

Assignment 3 - **Week 10**

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Course: **5**

Topic: **A Practical Guide to Effective Scheduling**

A P

Introduction

Project time management is essential for delivering the agreed scope within the approved schedule while meeting quality standards. This process integrates planning, scheduling, resource management, and risk management by relying on actual performance data and forecasts.

Main Objectives

The primary goals of time management are:

- Establishing a schedule baseline.**
- Monitoring variances from the plan.**
- Forecasting the Estimate at Completion (EAC) or the expected finish date.**
- Initiating timely corrective actions.**

The scope covers activity durations (work hours, elapsed time) and resource availability (labor, equipment, materials) from project initiation through closeout.

Key Concepts

| **Term | Definition |**

| **Activity Definition | Identifying all specific tasks required to complete the project deliverables.**

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| **Schedule Baseline | The approved version of the schedule, used for performance comparison. |**

| **Predecessor / Successor | Activities that must finish/start before another can begin/continue. |**

| **Critical Path | The longest sequence of dependent activities that determines the project's earliest completion date. |**

| **Float (Slack) | The amount of time an activity can be delayed without affecting the next activity or the project finish date. |**

Methodology

Planning and Scheduling

Effective scheduling begins with creating a Work Breakdown Structure (WBS) to clearly define scope. Then, activities are sequenced using dependency types:

- Finish-to-Start (FS): Most common, e.g., "foundation must finish before walls start."**
- Start-to-Start (SS): e.g., "painting starts when drywall installation starts."**

- **Finish-to-Finish (FF):** e.g., "testing finishes when installation finishes."
- **Start-to-Finish (SF):** Rare, e.g., "shift coverage ends when the new shift starts."

Duration estimating techniques include:

- **Analogous** (based on similar past projects).
- **Parametric** (using historical data and statistical relationships).
- **Three-point estimates (PERT):** Optimistic, Most Likely, Pessimistic.

Network Diagram and Critical Path

The Critical Path Method (CPM) is used to:

- **Identify the longest path through the project network.**
- **Compute Early Start (ES), Early Finish (EF), Late Start (LS), and Late Finish (LF) for each activity.**
- **Calculate Float ($\text{Float} = \text{LS} - \text{ES}$ or $\text{LF} - \text{EF}$).**

Any delay on the critical path directly delays the project finish date.

Monitoring and Control (Schedule Performance)

Schedule tracking uses the following key indicators:

| Indicator | Formula | Meaning |

| Schedule Variance (SV) | $EV - PV$ | Negative = behind schedule |

| Schedule Performance Index (SPI) | EV / PV | <1.0 = behind schedule |

| Schedule Estimate at Completion (EAC_s) | $Planned\ Finish / SPI$ | Forecasted finish date |

Forecasting

The Estimate to Complete (ETC) for schedule is less common; instead, we forecast the Projected Finish Date:

- Using current SPI: Projected Finish = $Planned\ Finish / SPI$ (assuming current trend continues).**
- Re-baselining if significant scope changes occur.**

Action thresholds are often set at SPI below 0.9 or negative SV, triggering corrective actions such as:

- Crashing: Adding resources to critical path activities (higher cost, faster time).**
- Fast-tracking: Performing activities in parallel that were planned sequentially (higher risk).**

Tools and Techniques

- **Project management software such as MS Project or Primavera, with Gantt charts, network diagrams, and dashboards.**
- **Resource Levelling: Adjusting start/finish dates to balance resource demand.**
- **Resource Smoothing: Adjusting activities within their float to avoid peaks.**
- **What-if scenario analysis for schedule risk.**

Schedule Risk Management

Focuses on identifying time-related risks such as:

- **Weather delays.**
- **Supplier lead time.**
- **Resource unavailability.**
- **Quality rework.**

Both qualitative and quantitative analyses are used—including schedule risk analysis using Monte Carlo simulation to estimate the probability of meeting the target date. Response strategies include:

- Mitigation (adding buffer time or parallel paths).
- Transfer (using fixed-price contracts with penalties for late delivery).
- Acceptance (with linked contingency time reserves).

Governance and Reporting

| Role | Responsibility |

| Project Manager | Integrates scope, schedule, and resources; issues performance reports. |

| Planning & Controls Team | Builds schedule baseline and tracks weekly/monthly progress. |

| Resource Managers | Provide resource availability and resolve conflicts. |

| Stakeholders | Receive periodic schedule updates per the communication plan. |

Reports must include:

- An executive summary with critical metrics (SPI, Projected Finish Date, critical path status).
- Detailed variance analysis per activity or work package with reasons and corrective actions.
- Milestone chart showing key deliverables status.
- Cash flow projections based on schedule.
- A reporting cadence (weekly or monthly) suited to project size.
- Traceable documentation of all baseline changes.

Example Scenario

Inputs:

- **Planned Duration = 12 months.**
- **At month four:**
 - **Planned work (PV) = 40% of total activities.**
 - **Actual work completed (EV) = 36% of total activities.**
- **$SPI = 0.36 / 0.40 = 0.90$ (behind schedule).**

Results:

- **Projected Finish Date = $12 / 0.90 = 13.33$ months (about 1.33 months late, approximately 40 days late).**
- **Critical Path currently shows a delay in the "Foundation" activity (float = -2 days indicating schedule slippage).**

Recommended actions:

- **Crash the "Foundation" activity by adding two more workers (increase cost by \$10K).**
- **Fast-track "Interior Finishing" and "Electrical Rough-in" in parallel (increase risk of rework).**

- Re-allocate idle resources from non-critical activities to the critical path.

Best Practices

- Integrate schedule and resource data early.
- Use leading indicators (e.g., float consumption, milestone trend analysis).
- Update the schedule regularly (weekly) and recalculate the critical path.
- Standardize activity codes across WBS elements in the scheduling tool.
- Conduct schedule risk analysis at key milestones.
- Conduct post-project reviews to refine duration estimates.

Common Challenges

- Incomplete or delayed data leading to poor decisions.
- Frequent scope changes without robust change control.
- Over-optimistic duration estimates.
- Resource conflicts across multiple projects.
- Resistance to adopting formal scheduling methodologies.

Conclusion

Effective project time management depends on:

- A clear schedule baseline.**
- Objective performance measurement (EVM).**
- Strong change controls.**
- Transparent reporting throughout the project lifecycle.**

This enables timely detection of schedule variances and facilitates corrective measures to protect the project's planned finish date and the final cost.