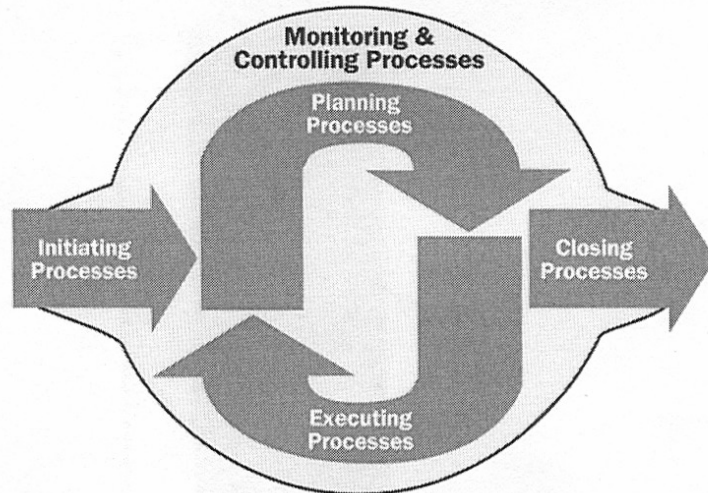# Project Management for Senior Design

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Outline

- Introduction – Motivation
- The Importance of Project Management
- Basic Skills of Project Management
- Exercise
- Recap and Discussion

Project (from Wikipedia)

A project is a temporary and one-time endeavor undertaken to create a unique product or service.

This property of being a temporary and a one-time undertaking contrasts with processes, or operations, which are permanent or semi-permanent ongoing functional work to create the same product or service over-and-over again.

Project Management (from Wikipedia)

Project management is the:

- discipline of organizing and managing resources

- in such a way that these resources deliver all the work required to complete a project

- within defined scope, time, and cost constraints.

The first challenge of project management is ensuring that a project is delivered within the defined constraints.

The Importance of Project Management

- Many engineers are now either faced with management responsibilities at their current positions, or promoted to higher positions

- They need to have PM skills to manage various aspects of a project-driven technological organization combining engineering problems, human factors, and financial issues and to work in a cross-functional team

- Consequently, to be successful in this work environment, it is crucial for engineers to have some level of PM knowledge and experience BEFORE they join the workforce

Senior Design Students' Knowledge of PM

- The overall performance of the students in meeting expectations is rated between "moderate" and "good," but closer to "moderate"

- Their project planning abilities (setting clear goals, tasks, schedules, budget, and resources) are also rated in this category

- Socio-cultural skills such as leadership and problem solving are additional candidates for improvement

- Students are not able to foresee risks and prepare contingency plans accordingly since these skills are rated between "poor" and "moderate"

# Project Management Body of Knowledge

- The Project Management Institute, the professional organization for project mangers, has identified a "Body of Knowledge" useful for managing small and large projects

- Although this body of knowledge and certification is valuable in industry, it is too extensive to cover completely in a university curriculum centered on technical skills

Process Groups & Links Between Groups

PMI has identified five groups of processes that incorporate one or more similar processes:

- Initiating - authorizing/starting the project.

- Planning - defining and refining objectives & courses of actions, and creating a project plan.

- Executing - carrying out project plan.

- Controlling - monitoring progress to ensure project objectives are met.

- Closing - bringing the project to an orderly end.
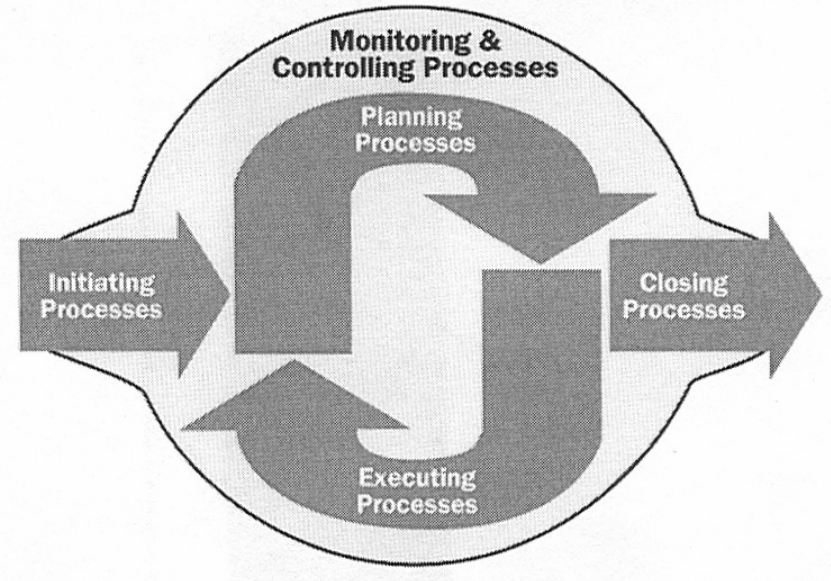
Basics of Project Management

Students should understand:

- Work Breakdown Structure Identification based on the requirements of the project
  - What are all of the tasks that you think need to happen
- Project Planning
  - Identify who does these tasks and how long they will take
- Project Execution
  - Then make sure you follow the plan!
- Watch out for changing requirements!
  - How do you handle these?

Sample Work Breakdown Structure (WBS)

Task		hrs	Responsible	A	B	C	D
Total Hours		**91**		**38.5**	**18.5**	**17**	**17**
PM							
	Develop WBS and schedule	0					
	Review WBS	0					
	Modify WBS & Estimates	0					
	Create MS Project File	0					
	Review Project Plan	0					
	Modify Project Plan	0					
	Identify Risks	6	All	1	1	1	1
	Develop mitigation plan	2	A, B	1	1		
	Review mitigation plan	2	A, B, Mentor, Sponsor	0.5	0.5		
	Monitor Project	20	A	20			
	Weekly group project meetings	40	A, B, C, D	10	10	10	10
	Projects reports	0					

WBS

1. Try to identify as many individual tasks that need to be done for the entire project. Can be done in a brainstorming session

2. Estimate the time needed for each task

3. Group tasks by "precedence" – similar task that may depend on each other

4. Assign this work to someone

Hint for project: Use the spreadsheet to help organize

Traditional GANTT Chart - Waterfall

Take the WBS, identify precedence of tasks

Task 1

Task 2

Task 3

Task 4

Task 5

The important thing to remember about traditional Project Management is that plans are made, then the project conforms to the plan.

You can change the plan!

ID	Task Name	Duration	Start	Finish	Predecesso
1	Major Milestones	18 days	Sun 9/24/06	Wed 10/18/06	
2	Risk Assessment	0 days	Fri 9/29/06	Fri 9/29/06	16
3	Financial Assessment	0 days	Wed 10/18/06	Wed 10/18/06	26
4	Design Review	0 days	Sun 9/24/06	Sun 9/24/06	
5	Implementation Milestone 1	0 days	Sun 9/24/06	Sun 9/24/06	
6	Implementation Milestone 2	0 days	Sun 9/24/06	Sun 9/24/06	
7	Final Test	0 days	Sun 9/24/06	Sun 9/24/06	
8	Delivery	0 days	Sun 9/24/06	Sun 9/24/06	
9					
10	Project Management of Effort	160 days	Mon 9/25/06	Fri 5/4/07	
11	Develop WBS and schedule	1 day	Mon 9/25/06	Mon 9/25/06	
12	Review Project Plan	1 day	Mon 9/25/06	Mon 9/25/06	
13	Modify Project Plan	1 day	Tue 9/26/06	Tue 9/26/06	12
14	Identify Risks	1 day	Wed 9/27/06	Wed 9/27/06	13
15	Develop mitigation plan	1 day	Thu 9/28/06	Thu 9/28/06	14
16	Review mitigation plan	1 day	Fri 9/29/06	Fri 9/29/06	15
17	Monitor Project	160 days	Mon 9/25/06	Fri 5/4/07	
18	Weekly group project meetings	160 days	Mon 9/25/06	Fri 5/4/07	
19	Projects reports	160 days	Mon 9/25/06	Fri 5/4/07	
20					
21	Design	18 days?	Mon 9/25/06	Wed 10/18/06	
22	Financial	4 days	Fri 10/13/06	Wed 10/18/06	
23	Budget assessment	1 day	Fri 10/13/06	Fri 10/13/06	
24	Initial Bill of Materials	1 day	Mon 10/16/08	Mon 10/16/06	23
25	Purchase Orders	1 day	Tue 10/17/06	Tue 10/17/06	24
26	Review	1 day	Wed 10/18/06	Wed 10/18/06	25
27	Product Design	1 day?	Mon 9/25/06	Mon 9/25/06	
28	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
29	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
30	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
31	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
32	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
33	Task	1 day?	Mon 9/25/06	Mon 9/25/06	
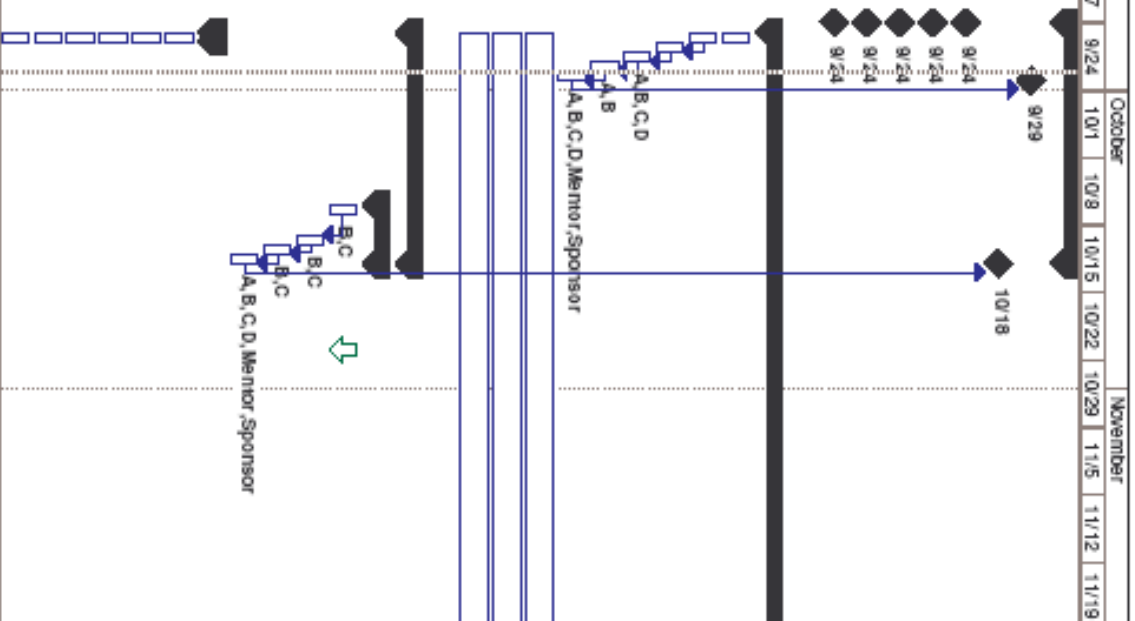
Simple Exercise – Plan a Party

- WBS: Identify the tasks that need to happen.

- Who does these tasks, how long do they take?

- Rough GAANT chart – Oct 1 to Dec 6 (11 weeks)

Webster

Risk n. 1. The chance of injury, damage, or loss: dangerous chance; hazard **2. *Insurance*** a) chance of loss b) degree probability of loss c) amount of possible loss d) person or thing with reference to risk of insuring it **vt. 1**. To expose to the chance of injury, damage, or loss: hazard **2**. To incur the risk of ….
Webster's New World Dictionary, Second College Edition

PMI

Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project . . . . the objectives are to increase the probability and impact of positive events and decrease the probability and impact of events adverse to the project,
A Guide to the PMBOK® Third Edition, page 237

Important Characteristics of Risks

- Probability: 3 = likely, 2=possible, 1=unlikely
  - Will this risk event happen
- Impact: 3=show-stopper, 2=medium, 1=low
  - If this risk does occur, how bad will it affect you?
- Ease of Mitigation: 3=costly, 2=medium, 1=low or none
  - Is it easy to fix or PREVENT

Your goal is risk avoidance – identify the potential risks and address them BEFORE they occur.

Identify them using exercises like brainstorming.

Brainstorm: What could go wrong with the party planning (and party)?

Demonstration – Risk Assessment and Mitigation

UNC Charlotte Senior Design	Project: xxxxxxx		
Risk Analysis and Mitigation Plan	Probability: 3 = likely, 2=possible, 1=unlikely		
2006-xx-xx, Rev A	Impact: 3=show-stopper, 2=medium, 1=low		
	Ease of Mitigation: 3=costly, 2=medium, 1=low or none		

Risk	Prob	Impact	Rank	Mitigation	Ease of mitigation	Cost
			0			0
			0			0
			0			0
			0			0
			0			0
			0			0
			0			0
			0			0
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			0			0

Impact Analysis Report & Checklist for Requirements Changes

Change Request ID: _____

Title: _____

Description: _____

_____

Prepared by/date: _____

Prioritization   Relative Benefit: _____ (1-9)
Estimates: Relative Penalty: _____ (1-9)
                  Relative Cost: _____ (1-9)
                  Relative Risk: _____ (1-9)
                  Calculated Priority: _____ (relative to other pending requirements)

Estimated total effort: _____ labor hours

Estimated lost effort: _____ labor hours (from discarded work)

Estimated schedule impact: _____ days

Additional cost impact: _____ dollars

Quality impact: _____

_____

Other requirements affected: _____

_____

Other tasks affected: _____

Recap and Discussion

Did you include everything in the WBS?

Did the GANTT help you organize everything?

Can you use