Project Management

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Outline

• What is Project Management?
• Scope Management
• Risk Management
• Planning and Scheduling
• Project Evaluation and Control
• Project Termination

Introduction

• Examples of projects
  – Split the atom
  – Chunnel between England and France
  – Introduce Windows XP

“Projects, rather than repetitive tasks, are now the basis for most value-added in business”

-Tom Peters

What is a Project?

Project
• Take place outside the process world
• Unique and separate from normal organization work

Process
• Ongoing, day-to-day activities
• Use existing systems, properties, and capabilities

A project is a unique venture with a beginning and an end, conducted by people to meet established goals within parameters of cost, schedule and quality.
Elements of Projects

- **Complex**, one-time processes
- **Limited** by budget, schedule, and resources
- Developed to resolve a **clear goal** or set of goals
- **Customer-focused**

General Project Characteristics (1/2)

- **Ad-hoc** endeavors with a clear life cycle
- **Building blocks** in the design and execution of organizational **strategies**
- Responsible for the **newest** and most improved **products**, services, and organizational **processes**
- Provide a philosophy and strategy for the management of change

General Project Characteristics (2/2)

- Entail **crossing** functional and organization **boundaries**
- **Traditional management functions** of planning, organizing, motivating, directing, and controlling apply
- Principal outcomes are the **satisfaction of customer** requirements within **technical**, **cost**, and **schedule constraints**
- **Terminated** upon successful completion

Why are Projects Important?

1. Shortened product **life cycles**
2. Narrow product **launch windows**
3. Increasingly **complex** and **technical** products
4. Emergence of **global markets**
5. Economic period marked by **low inflation**
Project Life Cycles

The Stages as We Experience Them
- Enthusiasm
- Disillusionment
- Panic
- Search for the Guilty
- Punishment of the Innocent
- Praise and Rewards for Nonparticipants

Determinants of Project Success

Our Goal
- Develop an *Appreciation* for Projects
- Understand *Fundamentals* of Project Management
Project Scope Management

**Project Scope**

*Project scope* is *everything about a project* – work content as well as expected outcomes.

*Scope management* is the function of controlling a project in terms of its goals and objectives and consists of:

1) Conceptual development  
2) Scope statement  
3) Work authorization  
4) Scope reporting  
5) Control systems  
6) Project closeout

Conceptual Development

*The process that addresses project objectives by finding the best ways to meet them.*

Key steps in information development:

- Problem/need statement
- Information gathering
- Constraints
- Alternative analysis
- Project objectives

Problem Statements

Successful conceptual development requires:

- *Reduction* of overall project complexity
- *Goals and objects* are clearly stated  
  — Reference points are provided
- *Complete understanding* of the problem
**Statement of Work (SOW)**

A SOW is a **detailed narrative description** of the work required for a project.

**Effective SOWs contain**
1. Introduction and background
2. Technical description
3. Timeline and milestones
4. Client expectations

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**The Scope Statement Process**

1. Establish the project **goal criteria**
   a) cost
   b) schedule
   c) performance
   d) deliverables
   e) review gates
2. Develop the **management plan** for the project
3. Establish a **work breakdown structure**
4. Create a **scope baseline**

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**Work Breakdown Structure**

A process that sets a project’s scope by **breaking down** its overall **mission** into a cohesive set of synchronous, increasingly **specific tasks**.

**What does WBS accomplish?**
- Echoes project objectives
- Offers a logical structure
- Establishes a method of control
- Communicates project status
- Improved communication
- Demonstrates control structure
Sample WBS in MS Project

Work Packages

- Lowest level in WBS
- Deliverable result
- One owner
- Miniature projects
- Milestones
- Fits organization
- Trackable

Responsibility Assignment Matrix

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Task &amp; Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match IT to Org. Tasks 1.1</td>
<td>Problem Analysis 1.1.1</td>
</tr>
<tr>
<td></td>
<td>Develop info 1.1.2</td>
</tr>
<tr>
<td>Identify IS user needs 1.2</td>
<td>Interview users 1.2.1</td>
</tr>
<tr>
<td></td>
<td>Develop show 1.2.2</td>
</tr>
<tr>
<td></td>
<td>Gain user &quot;buy in&quot; 1.2.3</td>
</tr>
<tr>
<td>Prepare proposal 1.3</td>
<td>Find cost/benefit info 1.3.1</td>
</tr>
</tbody>
</table>

LEAD PROJECT PERSONNEL

<table>
<thead>
<tr>
<th>Dave IS</th>
<th>Sue HR</th>
<th>Ann R&amp;D</th>
<th>Jim R&amp;D</th>
<th>Bob IS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- ■ Notification
- ○ Responsible
- □ Approval
- ☆ Support

Work Authorization

The formal “go ahead” to begin work

Follows the scope management steps of:
1. scope definition
2. planning documents
3. management plans
4. contractual documents
Contractual Documentation

Most contracts contain:
- **Requirements**
- **Valid consideration**
- **Contracted terms**

Contracts range from:
- **Lump Sum**
- **Cost Plus**
  also called “Turnkey”

Scope Reporting

determines **what** types of information reported, **who** receives copies, **when**, and **how** information is acquired and disseminated.

Typical project reports contain
1. Cost status
2. Schedule status
3. Technical performance

Types of Control Systems

- Configuration or change
- Design
- Trend monitoring
- Document
- Acquisition
- Specification

Project Closeout

The job is not over until the paperwork is done…

Closeout documentation is **used to**:
- Resolve disputes
- Train project managers
- Facilitate auditing

Closeout documentation **includes**:
- Historical records
- Post project analysis
- Financial closeout
Project Risk Management

Risk management - the art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interest of its objectives.

Project risk – any possible event that can negatively affect the viability of a project

Risk Vs Amount at Stake

Process of Risk Management

- What is likely to happen?
- What can be done?
- What are the warning signs?
- What are the likely outcomes?

*Project Risk* = (Probability of Event)(Consequences of Event)
Four Stages of Risk Management

- Risk *identification*
- Analysis of probability and consequences
- Risk *mitigation* strategies
- Control and documentation

Risk Clusters

- Financial
- Technical
- Contractual/Legal
- Commercial
- Execution

- Common Types
  - Absenteeism
  - Resignation
  - Staff pulled away
  - Time overruns
  - Skills unavailable
  - Ineffective Training
  - Specs incomplete
  - Change orders

Risk Factor Identification

- Brainstorming meetings
- Expert opinion
- Past history
- Multiple (team based) assessments

Risk Management Assessment Matrix
**Risk Mitigation Strategies**
- Accept
- Minimize
- Share
- Transfer
- Contingency Reserves

**Control & Documentation**
Help managers classify and codify risks, responses, and outcomes

Change management report system answers
- What?
- Who?
- When?
- Why?
- How?

**Planning and Scheduling**

**Project Scheduling Terms**
- Successors
- Predecessors
- Network diagram
- Serial activities
- Concurrent activities
- Merge activities
- Burst activities
- Node
- Path
- Critical Path
Network Diagrams

- Show interdependence
- Facilitate communication
- Determine project completion
- Help schedule resources
- Show start & finish dates
- Identify critical activities

AOA Vs. AON

The same mini-project is shown with activities on arc...

...and activities on node.

Node Labels

<table>
<thead>
<tr>
<th>Early Start</th>
<th>ID Number</th>
<th>Early Finish</th>
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<tbody>
<tr>
<td>Activity Float</td>
<td>Activity Descriptor</td>
<td></td>
</tr>
<tr>
<td>Late Start</td>
<td>Activity Duration</td>
<td>Late Finish</td>
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</tbody>
</table>

Duration Estimation Methods

- Past experience
- Expert opinion
- Mathematical derivation – Beta distribution
  - Most likely (m)
  - Most pessimistic (b)
  - Most optimistic (a)

\[
Activity Duration = TE = \frac{a+4m+b}{6}
\]
1. Sketch the network described in the table.
2. Determine the expected duration and variance of each activity.

<table>
<thead>
<tr>
<th>Task</th>
<th>Predecessor</th>
<th>a</th>
<th>b</th>
<th>c</th>
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<tbody>
<tr>
<td>Z</td>
<td>--</td>
<td>7</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Y</td>
<td>Z</td>
<td>13</td>
<td>16</td>
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<td>Z</td>
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<td>14</td>
<td>16</td>
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<tr>
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<td>W</td>
<td>1</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>T</td>
<td>W</td>
<td>6</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>S</td>
<td>T, V</td>
<td>11</td>
<td>14</td>
<td>19</td>
</tr>
</tbody>
</table>

**Constructing the Critical Path**

- Forward pass – an *additive move* through the network from *start to finish*
- Backward pass – a *subtractive move* through the network from *finish to start*
- Critical path – the *longest path* from end to end which determines the *shortest project length*

**Rules for Forward/Backward Pass**

**Forward Pass Rules (ES & EF)**
- ES + Duration = EF
- EF of predecessor = ES of successor
- Largest preceding EF at a merge point becomes ES for successor

**Backward Pass Rules (LS & LF)**
- LF – Duration = LS
- LS of successor = LF of predecessor
- Smallest succeeding LS at a burst point becomes LF for predecessor

**Task Predecessor Time**

<table>
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<tr>
<th>Task</th>
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<th>Time</th>
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<tr>
<td>A</td>
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<td>4</td>
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<tr>
<td>B</td>
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<td>9</td>
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<tr>
<td>C</td>
<td>A</td>
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<td>B</td>
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<td>E</td>
<td>B</td>
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<td>2</td>
</tr>
<tr>
<td>K</td>
<td>H</td>
<td>1</td>
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</table>

1. Sketch the network described in the table.
2. Determine the ES, LS, EF, LF, and slack of each activity.
Gantt Charts

- Establish a time-phased network
- Can be used as a tracking tool

Benefits of Gantt charts
1. Easy to create and comprehend
2. Identify the schedule **baseline** network
3. Allow for **updating** and **control**
4. Identify **resource needs**
Evaluation and Control

The Project Control Cycle

1. Setting a Goal
2. Measuring Progress
3. Comparing Actual with Planned
4. Taking Action and Recycling the Process

The Project S-Curve

Cumulative Cost ($ in thousands)

Elapsed Time (in weeks)

- Cumulative Budgeted Cost
- Cumulative Actual Cost

$10,000 Negative Var
Milestone Analysis

Milestones are *events or stages* of the project that represent a *significant accomplishment*. Milestones *signal* the team and suppliers *can motivate* the team *offer reevaluation points* *help coordinate* schedules *identify* key review gates *delineate* work packages

### Tracking Gantt Chart

<table>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2 B. Spec. Design</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 C. Site Identification</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4 D. Engineering Plans</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 E. Prototype Develop</td>
<td>7 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Project status is updated by linking task completion to the schedule baseline

### Earned Value Management

- **Cost**
- **Performance**
- **Schedule**
- **Project S-Curves**
- **Tracking Control Charts**

### Earned Value Terms

- Planned value
- Earned value
- Actual cost of work performed
- Schedule performance index
- Cost performance index
- Budgeted cost at completion
Steps in Earned Value Management

1. **Clearly define each activity** including its resource needs and budget
2. **Create usage schedules** for activities and resources
3. **Develop a time-phased budget** (PV)
4. **Total the actual costs** of doing each task (AC)
5. **Calculate** both the budget variance (CV) and schedule variance (SV)

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**Earned Value Milestones**

<table>
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<tr>
<th></th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Performed</td>
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</table>

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**Earned Value Example**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>April</th>
<th>Plan</th>
<th>%C Value</th>
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<tbody>
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<td>19</td>
<td>27</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cumulative:

- Planned Value: 80 (10)
- Earned Value: 75 (6+1)

**Schedule Variances**

- Planned Value (PV) = 38 = 15+10+10+3
- Earned Value (EV) = 30 = 15+8+6+1
- Schedule Performance Index = .79 = 30/38 = EV/PV
- Estimated Time to Completion = (1/.79)x4=5

**Cost Variances**

- Actual Cost of Work Performed (AC) = 40 = 8+11+8+13
- Cost Performance Index = .75 = 30/40 = EV/AC
- Estimated Cost to Completion = 50.7 = (1/.75)x38
Completion Values in EVM

*Accurate* and *up-to-date* information is *critical* in the use of *EVM*

- 0/100 Rule
- 50/50 Rule
- Percentage Complete Rule

Project Termination

**Elements of Project Closeout Management**

- Finishing The Work
- Handing Over the Product
- Gaining Acceptance for the Product
- Harvesting the Benefits
- Reviewing How It All Went
- Putting it All to Bed
- Disbanding the Team

**Lessons Learned Meetings**

**Meeting Guidelines**
- Establish clear rules of *behavior*
- Describe *objectively* what occurred
- Fix the *problem*, not the blame

**Common Errors**
- Misidentifying *systematic errors*
- Misinterpreting *lessons* based on events
- Failure to *pass along* conclusions
Closeout Paperwork

- Documentation
- Legal
- Cost
- Personnel

Why are Closeouts Difficult?

- Project sign off can be a de-motivator
- Constraints cause shortcuts on back-end
- Low priority activities
- Lessons learned analysis seen as bookkeeping
- Unique view of projects

Early Termination Decision Rules

- Costs exceed business benefits
- Failure to meet strategic fit criteria
- Deadlines are continually missed
- Technology evolves beyond the project’s scope

Project Termination Issues

- Emotional
  - Staff
  - Client
- Intellectual
  - Internal
  - External
Claims & Disputes

Two types of claims
- Ex-gratia claims
- Default by the project company

Resolved by
- Arbitration
  - Binding
  - Non-binding
- Standard litigation

Protecting Against Claims

- Consider claims as part of the project plan
- Verify stakeholders know their risks
- Keep good records throughout the life cycle
- Keep clear details of change orders
- Archive all correspondence

Final Report Elements

- Project performance
- Administrative performance
- Organizational structure
- Team performance
- Project management techniques
- Benefits to the organization and customer