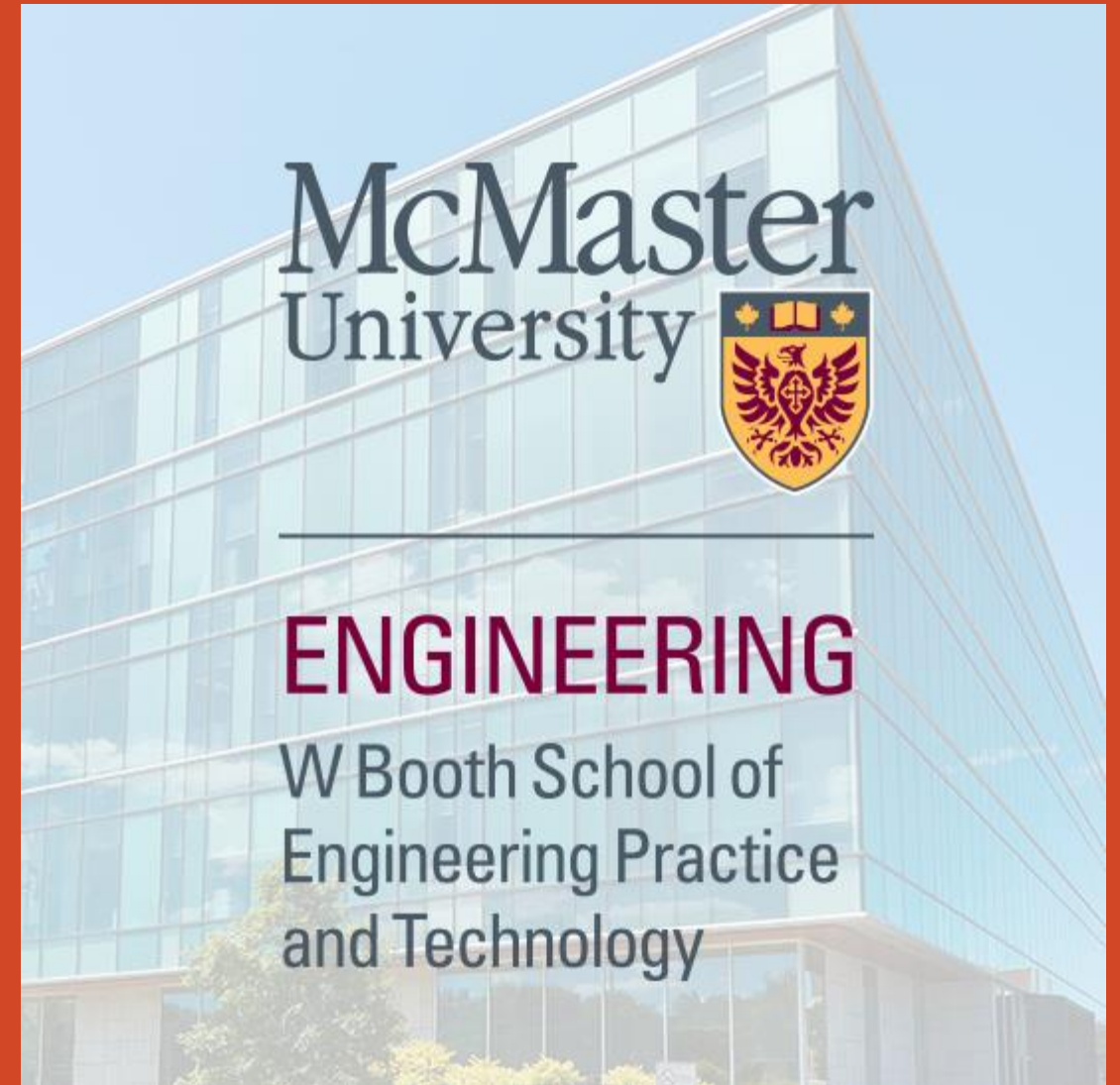


# Practical Project Management for Today's Business Environment

Fall 2024

Week 8: Monitoring and Control

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# Introduction to Monitoring and Controlling

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**Definition:** The Monitoring and Controlling process is crucial for ensuring that the project objectives are met by tracking, reviewing, and regulating progress.

**Importance:** Maintains project alignment with the plan, manages changes effectively, and ensures quality.

**Continuous Improvement:** Monitoring and controlling are ongoing processes that contribute to continuous improvement and project success.

# Key Objectives

**Track Project Progress:** Measure ongoing activities against the project management plan to ensure timely completion of tasks.

**Manage Changes:** Identify deviations and manage corrective actions to ensure that changes are documented, reviewed, and approved.

**Ensure Quality:** Verify that deliverables meet the required standards through quality assurance and quality control processes.

**Risk Mitigation:** Identify and manage risks proactively to minimize their impact on project objectives.





# Monitoring Vs. Controlling

**Monitoring:** Collecting, measuring, and disseminating performance information to stakeholders.

**Controlling:** Determining corrective or preventive actions based on monitoring information to keep the project on track.

**Feedback Loop:** Monitoring provides data that informs control decisions, creating a feedback loop that ensures project objectives are achieved.



# Performance Metrics



## 1. Cost Performance Index (CPI)

Formula:

$$CPI = \frac{\text{Earned Value (EV)}}{\text{Actual Cost (AC)}}$$

Measures cost efficiency. A CPI greater than 1 indicates a project is under budget.

## 2. Schedule Performance Index (SPI)

Formula:

$$SPI = \frac{\text{Earned Value (EV)}}{\text{Planned Value (PV)}}$$

Measures schedule efficiency. An SPI greater than 1 indicates the project is ahead of schedule.

## 3. Return on Investment (ROI)

Formula:

$$ROI = \frac{\text{Net Profit}}{\text{Total Investment Cost}} \times 100\%$$

Assesses project profitability by comparing net gains to total costs.

## 4. Earned Value (EV)

Formula:

$$EV = \text{Percent Complete} \times \text{Budget at Completion (BAC)}$$

Shows the monetary value of work completed.

## 5. Planned Value (PV)


Formula:

Represents the expected cost of work scheduled by a given time.

## 6. Budget Variance (BV)

Formula:

$$BV = \text{Earned Value (EV)} - \text{Actual Cost (AC)}$$

Indicates whether the project is under or  budget. A positive BV suggests a budget surplus.

## 7. Schedule Variance (SV)

Formula:

$$SV = \text{Earned Value (EV)} - \text{Planned Value (PV)}$$

Shows if the project is ahead or behind schedule. A positive SV indicates being ahead.

## 8. Resource Utilization

Formula:

$$\text{Resource Utilization} = \frac{\text{Actual Time Worked}}{\text{Available Time}} \times 100\%$$

Measures the percentage of available resources being actively used.

## 9. Quality of Deliverables

Formula:

$$\text{Quality Score} = \frac{\text{Number of Compliant Deliverables}}{\text{Total Deliverables}} \times 100\%$$

Assesses the quality based on the rate of deliverables meeting quality standards.

## 10. Customer Satisfaction Index

Formula:

$$\text{Customer Satisfaction} = \frac{\text{Total Customer Satisfaction Scores}}{\text{Number of Responses}}$$

Averages customer feedback scores to evaluate satisfaction.

## 11. Risk Mitigation Progress

Formula:

$$\text{Risk Mitigation Progress} = \frac{\text{Mitigated Risks}}{\text{Total Identified Risks}} \times 100\%$$

Tracks the percentage of risks successfully mitigated.

## 12. Project Velocity

Formula (specific to Agile):

$$\text{Velocity} = \frac{\text{Total Completed Story Points}}{\text{Number of Iterations}}$$

Measures work completed per iteration in Agile projects.

# Performance Metrics



## 13. Change Control

- Formula:

$$\text{Change Impact (\%)} = \left( \frac{\text{Cumulative Impact of Change Requests}}{\text{Original Project Scope}} \right) \times 100\%$$

- Explanation: Assesses the impact of change requests on the project scope.

## 14. Scope Creep

- Formula:

$$\text{Scope Creep (\%)} = \left( \frac{\text{Number of Unplanned Changes}}{\text{Total Scope Elements}} \right) \times 100\%$$

- Explanation: Monitors unauthorized or unplanned changes to the project scope.

## 15. Project Completion Percentage

- Formula:

$$\text{Completion (\%)} = \left( \frac{\text{Earned Value (EV)}}{\text{Budget at Completion (BAC)}} \right) \times 100\%$$

- Explanation: Indicates overall project progress in percentage terms.

## 16. Team Performance Index

- Formula:

$$\text{Team Performance (\%)} = \left( \frac{\text{Tasks Completed On Time}}{\text{Total Assigned Tasks}} \right) \times 100\%$$

- Explanation: Measures team productivity and adherence to schedules.

## 17. Defect Density

- Formula:

$$\text{Defect Density} = \frac{\text{Number of Defects}}{\text{Size of Deliverable (e.g., Lines of Code)}}$$

- Explanation: Calculates the number of defects relative to the size of the deliverable.

## 18. Stakeholder Engagement Index

- Formula:

$$\text{Stakeholder Engagement Score} = \frac{\text{Sum of Engagement Ratings}}{\text{Number of Stakeholders}}$$

- Explanation: Averages engagement levels to assess overall stakeholder involvement.

## 19. Forecasting Accuracy

- Formula:


$$\text{Forecast Accuracy (\%)} = \left( 1 - \left| \frac{\text{Actual Value} - \text{Forecasted Value}}{\text{Actual Value}} \right| \right) \times 100\%$$

- Explanation: Evaluates the accuracy of project forecasts compared to actual outcomes.

## 20. Issue Resolution Time

- Formula:

$$\text{Average Issue Resolution Time} = \frac{\text{Total Time to Resolve Issues}}{\text{Number of Issues Resolved}}$$

- Explanation: Tracks the average time  en to resolve project issues.





# Tools and Techniques for Monitoring and Controlling

## **Project Management Software:** MS

Project, Primavera P6, and other software to track schedule, budget, and resources.

**Dashboards and Reporting Tools:** Real-time dashboards for progress tracking and visualization.

**Regular Meetings:** Stand-up meetings, milestone reviews, and status meetings to ensure alignment and accountability.

**Control Charts and Data Analysis:** Use control charts, trend analysis, and variance analysis to identify trends or potential problems and take corrective action.

## PROCESS OF PROJECT MONITORING

- 1 Set monitoring objectives.
- 2 Identify key performance indicators (KPIs).
- 3 Collect project data.
- 4 Analyze performance metrics.
- 5 Compare against baselines.
- 6 Identify areas of improvement.
- 7 Address deviations promptly.
- 8 Communicate findings to stakeholders.
- 9 Continuously monitor and adjust.

# Change Management





# Sources of Change



**Natural and Healthy Changes:** Projects naturally evolve, and changes can be positive if properly managed.

## Common Sources:

**Scope Changes:** Client requirements, changes in project deliverables, or added functionalities.

**Schedule Changes:** Accelerated timelines due to market demands or external pressures.

**Budget Changes:** Budget cuts, cost overruns, or increased funding.

**Impact on the Triple Constraint:** Changes typically impact scope, schedule, or budget, which are interrelated and must be managed in balance.





# Change Control Process

**The Importance of Change Control:** A project plan is only effective if changes are controlled. Without a robust change control process, the project risks becoming unmanageable.

**Complexity of Change Control:** The process involves judgment calls, thresholds, sign-offs, and detailed evaluations to ensure stability throughout the project lifecycle.

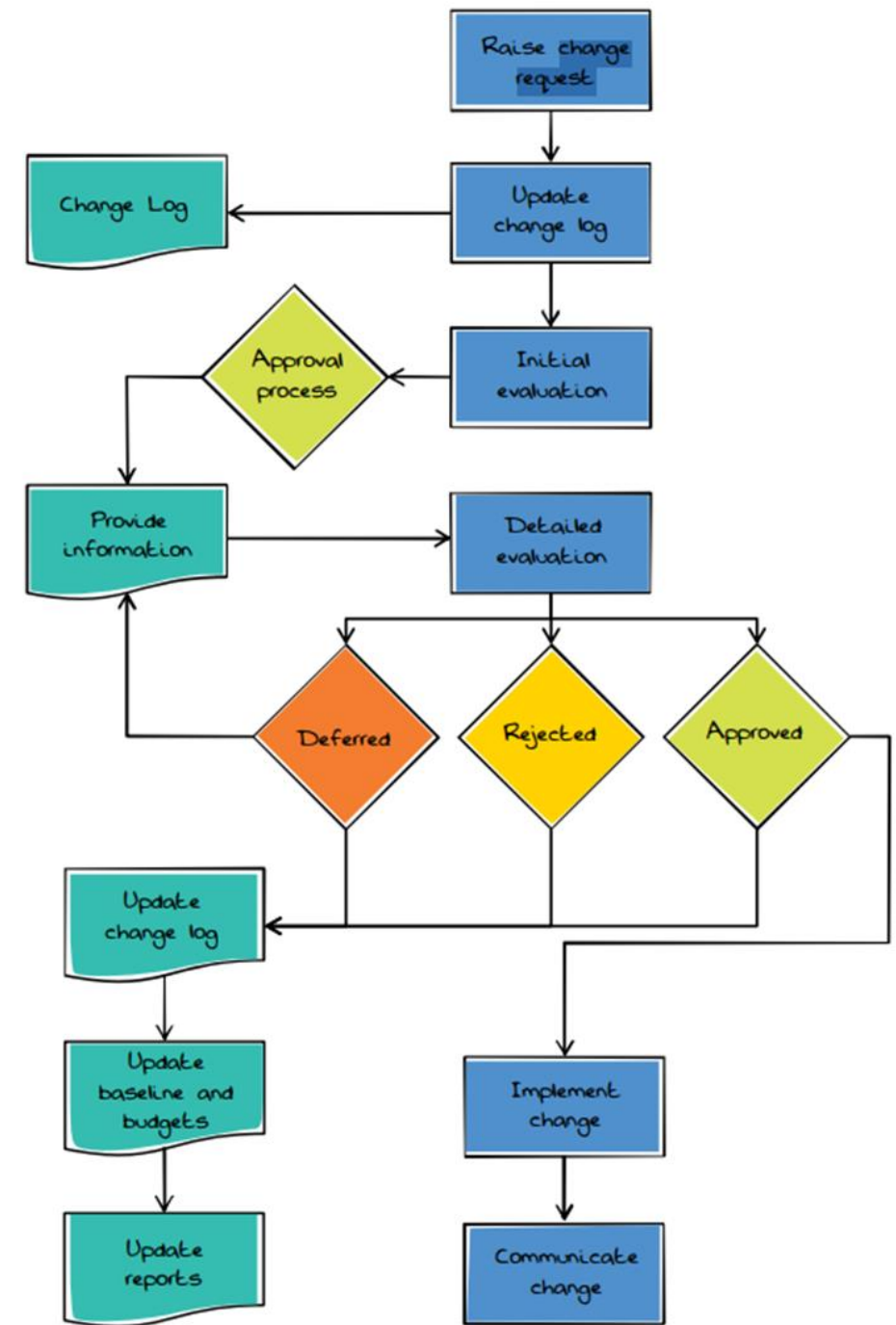
**Change Requests:** A formal process for identifying, documenting, reviewing, and approving changes that impact scope, schedule, cost, or quality.

**Stakeholder Involvement:** Stakeholders must be informed about changes, and their input is critical to the success of change control



# Change Control Process

- 1. Enter Initial Change Control Information:** Document all change requests to ensure traceability and accountability.
- 2. Determine If Change Should Be Processed:** Assess the value of the change and decide whether it should be pursued.
- 3. Submit Recommendations for Approval:** Submit proposed changes for review and approval by the appropriate stakeholders.
- 4. Update the Project Plan:** Adjust the project plan to reflect approved changes, creating a new baseline.
- 5. Distribute the Updated Plan:** Communicate changes to all stakeholders to ensure everyone is on the same page.
- 6. Monitor and Track Progress:** Track the progress of changes and ensure that they are successfully integrated without causing disruptions.



# Threshold

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**Defining Thresholds:** Determine the level of change that warrants the formal change control process.

**Minor vs. Significant Changes:** Minor changes may not need formal processing if they do not significantly impact the project. However, significant changes that exceed predefined thresholds must follow the change control process.

**Example 1:** A minor budget adjustment may not require formal approval, but a major budget cut will.

**Example 2:** A one-week delay on the critical path triggers the change control process due to its impact on the project timeline.

**Input from Stakeholders:** Determine the impact of changes with input from team members and stakeholders to make informed decisions.

# Change Control Log



**Purpose of the Change Control Log:** Tracks proposed changes and documents those that have been approved.

**Key Elements:** Change Number, Date of Change Request, Description, Requestor, Status (Open or Closed), Schedule Impact, Budget Impact, Scope Impact, and Comments.

**Discipline in Maintenance:** Maintaining the change control log is critical to ensure all changes are documented, reviewed, and communicated.

## PROJECT MANAGEMENT CHANGE LOG – EXAMPLE

PROJECT NAME	PROJECT MANAGER	LAST UPDATED
		00/00/0000

CHANGE NO.	CHANGE TYPE	OWNER NAME	CHANGE DESCRIPTION	ACTION	IMPACT	STATUS	PRIORITY
1	Compliance	Andrew Smith	Implement security patches to meet latest regulatory requirements.	Apply necessary security updates and conduct compliance audit.	Resources	Open	High
2	UI	Amy Lewis	Remove less-used feature to simplify UI.	Disable and remove feature from application.	Resources	In Progress	Low
3	Data	Edgar Poe	Integrate third-party analytics tool to enhance data insights.	Reach out to third parties. Negotiate cost. Configure and test integration with analytics API.	Scope and Budget	In Progress	Medium

CHANGE NO.	DATE OF REQUEST	EXPECTED RESOLUTION	DATE BEGUN	ESCALATION REQUIRED	DATE RESOLVED	COMMENTS
1	11/02/20XX	6 weeks	11/05/20XX	Yes		
2	11/05/20XX	2 weeks	11/06/20XX	No		
3	11/30/20XX	6 months	12/06/20XX	No		We're waiting to hear back from third parties.



# Embracing Change

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**Managing Change Effectively:** Effective change management enables teams to adapt to new requirements, market conditions, or unforeseen circumstances without losing control of the project.

**Proactive Approach:** Anticipate changes and manage them with a proactive approach to avoid last-minute disruptions.



# Keys to Remember

**Control and Communication:** Effective communication is key to successful change management.

**Sources of Change:** Changes can arise from shifts in scope, schedule, or budget and must be identified and managed proactively.

**Baseline Plan:** Keep the baseline plan current to maintain alignment between the plan and actual performance.

**Change Control Steps:** Follow the six steps for successful change control: log the change, evaluate, submit for approval, update the plan, distribute the updated plan, and monitor progress.

**Establishing Thresholds:** Establishing thresholds is critical to determining which changes need formal control.

**Managing Major Changes:** Significant changes may warrant creating a separate project if they impact the overall direction and objectives.





# Risk Monitoring

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**Purpose:** Continuously monitor risks to identify new risks and reassess known risks to minimize their impact.

**Risk Response Tracking:** Track the implementation of risk responses to ensure their effectiveness.

**Tools:** Use risk registers, heat maps, and periodic risk assessments to manage risk exposure.

**Continuous Assessment:** Risk management is a continuous process, requiring ongoing monitoring and adaptation.

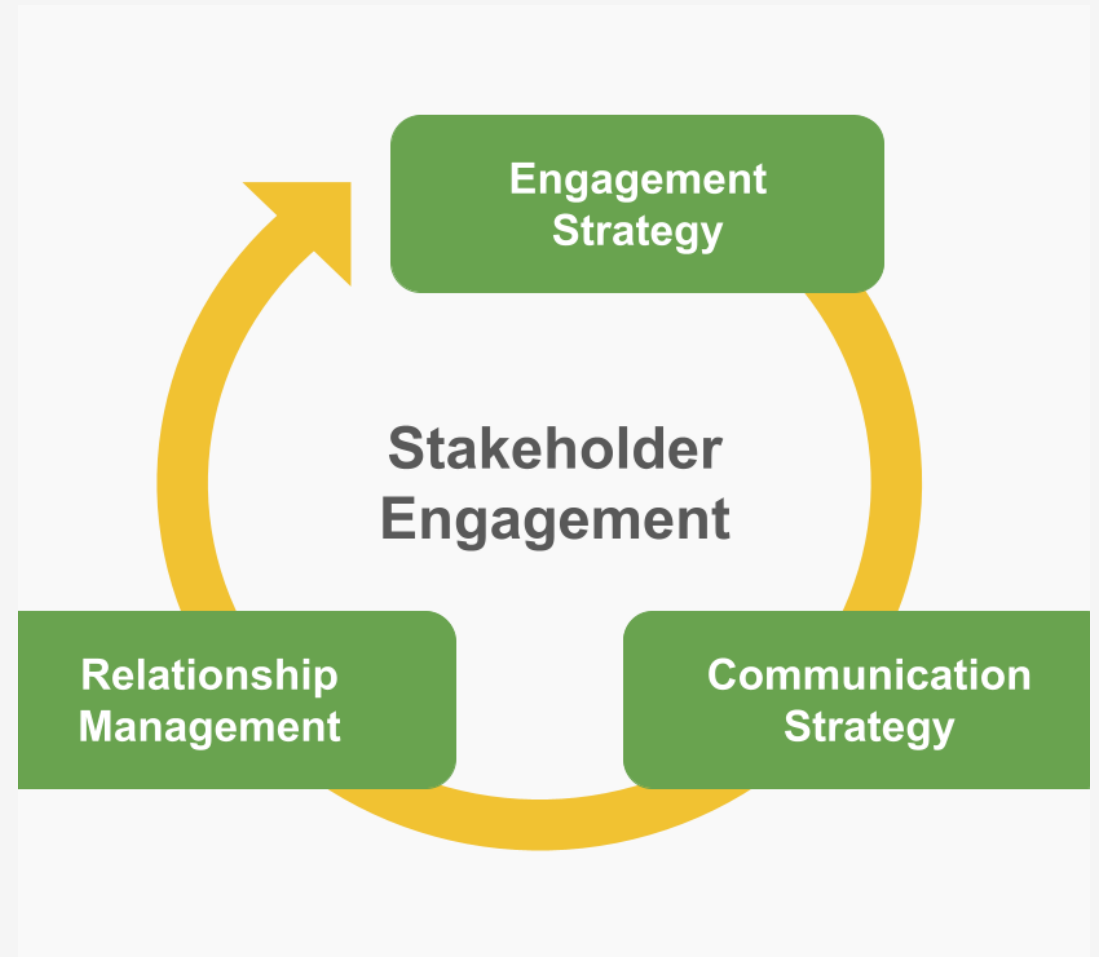


# Stakeholder Engagement in Monitoring and Controlling

**Importance of Communication:** Effective communication is essential to keep stakeholders informed, manage expectations, and ensure project alignment.

**Techniques:** Use status reports, dashboards, progress meetings, and newsletters to provide updates to stakeholders.

**Regular Engagement:** Establish a consistent schedule for updates to keep stakeholders involved and informed.





# Challenges in Monitoring and Controlling

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**Scope Creep:** Adding features or requirements not part of the original plan can cause project delays and budget overruns.

**Inaccurate Data:** Relying on outdated or inaccurate information can lead to poor decision-making and project delays.

**Communication Issues:** Miscommunication among team members or stakeholders can lead to misunderstandings, rework, and unmet expectations.

**Mitigation Strategies:** Implement clear processes for change requests, use real-time data, and engage stakeholders consistently to mitigate challenges.



# Best Practices for Effective Monitoring and Controlling

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**Set Clear Metrics:** Define clear, measurable KPIs that align with project goals.

**Engage Stakeholders Regularly:** Keep stakeholders informed, seek their input, and ensure alignment with project objectives.

**Use Automated Tools:** Use automated tools to track project progress, provide real-time updates, and reduce manual errors.

**Adaptability:** Be open to adapting plans based on monitoring results to keep the project on track.

# Project Controls System







# Characteristics of a Project Control System

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**Focus on Project Objectives:** Ensure that the control system is aligned with project objectives to achieve the mission.

## **Design Considerations:**

**Alignment with Organizational Goals:** What is important to the organization?

**Key Success Factors:** What are we attempting to achieve?

**Critical Control Points:** Which aspects of the work are most important to monitor?

**Effective Control Mechanisms:** What are the critical points in the process where controls should be placed?

**Balanced Emphasis:** Avoid overemphasizing budget and schedule at the expense of quality. Monitor performance to ensure quality is not compromised.



# Taking Corrective Action

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**Focus on Response:** Monitoring without corrective action is ineffective. Corrective action is required to realign project objectives.

**Difference Between Monitoring and Control:**

Monitoring collects data, while controlling uses that data to initiate action.

**Effective Corrective Action:** Empower team members to take action rather than micromanaging, which can slow down progress and hinder morale.



# Timeliness of Response

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**Importance of Timely Response:** Timely responses to deviations are crucial to prevent issues from escalating.

**Challenges of Delayed Data:** Delays in receiving project data make it difficult to take timely corrective actions.

**Real-Time Information:** Use real-time tracking tools to ensure project status is up-to-date and accessible.

**Accurate Data Collection:** Encourage daily data recording to maintain accuracy and ensure reliable decision-making.



# Designing the Right Control System

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**Tailoring Control Systems:** Design control systems that suit the project size and complexity. Large projects may require more robust systems, while small projects need simplified control.

**Avoid Overwhelming Small Projects:** Keep controls simple for small projects to avoid unnecessary bureaucracy.

**KISS Principle:** Keep It Simple, Stupid (KISS). Avoid excessive control mechanisms that add complexity without adding value.

**Check Report Usage:** Periodically assess whether reports are being used effectively and discontinue those that are not adding value.

# Project Review Meetings

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## Two Aspects of Project Control:

**Maintenance Reviews:** Ensure the project remains aligned with the plan.

**Improvement Reviews:** Focus on opportunities to improve team performance and efficiency.

## Types of Reviews:

**Status Reviews:** Focused on tracking progress against the plan.

**Process or Lessons-Learned Reviews:** Evaluate how well processes are working and identify areas for improvement.

**Design Reviews:** Used when designing systems, products, or campaigns to ensure requirements are met.

**Benefits:** Project reviews help maintain control, improve processes, and ensure alignment with objectives.

# Project Evaluation

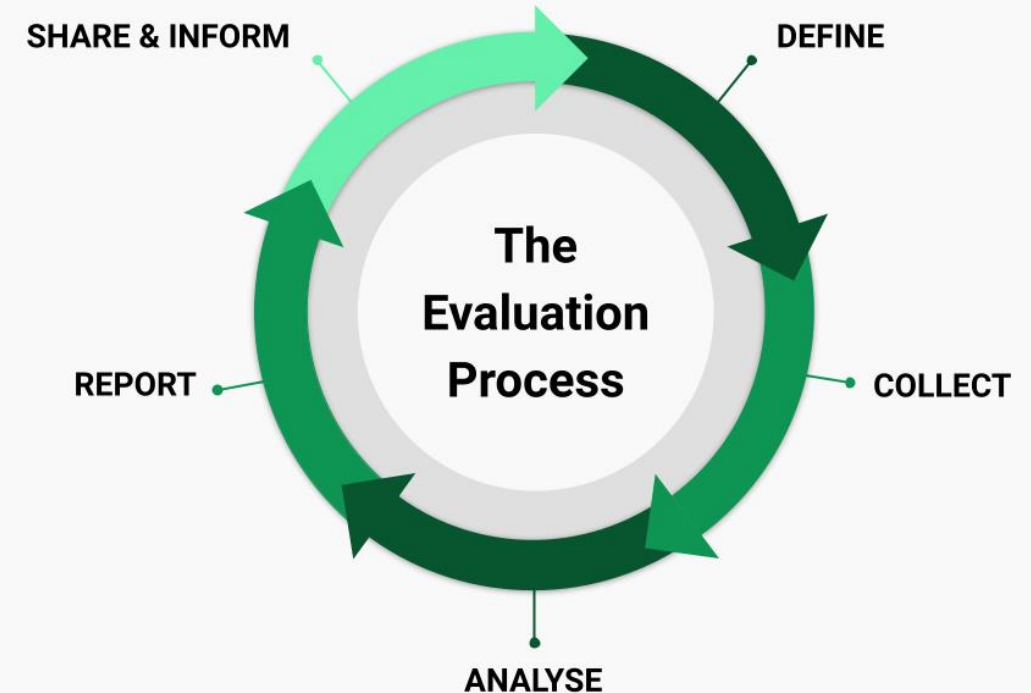


**Definition:** Evaluates whether project work is meeting expectations and adding value for stakeholders.

**Basis for Evaluation:** Compares actual performance against the project plan and identifies necessary adjustments.

**Purpose of Evaluation:** To learn from successes and failures, improve future performance, and ensure project outcomes meet stakeholder needs.

**Focus on Learning:** Evaluations should focus on learning and improvement rather than blaming individuals for mistakes.





# Group Exercise



# Group Exercise

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**Scenario Overview:** You are part of a project management team working on a construction project to build a new community center. The project has been progressing for three months, and you are now halfway through the schedule. However, your monitoring data shows some deviations:

**1.Schedule Deviation:** Due to unforeseen weather conditions, the construction is now two weeks behind schedule.

**2.Budget Overrun:** The cost of raw materials has increased by 15%, leading to a budget overrun.

**3.Quality Issues:** During inspections, you find that some concrete work does not meet the defined quality standards and will need rework.

**4.Stakeholder Concerns:** The community has raised concerns about noise levels, which were not previously considered.

## **1. Identify Key Issues (5 mins):**

1. Discuss the given scenario within your group.
2. Identify the key issues that need to be addressed (e.g., schedule deviation, budget overrun, quality issues, stakeholder concerns).

## **2. Propose Solutions (10 mins):**

1. For each issue, propose corrective actions that could be taken to get the project back on track.
2. Consider which monitoring and controlling tools and techniques (e.g., KPIs, risk assessments, change control) can be used to address the problems.

## **3. Create a Change Control Plan (5 mins):**

1. Identify any changes that need to be made to the project plan, such as schedule adjustments or budget reallocations.
2. Discuss how you would communicate these changes to stakeholders and document them in a change control log.

## **4. Present Your Plan (5 mins):**

1. Each group presents their proposed solutions and change control plan to the rest of the participants.
2. Highlight how the monitoring and controlling techniques were applied to address each issue.

# Summary

**Key Points Recap:** Monitoring and controlling ensures that the project stays aligned with objectives and identifies deviations early.

**Adaptability:** Effective monitoring and controlling allow teams to adapt to changes and keep the project on track.

