### **Lecture 7 - Project Execution, Monitoring, and Control**

#### **Goals of the Unit**

* **Purpose**:
  1. Translate project plans into actionable tasks and monitor execution.
  2. Use structured techniques to ensure alignment with schedules, costs, and quality benchmarks.
  3. Apply **Earned Value Analysis (EVA)** for comprehensive project monitoring.

### **Project Lifecycle Overview**

1. **Initiate**: Establish project goals and feasibility.
2. **Plan**: Develop schedules, budgets, and expected outputs.
3. **Execute & Monitor**: Perform planned tasks while tracking progress, risks, and changes.
4. **Close**: Finalize deliverables, document outcomes, and secure approvals.

### **Project Execution**

* **Definition**: Where planned activities are carried out to deliver outputs.
* **Key Activities**:
  1. **Kick-Off Activities**:
     + Establish a formal start for project phases.
     + Align team members with project goals and modalities.
     + Typically conducted through a **kick-off meeting** for clarity and engagement.
  2. **Collect Outputs**: Gather deliverables and verify alignment with the planned scope.
  3. **Monitor Project Health**: Evaluate progress, identify risks, and address resource utilization issues.

### **Project Monitoring and Control**

* **Goals**:
  1. **At the Project Level**: Assess scope, time, cost, and quality; analyze deviations; and implement corrective measures.
  2. **At the Organizational Level**: Collect data to improve the accuracy of future project planning.

#### **Monitoring and Controlling Cycle**

1. **Collect Data**: Gather real-time information about the project's status.
2. **Measure and Compare**: Benchmark against the baseline plan to highlight deviations and predict outcomes.
3. **Assess and Re-Plan**: Decide whether corrective actions are needed, revise the plan, and repeat the cycle.

### **Approaches to Monitoring**

1. **Non-Integrated Approach**:
   * Monitor schedule to check for delays or advancements.
   * Track costs to determine over- or under-budget status.
   * Provides limited, isolated insights.
2. **Integrated Approach**:
   * Use **Earned Value Analysis (EVA)** to integrate schedule, cost, and progress monitoring.
   * Delivers a holistic view of project health for better decision-making.

### **Key Concepts and Processes**

* **Baseline (Planned Values)**:
  1. Initial snapshot of the project plan, including schedules and budgets.
  2. Serves as a reference point for monitoring progress.
* **Actual Values**:
  1. Records of actual start and end times, effort, and progress.
* **Process**:
  1. Develop the project plan and save a baseline.
  2. Regularly assess actual progress against planned progress.
  3. Use **effort efficiency** and **progress efficiency** to estimate remaining work.
  4. Share the revised plan, create a new baseline, and repeat the process.

### **Collecting Effort Data**

* **Purpose**: Track time allocation and performance against planned activities.
* **Best Practices**:
  + Record weekly for accuracy and consistency.
  + Reference planned activities to minimize discrepancies.
  + Account for "noise" or variability in reported data.

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#### **Cost Control: The Simple Approach**

1. **Components**:
   * **Baseline**: Defined by the budget table, outlining expected costs.
   * **Actual Costs**: Captured current expenditures against the baseline.
   * **Reporting Periods**: Costs are monitored periodically (e.g., annually or quarterly).
2. **Example Budget Table**:

| **CBS Item** | **Budgeted** | **Actual** | **Status** | **New Budget** |
| --- | --- | --- | --- | --- |
| Hardware | €10,000.00 | €5,000.00 | €5,000.00 | €5,000.00 |
| Software | €4,000.00 | €2,000.00 | €2,000.00 | €2,000.00 |
| Travel | €5,000.00 | €6,000.00 | -€1,000.00 | €1,000.00 |
| Project Buffer | €3,000.00 | €3,000.00 | €0.00 | €1,000.00 |
| **Total** | €22,000.00 | €13,000.00 | €9,000.00 | €9,000.00 |

1. **Key Points**:
   * **Overruns**: Managed by reallocating funds (e.g., from project buffers or other CES items).
   * **Advantages**:
     + Straightforward and practical for tracking discrete items like hardware and software costs.
   * **Disadvantages**:
     + Does not provide a comprehensive view of project health (e.g., ability to complete within the remaining budget).

#### **Earned Value Analysis (EVA)**

1. **Overview**:
   * Integrates **planned effort**, **actual progress**, and **costs** into a single monetary-based framework.
   * Enables comparability between effort, progress, and budget.
2. **Benefits**:
   * Progress is directly tied to costs.
   * Places budget and expenditures in context (e.g., being under budget may not be favorable if technical progress is insufficient).
3. **Assumptions**:
   * **Manpower = Cost**: Effort and cost are interchangeable metrics.
   * **Progress = Money**: Progress can be quantified as a portion of planned monetary values.
4. **Key Metrics**:
   * **Planned Value (PV)**: Budgeted cost of work scheduled at a specific time.
   * **Actual Costs (AC)**: Actual expenditures incurred.
   * **Earned Value (EV)**: Actual progress expressed as a portion of planned value achieved.

#### **Planned Cost and Earned Value Computation**

1. **Planned Cost**:
   * Derived cumulatively over time for individual tasks.
   * Example:

| **Task** | **M1** | **M2** | **M3** | **M4** | **M5** | **M6** |
| --- | --- | --- | --- | --- | --- | --- |
| A | €500 | €0 | €0 | €0 | €0 | €0 |
| B | €0 | €2000 | €0 | €0 | €0 | €0 |
| C | €100 | €100 | €100 | €100 | €100 | €100 |
| **Total** | €600 | €2100 | €100 | €100 | €100 | €100 |

* + Cumulative totals illustrate how costs accumulate progressively over time.

1. **Earned Value Rules**:
   * **Rule 1**: EV should be based on tangible outputs (e.g., completed products).
   * **Rule 2**:
     + **50/50 Rule**: Assign 50% of the planned value at the start and 50% upon completion.
     + **20/80 Rule**: Assign 20% at the start and 80% upon completion.

#### **Earned Value Analysis (EVA) Practical Application**

##### **Example Analysis**

1. **Overview of Activities:**
   * **Activity 1: Progressing as scheduled in terms of time.**
   * **Activity 2: Started late but progressing faster than expected.**
   * **Activity 3: Started earlier; progress aligns with time elapsed.**
   * **Activity 4: Not started yet.**

##### **Baseline vs. Actual Performance**

1. **Budgeted Cost of Work Scheduled (BCWS):**
   * **Represents planned values over time for tasks.**
   * **Example:**

| **Week** | **Paint Wall** | **Paint Ceiling** | **Refurnish** | **Clean** | **Cumulative BCWS** |
| --- | --- | --- | --- | --- | --- |
| **W1** | **€800** | **€0** | **€0** | **€0** | **€800** |
| **W2** | **€800** | **€0** | **€0** | **€0** | **€1600** |
| **W3** | **€800** | **€800** | **€0** | **€0** | **€2400** |
| **W5** | **€800** | **€800** | **€400** | **€400** | **€5600** |

1. **Actual Cost of Work Performed (ACWP):**
   * **Tracks actual expenditures for activities.**

| **Week** | **Paint Wall** | **Paint Ceiling** | **Refurnish** | **Clean** | **Cumulative ACWP** |
| --- | --- | --- | --- | --- | --- |
| **W1** | **€900** | **€0** | **€0** | **€0** | **€900** |
| **W2** | **€900** | **€0** | **€0** | **€0** | **€1800** |
| **W5** | **€900** | **€2000** | **€400** | **€0** | **€6000** |

* + **Example:  
    Budgeted Cost of Work Performed (BCWP):**
  + **Tracks planned progress achieved (Earned Value).**
  + **Example:**

| **Week** | **Paint Wall** | **Paint Ceiling** | **Refurnish** | **Clean** | **Cumulative BCWP** |
| --- | --- | --- | --- | --- | --- |
| **W1** | **€800** | **€0** | **€0** | **€0** | **€800** |
| **W2** | **€1600** | **€0** | **€0** | **€0** | **€1600** |
| **W5** | **€1600** | **€1600** | **€400** | **€0** | **€5200** |

##### **Comments and Observations**

1. **Progress and Noise:**
   * **Variations in progress are influenced by assumptions like the 50%-50% rule.**
   * **For example:**
     + **Early weeks show inflated progress due to early accrual of 50% value.**
2. **Budget Context:**
   * **While ahead of schedule in W5, cost efficiency declines as tasks progress.**
   * **Final completion of activities will adjust cumulative data and provide clearer insights.**
3. **Practical Application:**
   * **Adjust forecasts as data accuracy improves with activity completion.**
   * **Ensure progress reflects actual performance, not artifacts of simplistic rules.**

#### **Types of Project Closures**

1. **Termination by Integration/Addition:**
   * **Outputs are integrated into other projects or used as inputs for production.**
   * **Typically observed in successful projects.**
2. **Termination by Starvation:**
   * **Project halts due to a lack of resources (budget, personnel, or materials).**
3. **Termination by Extinction:**
   * **Management ends the project due to unmet objectives, obsolescence, or financial unviability.**

#### **The Project Closing Phase**

1. **Definition:**
   * **The final phase where deliverables are transferred to stakeholders, contractual obligations are resolved, and project records are archived.**
2. **Goals:**
   * **Ensure usability of project outputs.**
   * **Resolve pending obligations.**
   * **Document lessons learned for future reference.**

#### **Challenges in Closing Projects**

1. **For Unsuccessful Projects:**
   * **Team disinterest and reluctance.**
2. **General Challenges:**
   * **Low team motivation and interest as the project concludes.**
   * **High cost of closing activities with limited creativity.**
   * **Loss of implicit knowledge due to poor documentation.**
   * **Reluctance to release resources for other opportunities.**
   * **Emotional detachment or burnout after long-term projects.**

#### **Steps in the Project Closing Process**

1. **Obtain Client Acceptance:**
   * ***Ceremonial*: Informal acceptance (e.g., handshake agreements).**
   * ***Formal*: Structured approvals via testing and documentation.**
2. **Install Project Deliverables:**
   * **Ensure the outputs are fully functional and integrated.**
3. **Archive Deliverables:**
   * **Properly store documents, artifacts, and relevant files for future reference.**
4. **Document the Project:**
   * **Record key decisions, processes, and results for organizational learning.**
5. **Financial Closure:**
   * **Finalize all budget-related matters.**
6. **Post-Implementation Audit:**
   * **Evaluate project performance and outcomes for lessons learned.**
7. **Release Staff:**
   * **Transition team members to new roles or projects with proper recognition and assignments.**

#### **Post-Implementation Audit (Post-Mortem)**

1. **Purpose:**
   * **Analyze the project critically to identify successes, failures, and areas for improvement.**
2. **Structure:**
   * **Conduct surveys to gather insights.**
   * **Collect objective data, such as cost, effort, and schedule metrics.**
   * **Hold debriefing meetings and root cause analysis sessions.**
   * **Publish findings to ensure the team and organization learn from the experience.**
3. **Metrics:**
   * **Cost: Planned vs. actual costs and effort.**
   * **Schedule: Original vs. final timelines.**
   * **Quality: Errors, requirement changes, and code modifications.**
4. **Report Structure:**
   * **Description: Contextual details about the project.**
   * **The Good: What worked well.**
   * **The Bad: Factors hindering the achievement of goals.**
   * **The Ugly: Prescriptive measures for improvement.**

#### **Releasing Project Staff**

1. **Key Considerations:**
   * **Acknowledge the experience and achievements gained during the project.**
   * **Assign meaningful and relevant tasks for team members in their next roles.**
2. **Transition Challenges:**
   * **Address the potential disruption caused by transitioning from long-term projects.**