Key Definitions

- **Project management** is the process of planning and controlling the development of a system within a specified timeframe at a minimum cost with the right functionality.
- A **project manager** has the primary responsibility for managing the hundreds of tasks and roles that need to be carefully coordinated.

Four Key Steps in Managing Projects

- Identifying project size
- Creating and managing the workplan
- Staffing the project
- Coordinating project activities

Project Manager’s Balancing Act

Project Management involves making trade-offs…

Modifying one element requires adjusting the others
Project Estimation

- The process of assigning projected values for time and effort
- Sources of estimates:
  - Methodology in use
  - Actual previous projects
  - Experienced developers
- Estimates begin as a range and become more specific as the project progresses

Project Estimation Using the Function Point Approach

1. Estimate system size (function points and lines of code)
2. Estimate effort required (person-months)
3. Estimate time required (months)

Function Point Estimation Worksheet
Step One – Estimate System Size (System Components)

<table>
<thead>
<tr>
<th>Complexity</th>
<th>Description</th>
<th>Total</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td></td>
<td>5 x 3</td>
<td>5 x 4</td>
<td>5 x 6</td>
<td>5 x 7</td>
<td>8</td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td>10 x 3</td>
<td>10 x 4</td>
<td>10 x 6</td>
<td>10 x 7</td>
<td>30</td>
</tr>
<tr>
<td>Queries</td>
<td></td>
<td>10 x 7</td>
<td>10 x 8</td>
<td>10 x 10</td>
<td>10 x 15</td>
<td>45</td>
</tr>
<tr>
<td>Files</td>
<td></td>
<td>10 x 7</td>
<td>10 x 8</td>
<td>10 x 10</td>
<td>10 x 15</td>
<td>45</td>
</tr>
<tr>
<td>Programs/ Interfaces</td>
<td></td>
<td>5 x 5</td>
<td>5 x 7</td>
<td>5 x 10</td>
<td>5 x 15</td>
<td>30</td>
</tr>
<tr>
<td>Total Unadjusted Function Points (TUFF):</td>
<td>338</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjusting the Function Points

Processing Complexity (PC): 
(From Step 2)

Adjusted Processing Complexity (PCA) = 0.65 + (0.01 * )

Total Adjusted Function Points: 73 * 338 = 247
Function Points Estimation

Review of Adjustments

Adjusted Project Complexity
= .065 + (0.01 * Project Complexity)
Total Adjusted Function Points
= Adjusted Project Complexity * TUF

Converting Function Points to Lines of Code

<table>
<thead>
<tr>
<th>Language</th>
<th>Approximate Number of Lines of Code per Function Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>130</td>
</tr>
<tr>
<td>C++</td>
<td>110</td>
</tr>
<tr>
<td>Java</td>
<td>55</td>
</tr>
<tr>
<td>Visual Basic</td>
<td>50</td>
</tr>
<tr>
<td>PowerBuilder</td>
<td>30</td>
</tr>
<tr>
<td>HTML</td>
<td>15</td>
</tr>
<tr>
<td>Packages (e.g., Access, Excel)</td>
<td>10-40</td>
</tr>
</tbody>
</table>

Function Point Estimation

Step Two – Estimate Effort Required

Function of size and production rate
COCOMO model

\[
\text{Effort in Person Months} = 1.4 \times \text{thousands-of-lines-of-code}
\]

Example:
If LOC = 10000 Then...
Effort = \((1.4 \times 10)\) = 14 Person Months

Function Point Estimation

Step Three - Schedule Time

Rule of thumb for estimation

\[
\text{Schedule Time (months)} = 3.0 \times \text{person-months (1/3 is the exponent)}
\]

A Workplan Example

<table>
<thead>
<tr>
<th>Work Plan Information</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of task</td>
<td>Perform economic feasibility</td>
</tr>
<tr>
<td>Start date</td>
<td>Jan 05, 2005</td>
</tr>
<tr>
<td>Completion date</td>
<td>Jan 19, 2005</td>
</tr>
<tr>
<td>Person assigned</td>
<td>Project sponsor: Mary Smith</td>
</tr>
<tr>
<td>Deliverable(s)</td>
<td>Cost-benefit analysis</td>
</tr>
<tr>
<td>Completion status</td>
<td>Open</td>
</tr>
<tr>
<td>Priority</td>
<td>High</td>
</tr>
<tr>
<td>Resources needed</td>
<td>Spreadsheet</td>
</tr>
<tr>
<td>Estimated time</td>
<td>16 hours</td>
</tr>
<tr>
<td>Actual time</td>
<td>14.5 hours</td>
</tr>
</tbody>
</table>
### Identifying Tasks

- **Methodology**
  - Using standard list of tasks
  - Top-down approach
  - Identify highest level tasks
  - Break them into increasingly smaller units
  - Organize into work breakdown structure

### Project Workplan

- List of all tasks in the work breakdown structure, plus
  - Duration of task
  - Current task status
  - Task dependencies
  - Milestone (dates)

### Tracking Project Tasks

- **Gantt Chart**
  - Bar chart format
  - Useful to monitor project status at any point in time

- **PERT Chart**
  - Flowchart format
  - Illustrate task dependencies and critical path

### Tracking Tasks Using Gantt Chart

<table>
<thead>
<tr>
<th>Task</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go to Library</td>
<td>2</td>
</tr>
<tr>
<td>Go to Bookstore</td>
<td>3</td>
</tr>
<tr>
<td>Select and Purchase Book</td>
<td>4</td>
</tr>
<tr>
<td>Skim Book</td>
<td>5</td>
</tr>
<tr>
<td>Write Phase One</td>
<td>6</td>
</tr>
<tr>
<td>Read Book Carefully</td>
<td>7</td>
</tr>
<tr>
<td>Write Phase Two</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

### Tracking Tasks Using PERT Chart

### Hurricane Model
Margins of Error in Cost and Time Estimates

<table>
<thead>
<tr>
<th>Phase</th>
<th>Deliverable</th>
<th>Typical Margins of Error for Well-Done Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning phase</td>
<td>System request</td>
<td>Cost (%) Schedule Time (%)</td>
</tr>
<tr>
<td></td>
<td>Project plan</td>
<td>400 60</td>
</tr>
<tr>
<td>Analysis phase</td>
<td>System proposal</td>
<td>100 25</td>
</tr>
<tr>
<td>Design phase</td>
<td>System specifications</td>
<td>50 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5 10</td>
</tr>
</tbody>
</table>

Managing Scope

- Scope creep
- JAD and prototyping
- Formal change approval
- Defer additional requirements as future system enhancements

Timeboxing

- Fixed deadline
- Reduced functionality, if necessary
- Fewer “finishing touches”

Timeboxing Steps

1. Set delivery date
   - Deadline should not be impossible
   - Should be set by development group
2. Prioritize features by importance
3. Build the system core
4. Postpone unfinished functionality
5. Deliver the system with core functionality
6. Repeat steps 3-5 to add refinements and enhancements

Staffing Attributes

- Staffing levels will change over a project’s lifetime
- Adding staff may add more overhead than additional labor
- Using teams of 8-10 reporting in a hierarchical structure can reduce complexity

STAFFING THE PROJECT
Increasing Complexity with Larger Teams

Your Turn
- How do you know how many people to assign to a project?
- How do you know what special skills will be needed for completion of the project?

Key Definitions
- The staffing plan describes the kinds of people working on the project
- The project charter describes the project’s objectives and rules
- A functional lead manages a group of analysts
- A technical lead oversees progress of programmers and technical staff members

Motivation
- Use monetary rewards cautiously
- Use intrinsic rewards
  - Recognition
  - Achievement
  - The work itself
  - Responsibility
  - Advancement
  - Chance to learn new skills

Handling Conflict
- Clearly define project plans
- Recognize project importance to organization
- Project charter listing norms and ground rules
- Develop schedule commitments ahead of time
- Forecast other priorities and their possible impact on the project

COORDINATING PROJECT ACTIVITIES
CASE Tools

Planning  Analysis  Design  Implementation

Upper CASE  Lower CASE

Integrated CASE (I-CASE)

CASE Components

Diagrams  Screen Designs

CASE Repository

Procedural Logic  Metadata

CASE Components

Standards

Examples

- Formal rules for naming files
- Forms indicating goals reached
- Programming guidelines

Documentation

Project binder  Table of contents  Continual updating

Managing Risk

Risk assessment  Actions to reduce risk  Revised assessment

Classic Mistakes

- Overly optimistic schedule
- Failing to monitor schedule
- Failing to update schedule
- Adding people to a late project
Summary

- Project management is critical to successful development of new systems.
- Project management involves planning, controlling and reporting on time, labor, and costs.

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