics Mode		X							
TR024	0027420B(7)	4.1.11	Exit Display Statistics Mode									
TR025	0027420B(7)	4.1.12	View Diary Mode		X							



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Testing and Evaluation

- **Early testing** and **prototyping** activities help clarify customer requirements
- Product demos at the iteration review
- **User acceptance testing (UAT)** at completion can confirm final suitability of the product
- **Pilot** or **sandbox release** into pre-production environment is an extended test before full release



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Validate Requirements and Validate Scope

	Definition	Functional Area
Validation	The assurance that a product, service, or result meets the needs of the customer and other identified stakeholders	Business analysis
Validate Requirements	Process of checking that requirements meet business goals and objectives	Business analysis
Validate Scope	Process of formalizing acceptance of the completed project deliverables	Project management

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Prepare for Delivery

Validate and Verify

Both are prerequisites for successful delivery and implementation

	Validation	Verification
Premise	Are we building the right product?	Are we building the product correctly?
What/ Why	Ensures requirements solve the problem for the business and/or customer	Ensures the product complies with quality specifications
How	Use acceptance criteria to share understanding of changes between project team and customer	• Manage quality • Conduct testing • Conduct peer reviews or inspection—e.g., walkthroughs, day-in-the-life testing,
Who	Customers, stakeholders, project sponsor	Project team

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Validate Requirements and Validate Scope



Use the **requirements traceability matrix** to identify the requirements impacted by the change.

Impact analysis

- Project manager considers any scope change against the **baselines** (benchmark for comparison)
- Business analyst assesses any proposed change against **requirements documentation**
- Identify potential conflicts, risks, and impact to cost or schedule



Use the **product backlog** to define and refine scope

- Product owner aligns backlog to business value continuously
- Customer and stakeholder consent gained by defining **acceptance criteria** for user stories and iteration feedback

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When Is the Product Ready and the Project Complete?

- Review the **requirements traceability matrix**—Have requirements been met?
- Has the customer accepted the product?

Requirements Traceability Matrix

Project Name:	
Cost Center:	
Project Description:	

ID	Associate ID					WBS Deliverables	Product Design	Product Development	Test Cases
			Goals, Objectives						
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								

Has the customer accepted the final release or product?

- Completed features indicate readiness for delivery
- No further refinement of the **product backlog** is performed

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Accepting the Solution for Release or Delivery

Implementation strategy—Pilot or full release?

Knowledge transfer—Lessons learned, retrospectives, project reports (if applicable)

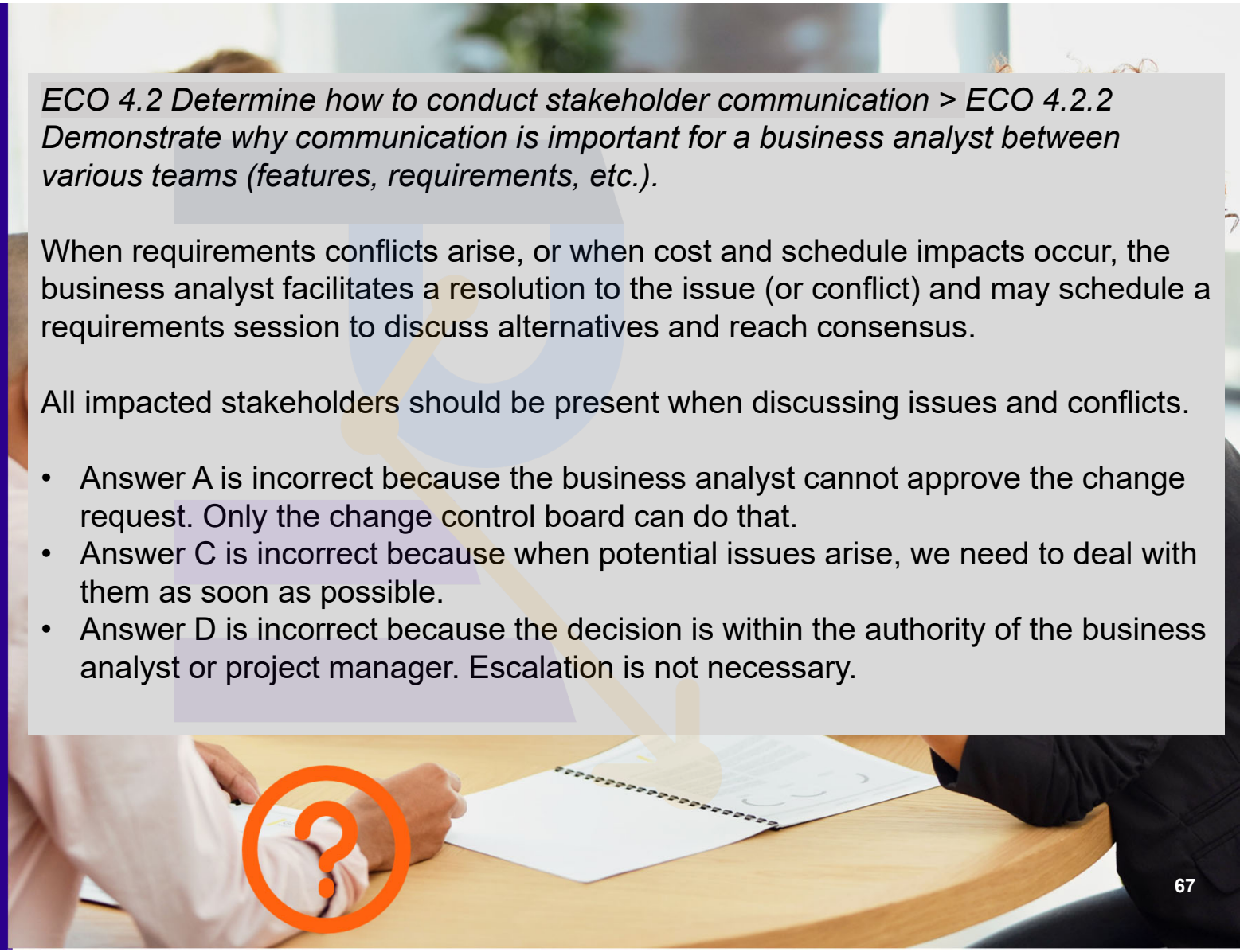


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Addressing Requirements Conflicts

Sample CAPM Exam Question

Someone has made a change request. The impact analysis reveals a requirements conflict and negative cost/schedule impact.



ECO 4.2 Determine how to conduct stakeholder communication > ECO 4.2.2 Demonstrate why communication is important for a business analyst between various teams (features, requirements, etc.).

When requirements conflicts arise, or when cost and schedule impacts occur, the business analyst facilitates a resolution to the issue (or conflict) and may schedule a requirements session to discuss alternatives and reach consensus.

All impacted stakeholders should be present when discussing issues and conflicts.

- Answer A is incorrect because the business analyst cannot approve the change request. Only the change control board can do that.
- Answer C is incorrect because when potential issues arise, we need to deal with them as soon as possible.
- Answer D is incorrect because the decision is within the authority of the business analyst or project manager. Escalation is not necessary.



9G Closing and Transitioning

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Project Closure Activities

The **Close Project or Phase process activities** are typically included in the project management plan and in the WBS, under the project management function.



- **Customer accepts product** or **project fails**
- Project team transitions deliverables or product to customer—include any training requirements or recommendations
- Notify sponsoring organization; update OPAs
- Close open issues and prepare project report
- Close external obligations—e.g., contracts
- Archive project information
- Hold a final meeting for the team to include lessons learned conversations and celebrations!
- Release resources (team members, financial, and physical assets)
- Archive lessons learned in the lessons learned repository

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Conduct Final Retrospective, Capture Lessons Learned



What went well:	We can improve:

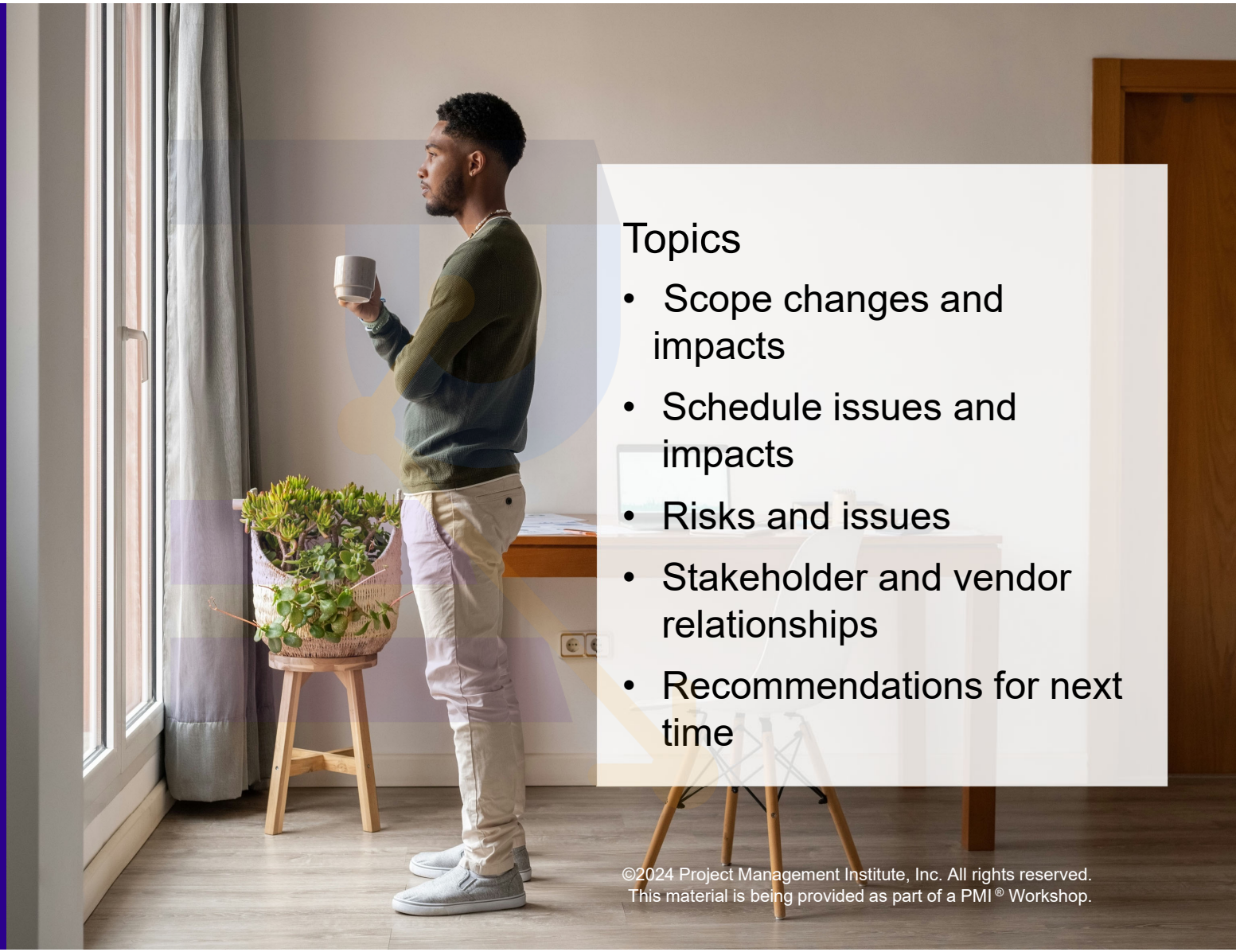


Adaptive teams should document lessons learned!

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What's in the Lessons Learned?

Start documenting early in the project and make it a good habit!



Topics

- Scope changes and impacts
- Schedule issues and impacts
- Risks and issues
- Stakeholder and vendor relationships
- Recommendations for next time

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Evaluating the Deployed Solution



A business analyst can **gauge a project's success** when the end users or operations personnel start to use the solution **post-release**.

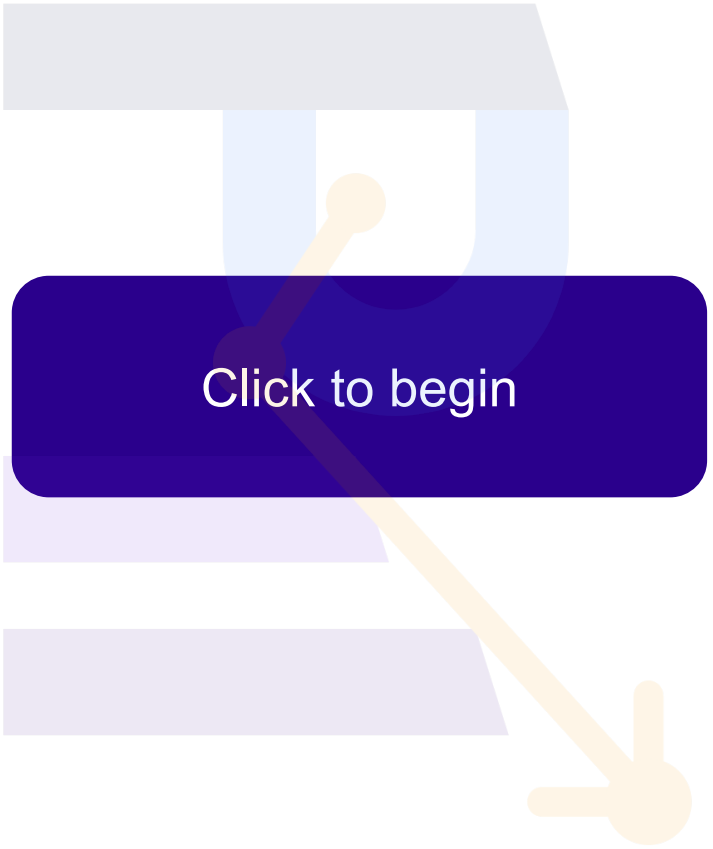
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Knowledge Check

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Matching Activity: Threat Strategies



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Question 1

What type of chart highlights how much work is left to complete in a sprint?



1. Burndown chart

2. Velocity chart

3. Cumulative flow chart

4. Burnup chart

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Question 2

Which condition is a factor of uncertainty and describes project dimensions or components that change often and unexpectedly?



1. Complexity
2. Opportunity
3. Threat
4. **Volatility**

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Question 3

Which term refers to a shared understanding within a development team of criteria for determining a user story, feature, or product ready for release to the customer?



1. Story points

2. Definition of done

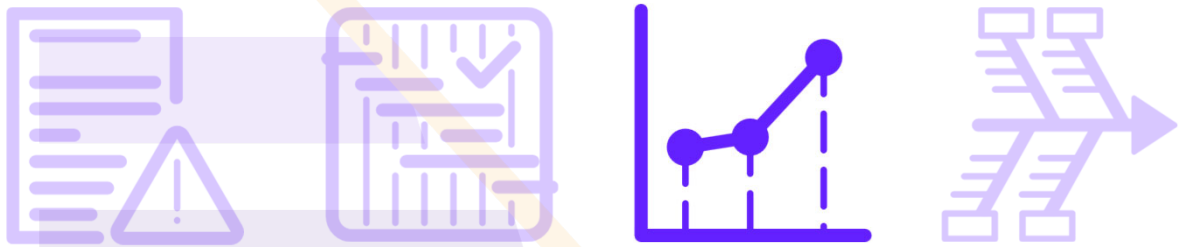
3. Retrospective

4. Acceptance criteria

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Question 4

Which graph shows the behavior of a process over time and whether or not it is stable and within expectations?



1. Risk register

2. Gantt chart

3. Control chart

4. Ishikawa diagram

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Wrapping Up

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Summary

9A Engaging Stakeholders

9B Monitoring and Controlling Processes

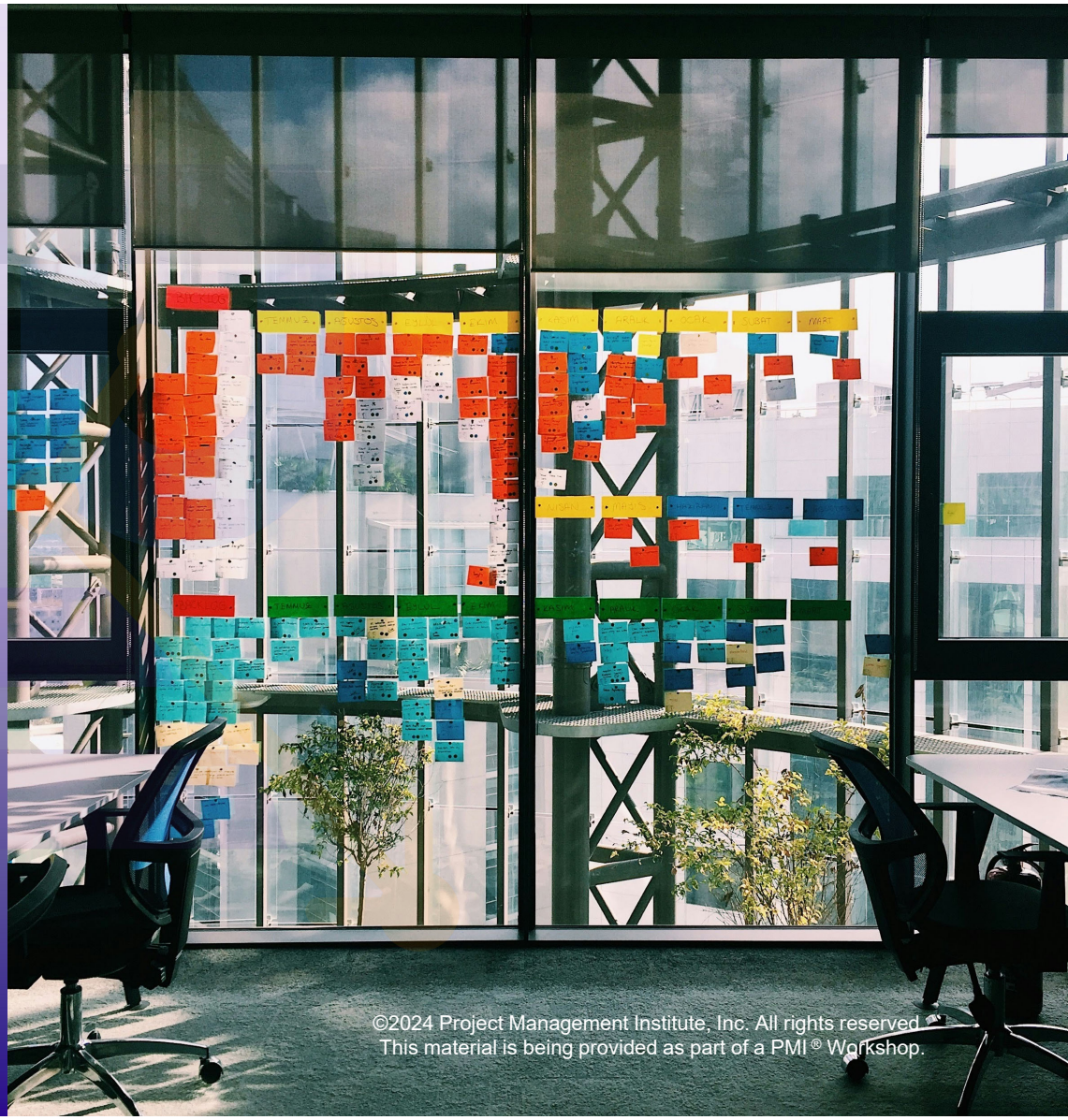
9C Detecting and Solving Problems

9D Measuring Performance

9E Applying Project Controls and Forecasting

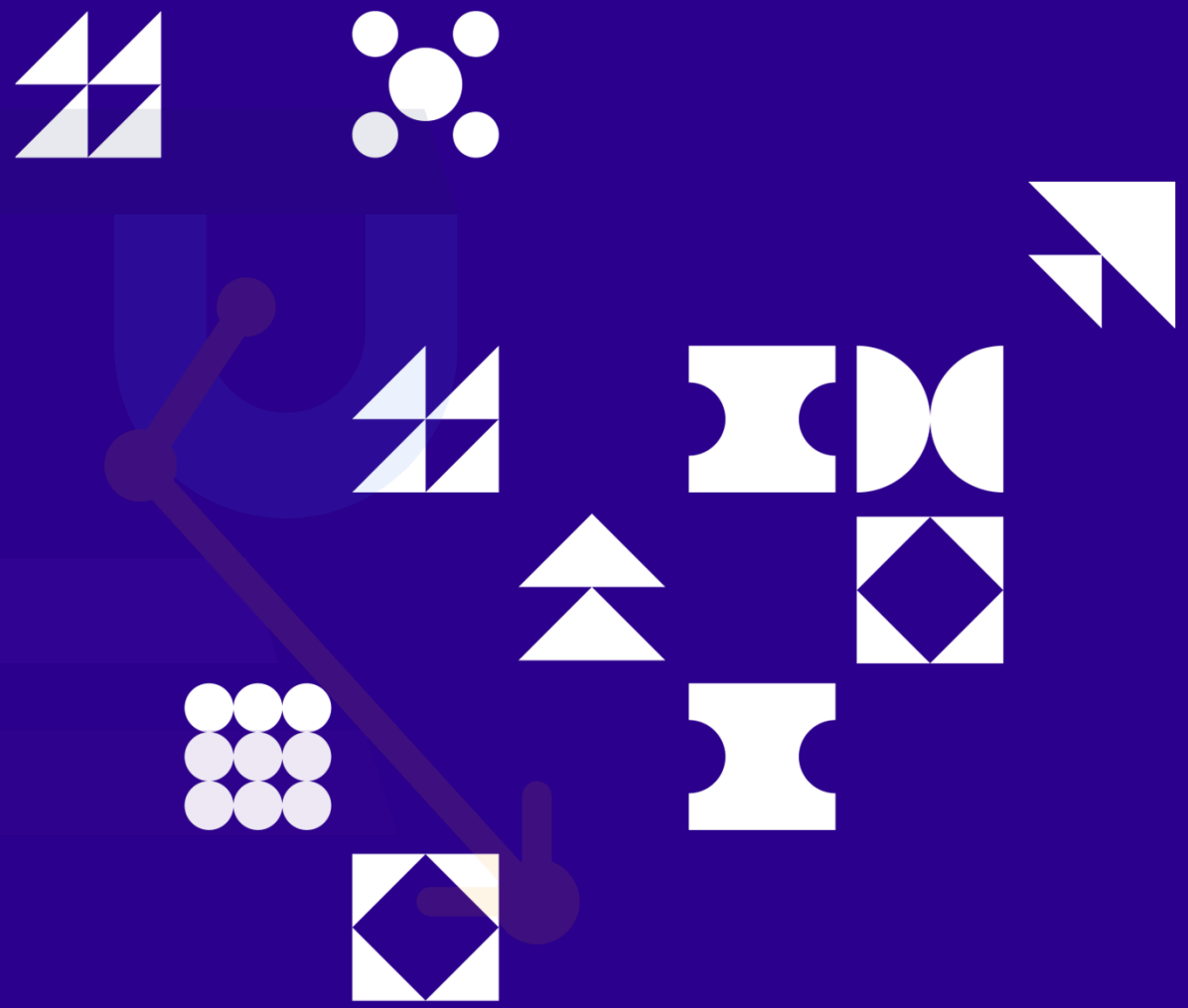
9F Validating Requirements Through Project Delivery

9G Closing and Transitioning



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End of Lessons



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