Project Scope, Introduction to Planning

ELEX 4560 Lecture 2

Sept 20, 2019

Project Scope

- The most common cause of project failure is probably "scope creep": small, seemingly-simple additions to project objectives
- But these small changes frequently violate assumptions made during planning (e.g. dependencies) and can have surprisingly large impacts on schedule & costs
- Scope creep typically leads to schedule slips & cost overruns
- Project manager gets the blame even if management pressured him/her to make the changes
- How to avoid this?

Project Scope Definition

- The project scope document should address all stakeholder expectations
- It may not be possible to include all of them (conflicting, impossible, impractical)
- The project scope defines what is, and is not, included in the project -- exclusions are just as important
- Needs to be approved and "signed off" by key stakeholders
- This agreement will allow you, the project manager, to reject requests that would result in scope creep ("moving goalposts")
- If scope changes are requested you should revise the scope document, the project plans and request any necessary additional time & resources

ELEX 4560 Scope Document

- Combine results of your key stakeholder interviews to come up with a single project scope document in the format shown in the textbook

- Submit by next week (Sept 27) along with your stakeholder interviews.

- Based on your scope document, we (instructor, mentor, students) will agree on specific deliverables and how each one will contribute to the "achievement" component of your final mark.

Project Planning

- Strategies have been devised for project planning that seem to work well
- The recommended steps are:
  1. Decompose the objectives into a *hierarchy* of simpler tasks (called a *Work Breakdown Structure*)
  2. Identify *risks* and necessary mitigations; add these tasks
  3. Determine *time & resources* required for each task (primarily time but can also include specific people, components, equipment, approvals, …)
  4. Determine which tasks depend on others (*prerequisites*)
  5. Organize tasks and resource requirements into a dependency graph (usually done using software with results presented as a *Gantt Chart*)
  6. Keep the plan updated so you can always answer question such as: When will it be done? By when do we need to have X? Can I take a day off?, …

Work Breakdown Structure (WBS)

- We don't want to forget to include any tasks required to complete the project

- A good approach is to decompose the overall project into a small (e.g. 3 to 5), high-level tasks that we can be certain will be sufficient to complete the project

- Each of these tasks is then decomposed into smaller, simpler tasks that we can also easily verify will guarantee success of the higher-level task

- We repeat this process of decomposition until we have broken the project down into simple-enough tasks that their resource requirements (time, people, …) are easily estimated

Accurate WBS is Important

- Most of your planning time will be devoted to coming up with an *accurate* WBS
- If you haven't done a similar project, creating the WBS could take a long time; ask those with experience for help; get your WBS reviewed
- You will need to do research (web sites, experts, …) to figure out what's required to complete each task
- You need to do this anyways; do as much as possible at the start and minimize surprises
- Don't be tempted to start work before you understand in detail how the project will be accomplished (what components to buy, what software to write, what needs to be built, …)

Creating the WBS

- An easy way to create the WBS is to use nested lists in a word processor; this works well early on

- Eventually you will transfer the tasks to project-management software and add other details

- Exercise 1: create a WBS for making a peanut-butter sandwich; use at least 3 levels of hierarchy

- Exercise 2: create the top level of the WBS for your project; decompose just one task into sub-tasks

Resources Requirements & Dependencies

- Each task will take time
- Each task will require resources (people, supplies, equipment, …)
- Some (but not all) tasks will require that other tasks be completed first; the first task is a *dependency* of the second
- e.g. you need to receive parts before assembling them; you need to order the parts before they are shipped, they need to be shipped before they are received
- Completion of a task is a *milestone*
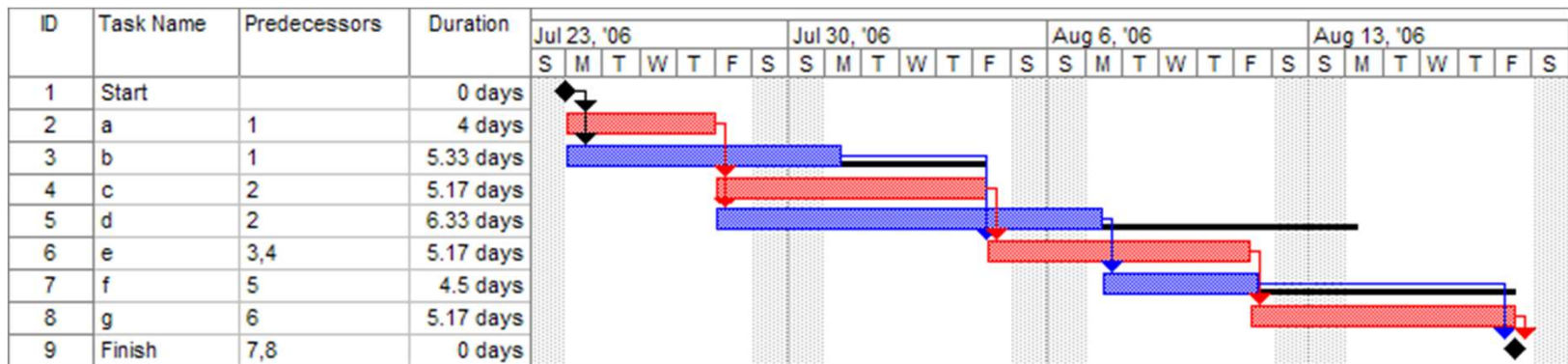
Critical Path Method

- The critical path method (CPM) is a way to arrange tasks, their resource requirements and their dependencies into a "graph"
- Example from Wikipedia:
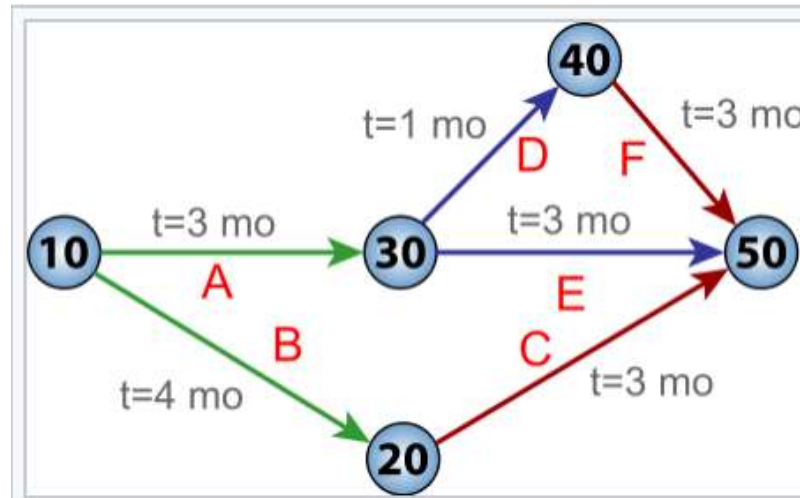
Project Management Software

- We use project management software to enter tasks, dependencies, and resources

- The software automatically arranges tasks to so each tasks' dependencies are completed before that task begins.

- The software keeps track of time (most important resource) and estimates when each task can start and when it will be completed.

- The software can create various graphical representations
- The most often-used is called a "Gantt Chart" (from Wikipedia):

ID	Task Name	Predecessors	Duration	Jul 23, '06	Jul 30, '06	Aug 6, '06	Aug 13, '06
1	Start		0 days				
2	a	1	4 days				
3	b	1	5.33 days				
4	c	2	5.17 days				
5	d	2	6.33 days				
6	e	3,4	5.17 days				
7	f	5	4.5 days				
8	g	6	5.17 days				
9	Finish	7,8	0 days				

- Various other features (milestones, critical path, slack, …) will be described later

Estimating Task Duration

- This is often the most difficult part
- Not all of your time can be productive (meetings, sick days, equipment failures, correcting mistakes, …)
- Easier to estimate a range than a single number
- PERT (another project management method) formula (from text):
    - Expected Time = (Optimistic + 4 x Most Likely + Pessimistic) / 6
- Exercise: use the PERT formula to estimate how long it will take you to compute the product of two 2-digit numbers.   Try it and see how close your estimate was.

Next Steps

- Complete the Scope Document; your project's marking scheme will be based on this

- If you have time, start a WBS for your project; make it as detailed as possible; review it with you mentor

- Next week we will cover risk analysis and introduce an example of project management software ([Gantt Project](#)).