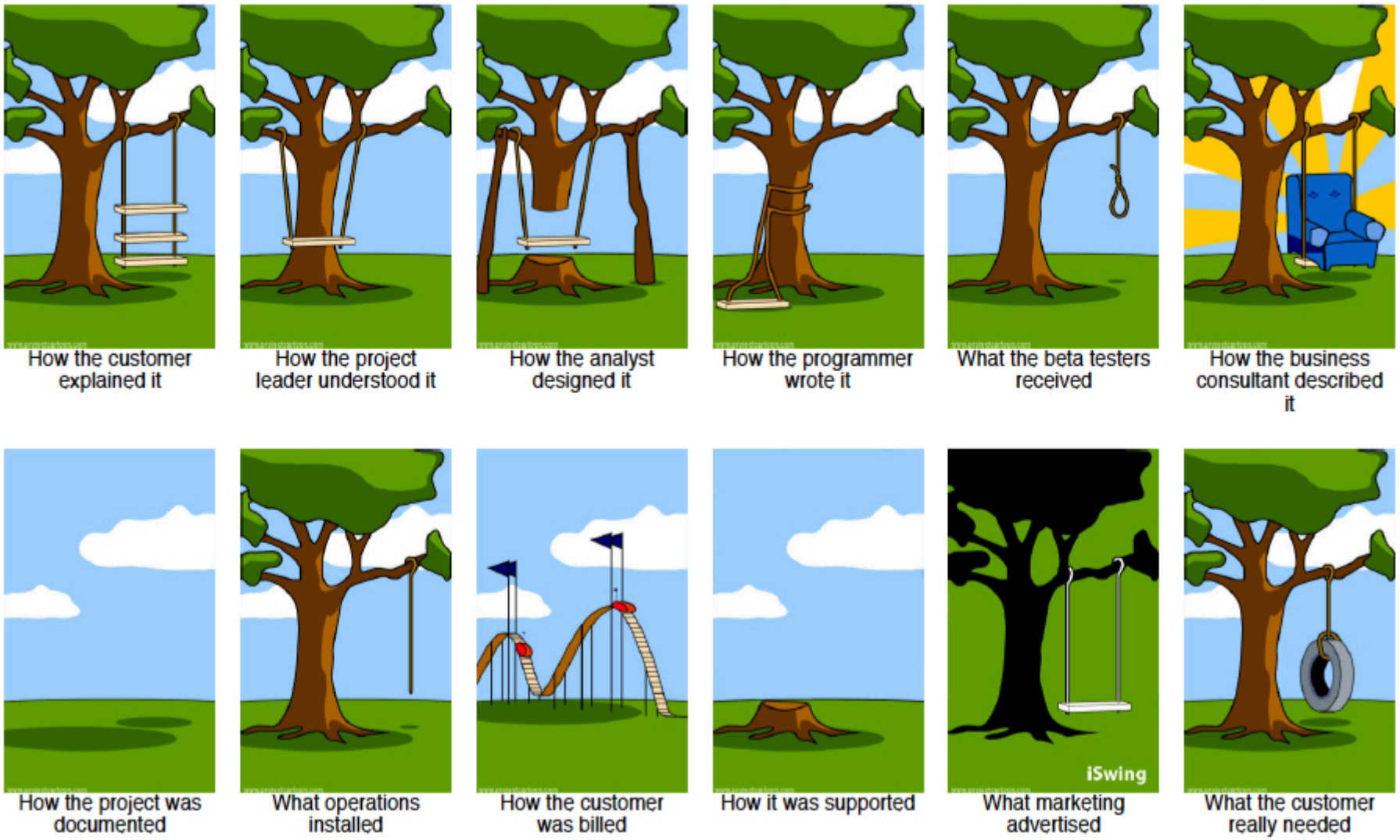
ENGR 13x2
Engineering Design with CAD

Teams & Project Management

Agenda

- Building an effective team
- Project Management
  - Gantt Charts
  - PERT Charts
  - Org Charts
- Dealing with difficult people
- Logbooks



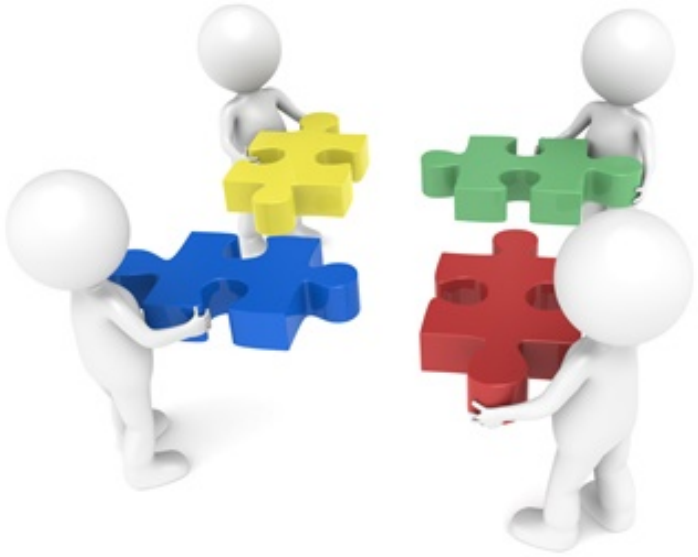
https://blog.sethgillespie.com/category/project-management/

“There are two kinds of people, those who do the work and those who take the credit. Try to be in the first group; there is less competition there”

- Indira Gandhi

Teamwork

- Why do we work in teams?
  - Complex nature of design problems.
- Engineers (designers) are often at the crossroads in multi-disciplinary teams since the design determines the product.
- However…
  - Project management determines how responsibilities are assigned and controlled.
  - Accounting determines how funding flows and is tracked.
  - Supply chain determines what vendors are available.
  - Manufacturing determines what processes can be used to create the product.
  - Marketing determines how the product will be sold.
  - And many others…



Building an Effective Team

- Agree upon goals
- Define clear roles
- Define procedures
- Develop good professional relationships
- Define leadership roles

Some team videos

- http://www.youtube.com/watch?v=1qzzYrCTKuk&feature=related
- https://www.youtube.com/watch?v=5L8Em5vU0FU
- http://www.youtube.com/watch?v=TRZnTfRingg&NR=1&feature=endscreen

When trouble comes . . .

- If you are having trouble, go back to the basics for building an effective teams.

- Will your client care if you have three other projects due at the same time and your kids are sick and one of your teammates is a lazy bum and you are doing all of the work?

Project Management

“Plan your work and work your plan.”

Proj. Mngmt.: "Who Does What by When"

- Figure out the "What" – Tasks that need to be completed
  - Identify "deliverable" for every task
- Determine order and relationship between tasks
  - Sequence & Dependency
- Estimate time required for task completion
  - Labor time vs. Calendar time
- Assign tasks
  - Skill set & Availability
- Work plan: Logical list (sequence) of tasks, activities, durations & deadlines
  - Tasks need descriptions, deliverables, durations, due dates and assigned team members
  - Activities may be team meetings, practice sessions, and similar

Task Descriptions

- Work should always result in a product: the “deliverable”
  - May be a physical item (a widget) or information in a given form (a drawing or 3D model)
- *Example Task: Research alternatives for system power sources*
  - *Work is to research, but what is produced?*
  - *Deliverable might be: 1 page list of alternatives, their characteristics relative to requirements, procurement costs, operating costs and lead times*
- Often better to describe the deliverable and leave the means and methods to the task executor
  - Tell them what you need and let them figure out how best to get it
- *Task Description for example above:*
  - *Task 2.3: Produce 1 page paper on system power source alternatives adequate to select lowest life cycle cost system meeting all requirements. Post to team dropbox 1 week prior to preliminary design review.*

Project Management Tools

- Checklist (Basic!)
  - Just a “to-do” list for the project.

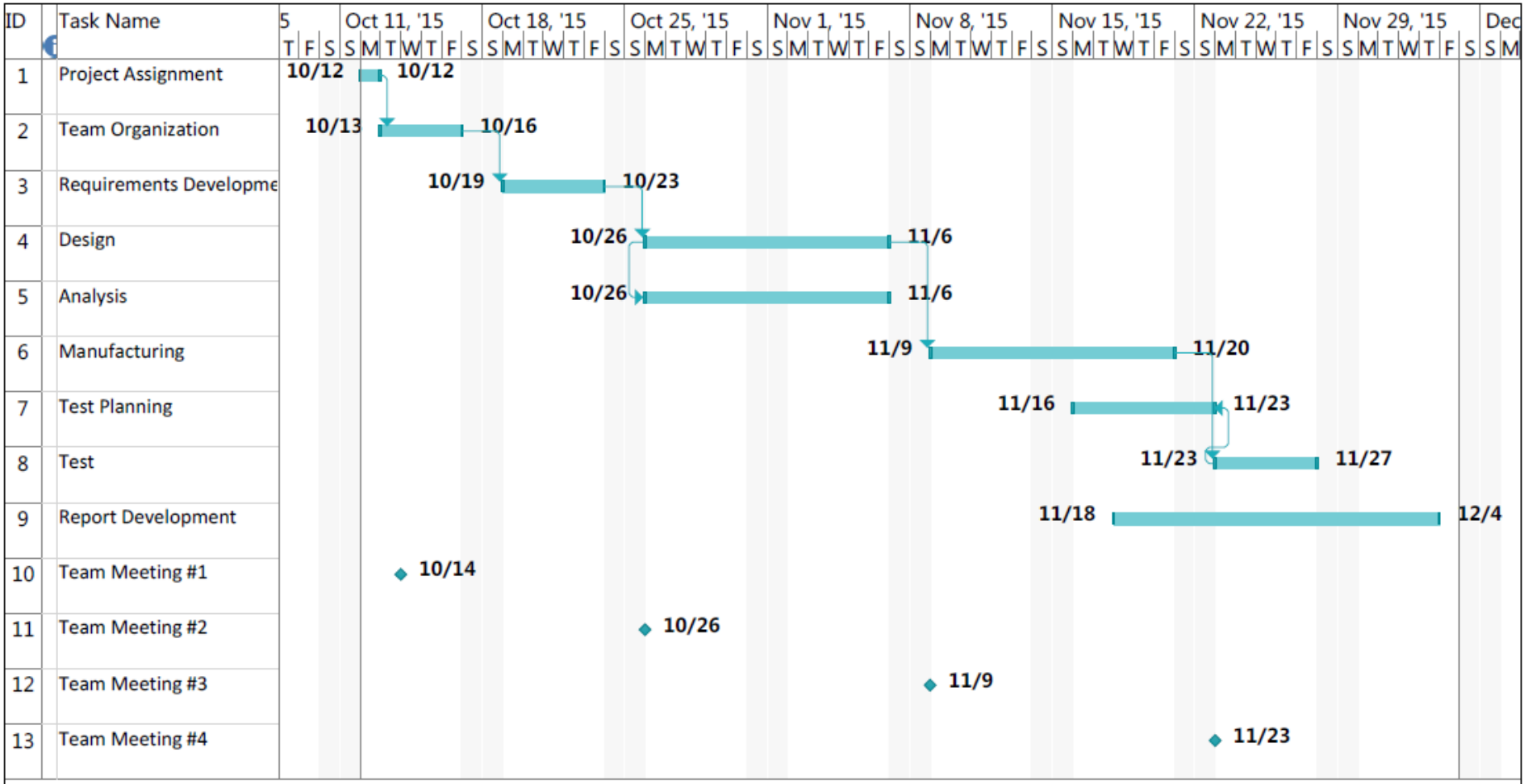
- Gantt Chart
  - Plot of project tasks vs. time
  - Graphically depicts amount of time allotted to each task.
  - Updated as project progresses.

- PERT (Project Evaluation and Review Technique)
  - Developed by the US Navy in 1958.
  - Clearly illustrates task dependencies.
  - Identifies critical path.

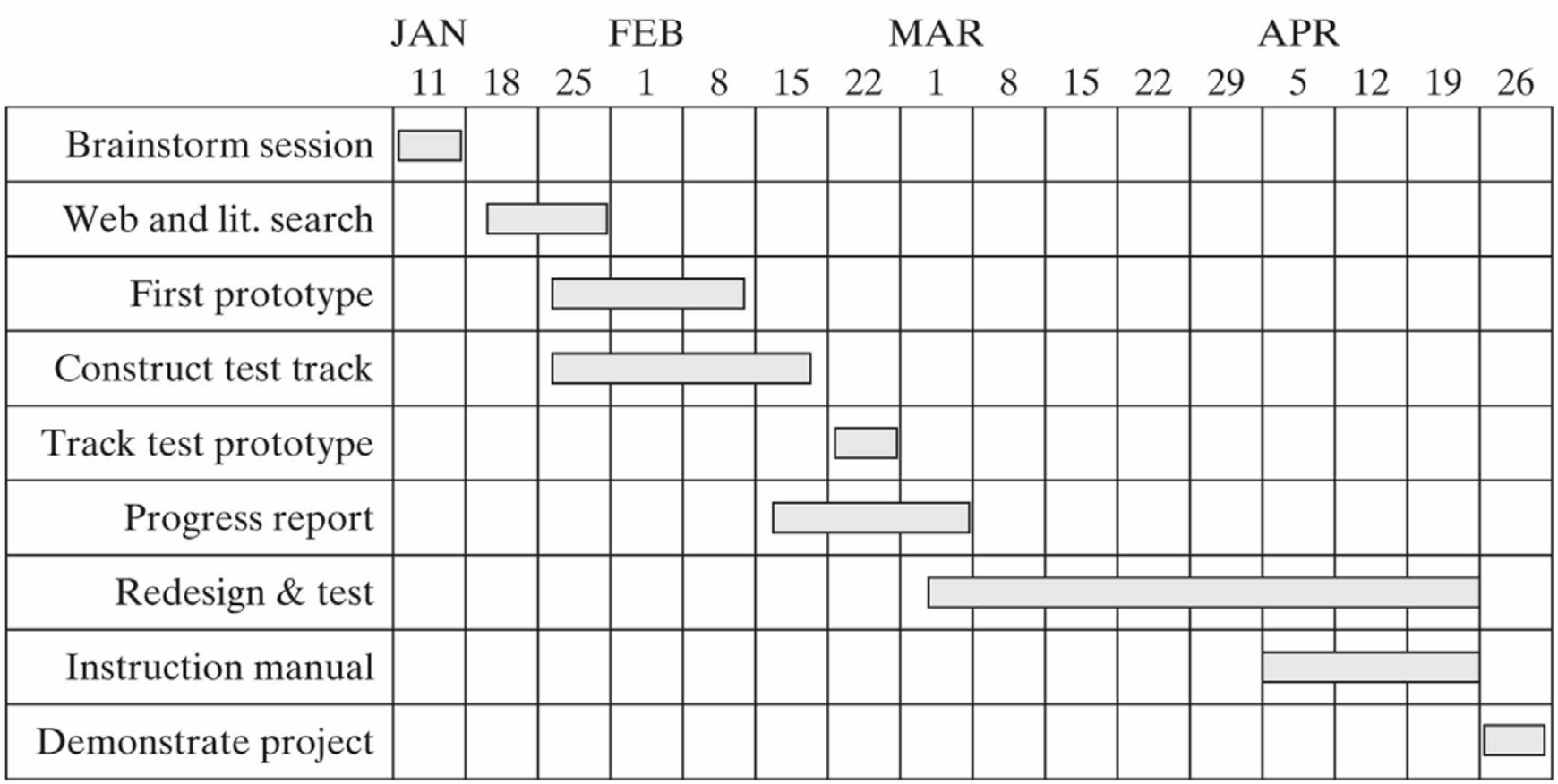
Gantt Chart

- Graphic depiction of work plan with tasks, durations and relationships
- Some software permits resource loading, completion status and other task information (Ex: Microsoft Project)

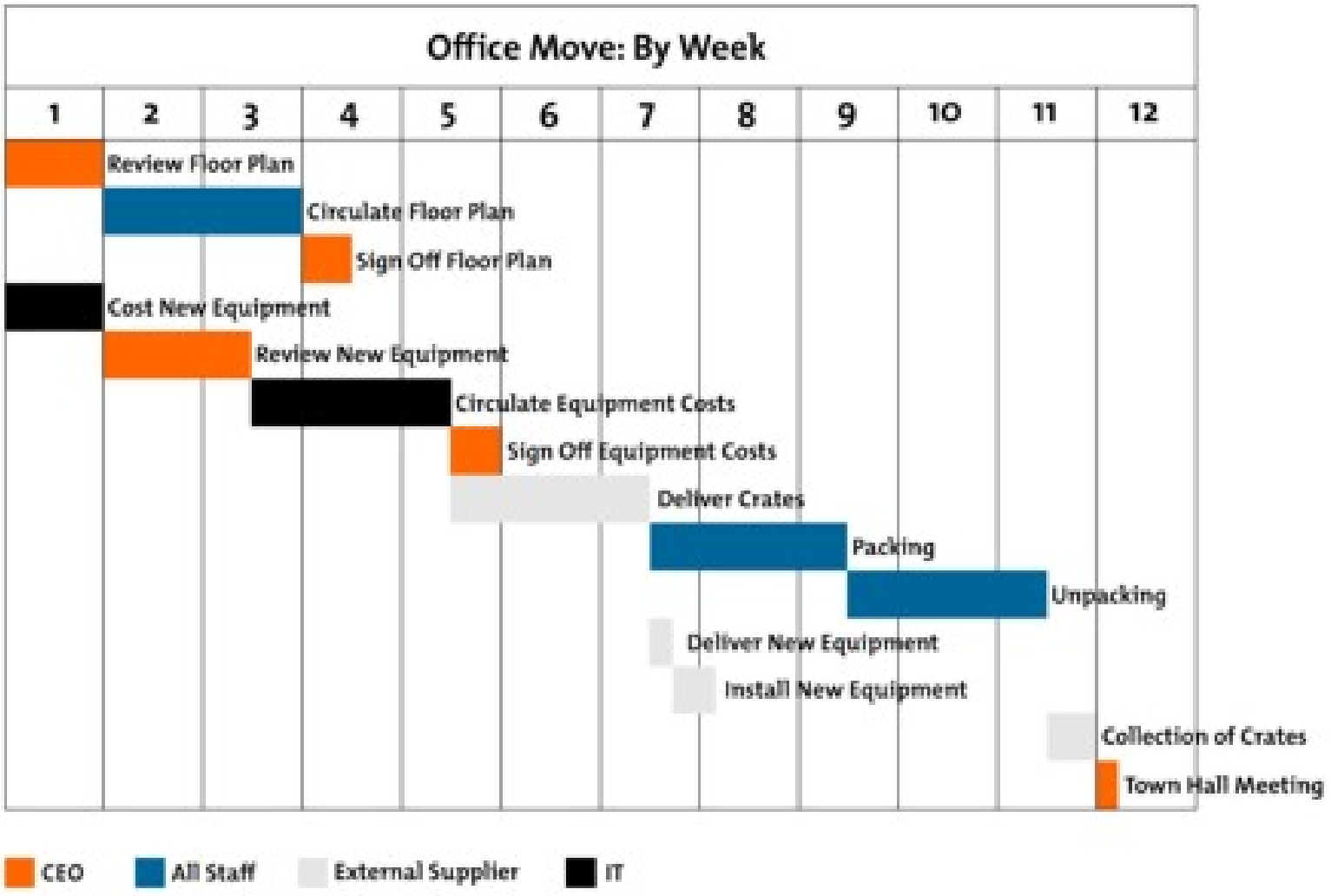
See also section 3.2.3 in Horenstein textbook



Gantt Chart Example



Gantt Chart Example



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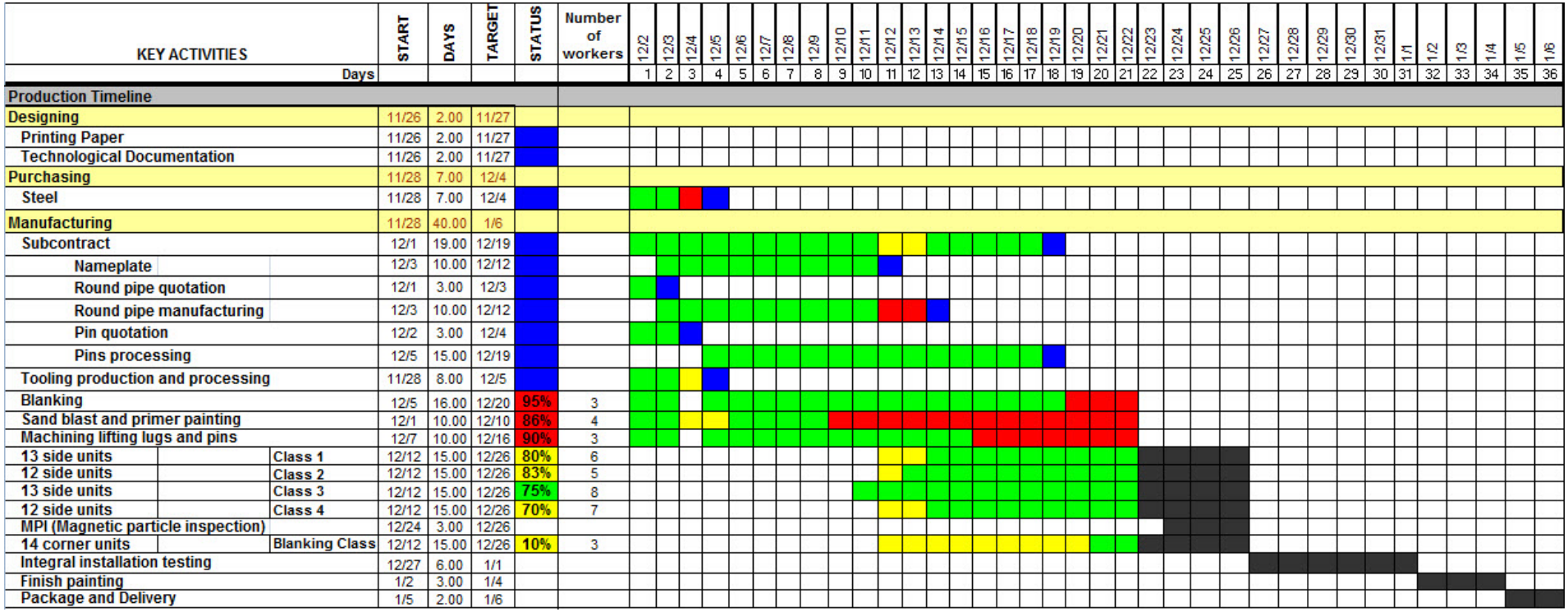
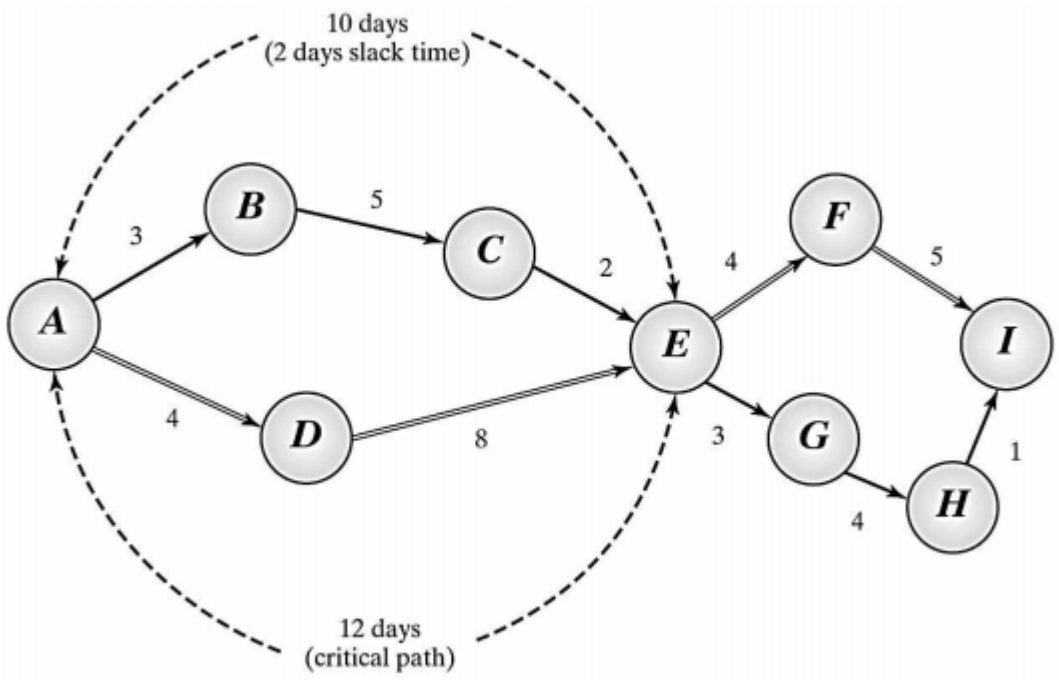


KEY ACTIVITIES	START	DAYS	TARGET	STATUS	Number of workers
Days					
Production Timeline					
Designing	11/26	2.00	11/27		
Printing Paper	11/26	2.00	11/27		
Technological Documentation	11/26	2.00	11/27		
Purchasing	11/28	7.00	12/4		
Steel	11/28	7.00	12/4		
Manufacturing	11/28	40.00	1/6		
Subcontract	12/1	19.00	12/19		
Nameplate	12/3	10.00	12/12		
Round pipe quotation	12/1	3.00	12/3		
Round pipe manufacturing	12/3	10.00	12/12		
Pin quotation	12/2	3.00	12/4		
Pins processing	12/5	15.00	12/19		
Tooling production and processing	11/28	8.00	12/5		
Blanking	12/5	16.00	12/20	95%	3
Sand blast and primer painting	12/1	10.00	12/10	86%	4
Machining lifting lugs and pins	12/7	10.00	12/16	90%	3
13 side units Class 1	12/12	15.00	12/26	80%	6
12 side units Class 2	12/12	15.00	12/26	83%	5
13 side units Class 3	12/12	15.00	12/26	75%	8
12 side units Class 4	12/12	15.00	12/26	70%	7
MPI (Magnetic particle inspection)	12/24	3.00	12/26		
14 corner units Blanking Class	12/12	15.00	12/26	10%	3
Integral installation testing	12/27	6.00	1/1		
Finish painting	1/2	3.00	1/4		
Package and Delivery	1/5	2.00	1/6		

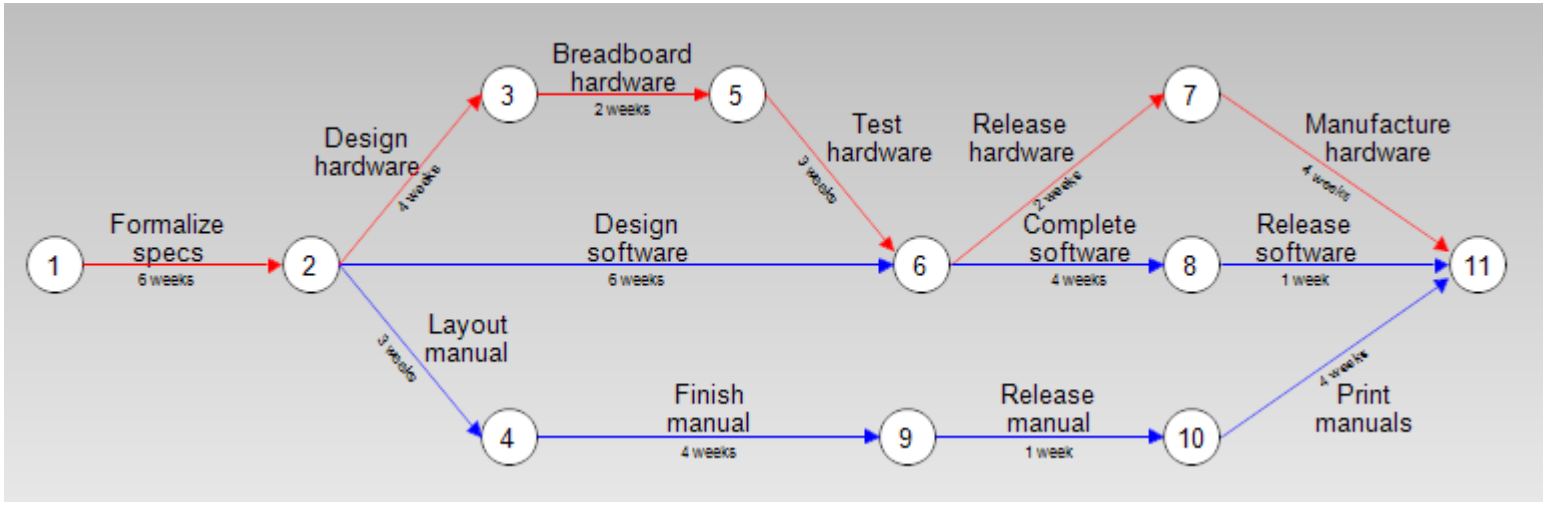
12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26	12/27	12/28	12/29	12/30	12/31	1/1	1/2	1/3	1/4	1/5	1/6
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

PERT Chart



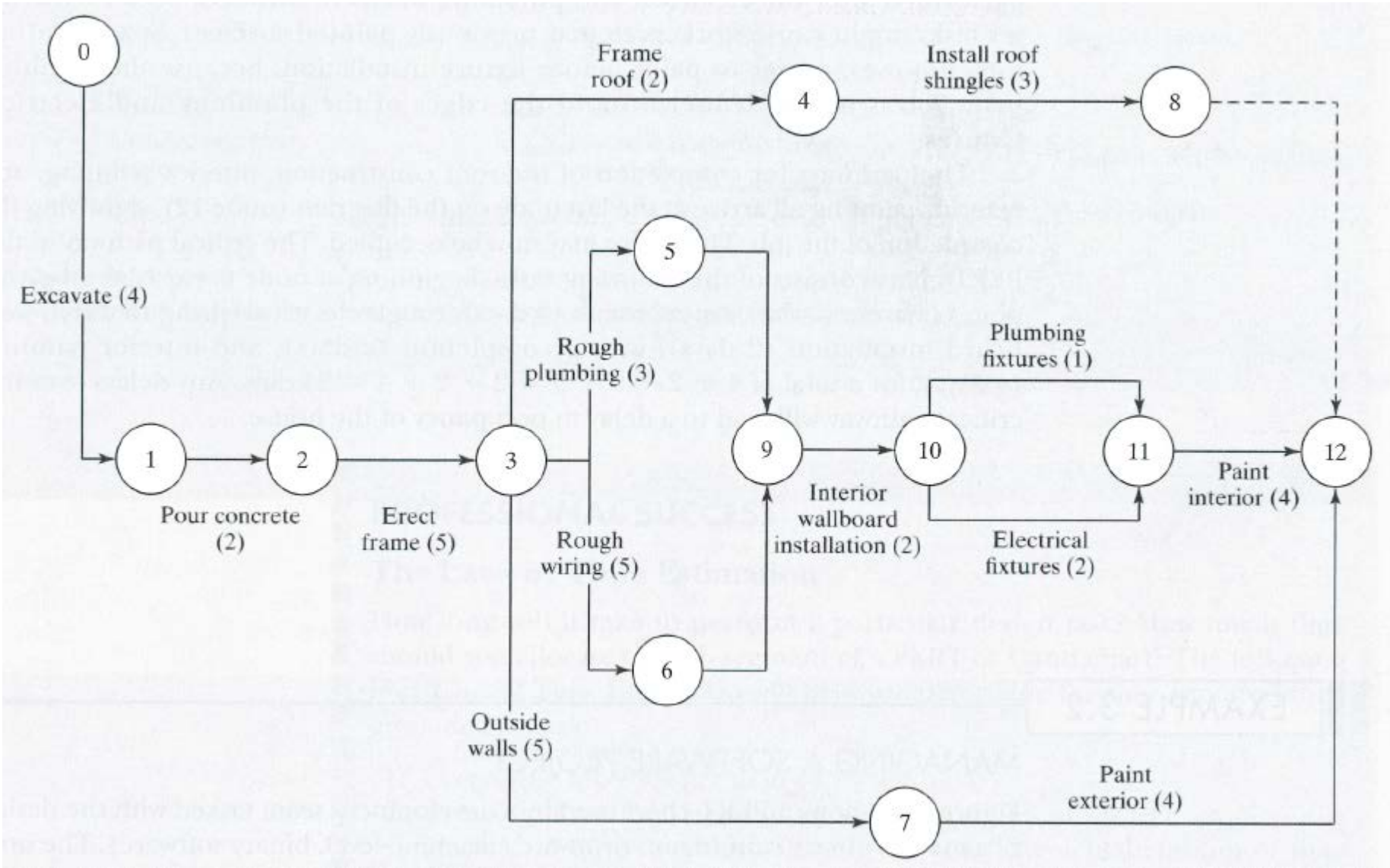
- Multiple branches/pathways with timing
- Slack time and critical path
- Microsoft Visio – good tool for making PERT charts

See also section 3.2.4 in Horenstein textbook



PERT Chart Example

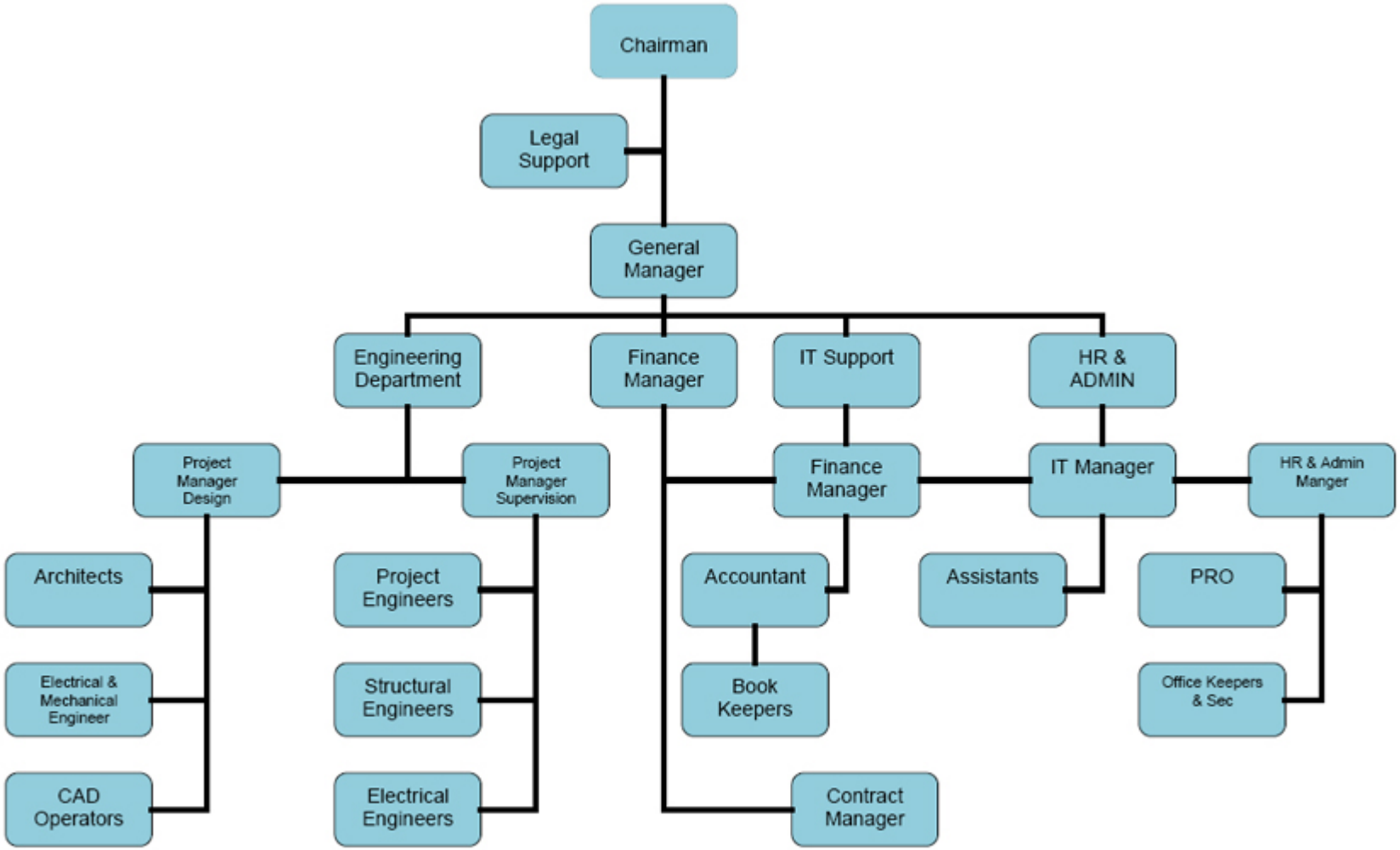
PERT chart for building a house



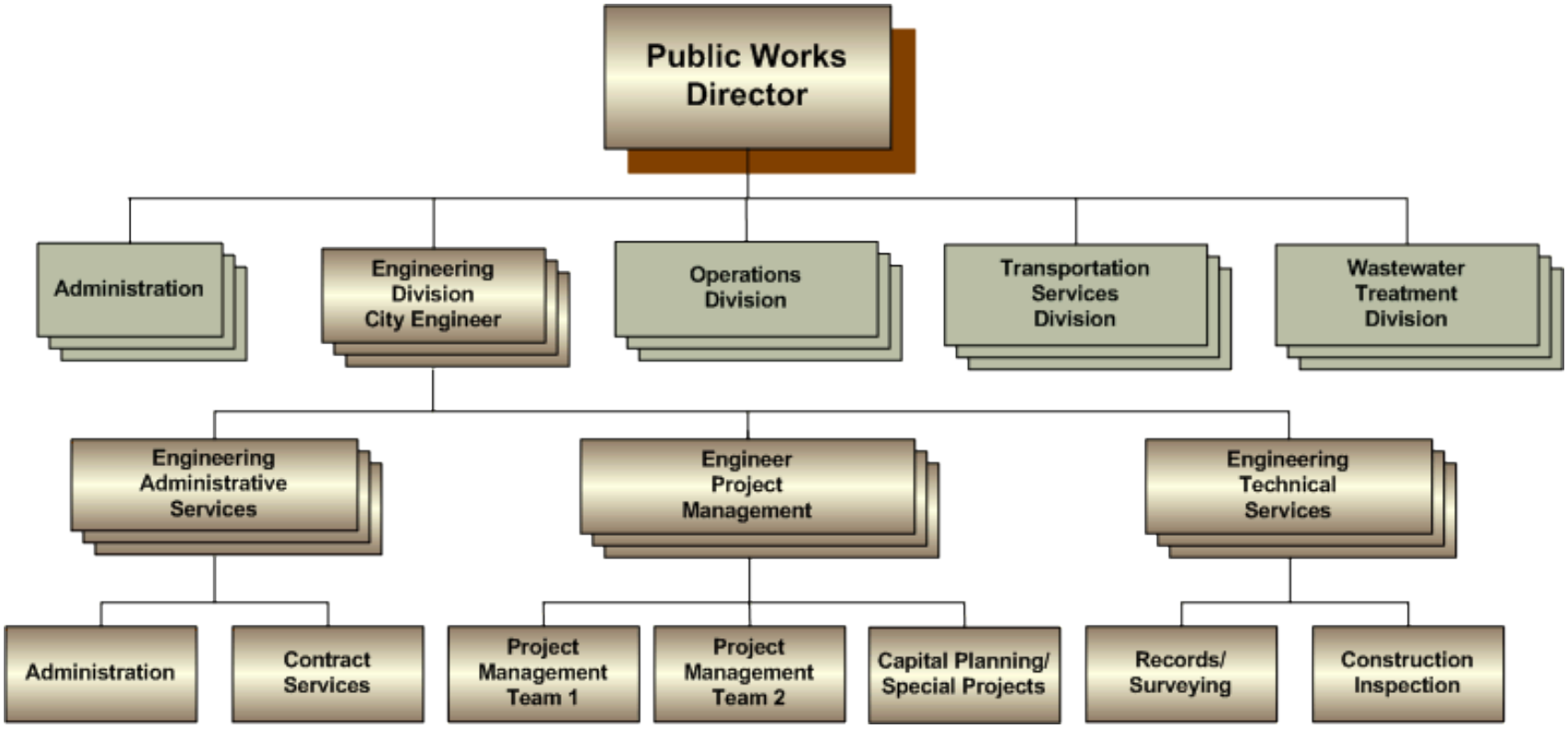
Organizational Charts

- Specifies the management structure of the team or organization
- Indicates roles/responsibilities
- Graphically depicts the hierarchy and reporting structure

Organizational Chart – Example



Organizational Chart – Example



Dealing with Difficult People

- Characteristics
  - Quick to judge, doesn't listen
  - Condescending, know-it-all
  - Unprofessional, angry, disrespectful, bossy
  - Standoffish
  - Whiner/Complainer, Rambler
  - Doesn't pull their weight

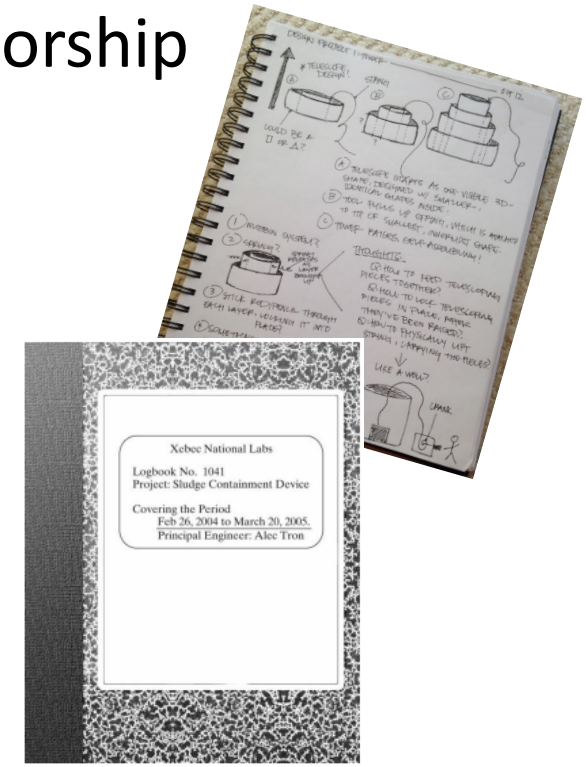
- Frequent causes of difficult behavior
  - Insecurity
  - Fear (Failure, Humiliation, Losing Power, Rejection)
  - Stress
  - Cultural differences
  - Age differences

Strategies for Dealing with Difficult People

1. Be calm!
2. Try to understand the person's intentions.
3. Get some perspective from others (don't make this a gossip session).
4. Be respectful.
5. Let the person know where you are coming from.
6. Focus on actions.
7. Bring in a higher authority if needed.
8. Respond, don't react. Control your own thoughts and reactions.
9. Consider how you are impacting the situation.

Project Documentation

- Logbook
  - Running record of all activities related to a design project. (Design ideas, data collection, test results, successes/failures)
  - Typically stored in an archive at the end of a project
  - May be used as evidence of inventorship
    - Has legal implications
    - May be required by your employer
  - Should be permanently bound
  - No loose papers
  - Get in the habit of writing everything in your logbook – it is your daily accounting of your project work!



Some Logbook Guidelines

- Every person working on the project keeps a separate logbook for the project
  - Separate logbooks for each project
- Write in pen
  - Pencil can smudge
  - Cross out mistakes – no correction fluid
- Enter all ideas, calculations, tests, sketches, diagrams, etc. in the logbook

Some Logbook Guidelines

- Write as though someone else will be reading your documents – a teammate, your boss, legal counsel, etc.
- If intellectual property is at stake, sign and date at the end of each session – a countersignature may also be required
- Don’t leave pages blank or tear out pages