COMP3710
Planning & Scheduling

References
- Watts Humphrey, A discipline for Software Engineering Ch6
- D. Lock, Project Management, Gower Publishing.

Outline of Lecture
- Planning
- Scheduling
- Planned Value
- Earned Value
- Tracking
- MS Project
- Pair
- Design

Plans
- Visual display of listed activities
- Project activities resulting from estimating, logical sequencing, target timing and determination of priorities.
- Methods include
  - Bar (Gantt) charts
  - Networks (Arrow, Precedent)
  - Line of balance charts for repetitive projects
  - Other specific types

Why Plan
- Plans provide a business basis for doing the work.
  - establish the price by breaking down activities
  - set the schedule
  - permit agreement on the work
- Plans establish a management framework.
  - define commitments
  - help groups coordinate their work
  - allow status tracking

Planning
- **Free Planning – the ideal**
  Planner is free to plan project activities and achieve a working schedule and project completion date with certainty
  - Uses estimates with no pressure to compress timetable
  - No need to over stretch resources when organizing projects
  - Can have unrealistic end dates from the customer point of view
  - Longer times attract higher overhead costs
- **Target –led Planning**
  Planner is governed by factors beyond his/ her control
  - All estimates must be suited to predetermined targets
  - Plan can be too tight with no room for error (e.g. working overtime)
  - Tendency to mark down estimates without justification
  - Can be deceitful to customers and competitors
  - Need to compress project timescales without increasing risks unacceptably (e.g. fast tracking, cost-time optimization)
Estimation Accuracy

- Planning is a skill that must be developed. Even simple plans are subject to error.
  - unforeseen events - Risk
  - unexpected complications
  - low priority to important tasks
  - just plain mistakes
- The best strategy is to plan in detail.
  - Identify the recognized tasks.
  - Estimate based on similar experience.
  - Make judgments on the rest.

Planning Process

Schedule Estimating

- To make a schedule you need three things:
  - the estimated direct project hours available
  - a calendar of available direct hours
  - the order in which the tasks will be done (precedence)
- You then need to
  - Estimate the hours needed for each task.
  - Spread these hours over the calendar of available hours.

Produce the Schedule

- Estimate the hours for each task:
  - What portion of total hours have such tasks historically taken?
  - Will anything unusual affect this project?
  - To ensure that tasks are not omitted, set up time for all tasks for the project.
- Spread the task hours over the calendar:
  - Identify key project checkpoints.
  - Use a standard format.

The Task Order

- The task order must be driven by the development strategy.
  - You need a conceptual approach.
  - Each task needs completion criteria.
  - You must consider task interdependencies.
  - Also consider cost and cycle time priorities.
- Determine planned task order.
  - The task order will change with new knowledge.
  - The initial task order provides a basis for planning.

Planning & Tracking

- Planned Value (PV) [Planning]
  - The Time Percentage of each task compared to the total time of all tasks.
  - Deals with estimated values not actual values
- Earned value (EV) [Tracking]

As each task is completed, it earns the planned value.
Example Tracking

```
<table>
<thead>
<tr>
<th>Task</th>
<th>Est. Hours</th>
<th>PV</th>
<th>P Completion Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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<td>5.4</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>13.5</td>
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<tr>
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<td>3</td>
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<td>D</td>
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<tr>
<td>E</td>
<td>3</td>
<td>8.1</td>
<td>5</td>
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<td>F</td>
<td>5</td>
<td>13.5</td>
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<td>G</td>
<td>6</td>
<td>16.3</td>
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<td>H</td>
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</tr>
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<tr>
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Example

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<table>
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<tr>
<th>Task</th>
<th>Est. Hours</th>
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<th>Cumulative PV</th>
<th>P. Day</th>
<th>Done Day</th>
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<tr>
<td>D</td>
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<td>18.9</td>
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<td>37</td>
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</table>
```

Earned Value

- Deals with Actual Values
- The purpose of earned value is to
  - establish a value for each task
  - permit progress tracking against the plan
  - facilitate tracking even with plan changes
- The principles behind earned value are the following:
  - It provides a common value for each task.
  - This value is the percent of total project hours this task is planned to take.
  - No value is given for partial task completion.
  - Major plan changes require new plans.

Projecting Project Completion

- Assume that the project will continue to earn value at the rate it has in the past.
- Extrapolate to project completion by linearly extending the EV line until it reaches 100%.
- This is the likely project completion date unless
  - the rate of progress can be accelerated
  - the work for the remaining tasks can be reduced below the original plan
Example (Cont.)

- Notice that no task was completed on day 3.
- Therefore Earned value for day 3 = earned value for day 2.
- Actual earned value rate per day is 48.6/5 = 9.72/day.
- Therefore, Projected completion day of project is now 11 days instead of 8 days.

Changes to Plans

- For small plan changes, the earned value amounts can be adjusted as follows:
  - Assume that the change is a task addition.
  - Estimate the hours for the new task.
  - Determine the new task PV%.
  - Add this amount to the project total.
  - Proportionally reduce the value of every task by the ratio 100/(100 + new task PV).

Changes to Plans (cont)

- The plan is still tracked against the original planned value schedule.
- By adding a task, the value of all the completed and planned tasks is reduced.
- When tasks are deleted, the value of all the completed and planned tasks is increased.
- For major plan changes, you must produce a new plan.

Example (Cont.) Projected Completion

<table>
<thead>
<tr>
<th>Day</th>
<th>Est Hr PV</th>
<th>Cum. PV</th>
<th>EV</th>
<th>Proj. EV</th>
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Example

<table>
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<th>Task</th>
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<th>Cum Hrs</th>
<th>PV</th>
<th>Cumul. PV</th>
<th>Adjust EV</th>
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</table>

Re-Planning

- Extend Project Duration
- Increase your resources
  - Concurrent tasks
- Increase rate
  - Training
  - Increase calendar hours
MS Project

- You are using this tool to:
  - Understand how a PM tool works
  - Estimate a Plan
  - Track your plan and re-estimate
  - Print reports to .ps files on your progress
- You will need to enter your actual times
  - Insert columns for Actual Work/Duration and % complete
  - Use Tracking menu to set up tracking screen
- progress

Concepts for this week

Insert columns for Actual Work/Duration and % Complete

Select Track view
Step 2 – Prepare to track progress
Then select ‘track by entering work done’

MS Project (cont)

- MS Project is a data base system (cf Data Table design). You are looking at the Interface screens (cf Interface design).
- When you enter data in one screen, it will update other screens.
- You have to work out what formulae MSProject uses to update columns eg
  - Bold Activities will be a sum of sub tasks
  - All time from different resources (eg PM and Designer) will be added to provide the total time

Pair Work

- You will design in pairs for about 3 weeks
- You tutor will tell you when you are in pairs
- You will collect the data from you and your pair for your time spent in design (actuals)
- You will enter this in YOUR plan
- You will enter YOUR project management times in your plan
- You will analyse YOUR plan individually
Designs

- Your designs will be marked according to the Goals and Questions in the QA.doc
- Set up your own measures to evaluate your design as you go
- If working in pairs, always design in pairs to maintain consistency or you will have to re-design
- Design DFD to functional level, then expand that as Structured English or pseudo-code

Quality Assurance

- Add Metrics to the right and set a value to achieve
- Metrics are to evaluate the quality of your work
- We will mark according to the goal/question with metrics that cover the range of your submissions

Example

- Goal: Whether the functions are enough to do what the client wants
- Question: How it implements each function and does it work?
- Measure: What function?
  - Clients list of Requirements
  - Use Case Functionality
- Measure: Where is it implemented?
  - DFD
  - Interface
- Measure: Alternatives?
  - Only those functions related to the Use Cases.