# Senior System Design

CpE 190 and EEE 193A

Week 2

# What is a project?

Project – “a temporary endeavor undertaken to produce a unique produce, service, or result.” [1]

Project –by Dr. J.M Juran – “a problem scheduled for solution.” [1]

A project should have:

a definite starting point,

a budget,

a clearly defined scope of work,

specific performance requirements that must be met, and

a definite ending point.

Project Management is the "… application of knowledge, skills, tools and techniques to project activities to achieve project requirements."

Project management is *accomplished* through the application of the following processes:

initiating,

planning,

executing,

monitoring and controlling, and

closing.

The first rule of project management is that the people who must do the work should help plan the work.

The faculty and industrial advisors will assist you in defining the destination, but the student (teammates) are always in the driver's seat.

So who is your project manager?

The course instructor AND the current team leader.

The primary role of the project manager is to manage not do.

The current student team leader manages first, and works only as time permits (and a good team leader makes sure there is time to work).

There are four generally accepted project constraints (PCTS):

Performance,
Cost,
Time,
Scope.

For senior design these mean:

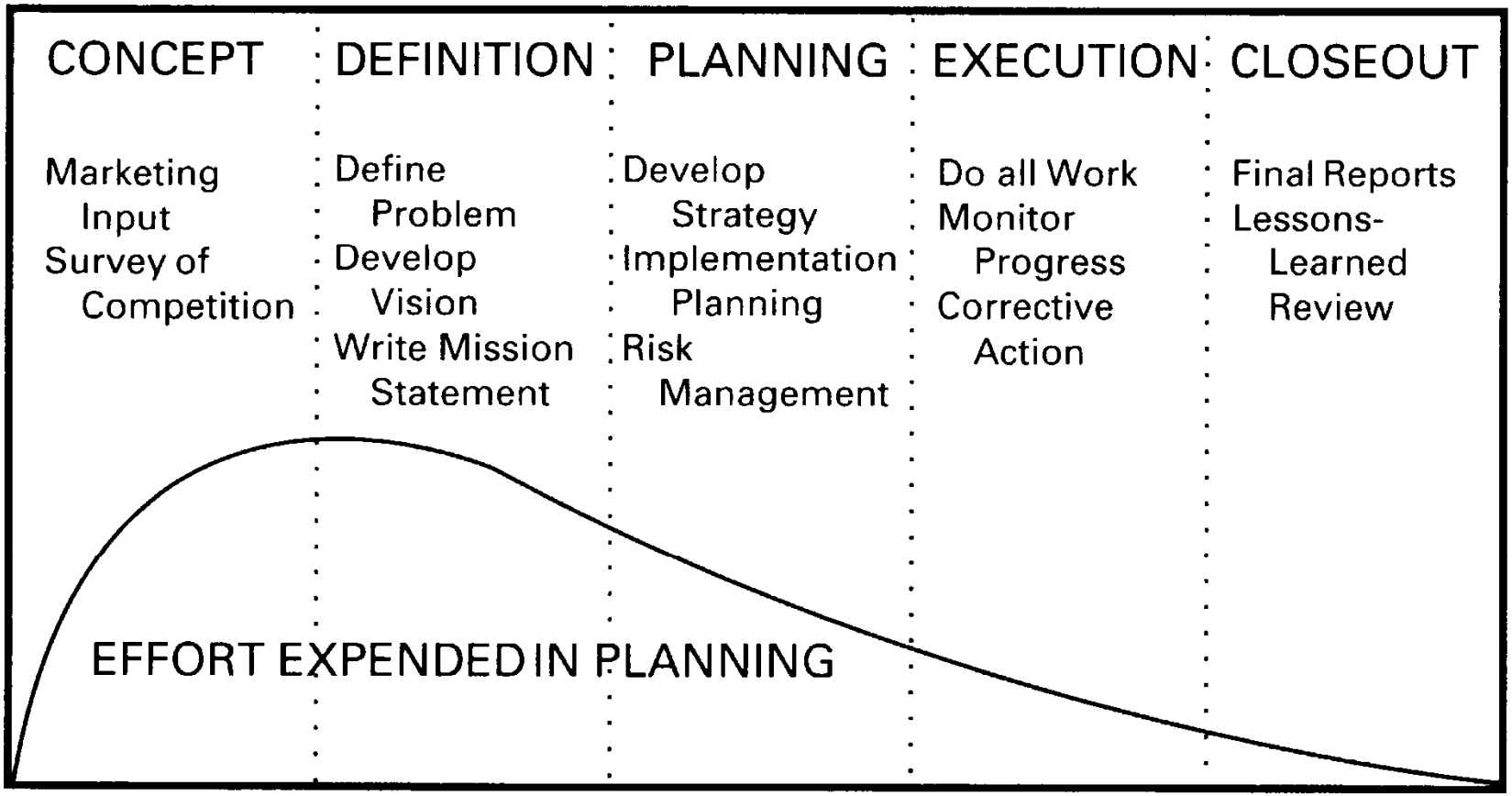
*Performance* – a fuzzy area to be defined, but the project must work;

*Cost* – whatever you can personally afford or talk a sponsor into funding;

*Time* – defined for you - your project ends in early May 2015;

*Scope* – absolutely critical!!!!! Faculty will help you define the scope of your project to reach the “doable” level.

# Project Life Cycle [1]



System Design

Concept – the Societal Problem statement

Definition – the Design Idea Contract

Planning – Work Breakdown Structure and Project Timelines

Execution – the weeks for device construction

Closeout – End of term/project Presentations and Documentation

This is a two semester course and you go through the process twice.

Fall – laboratory prototype

Spring – “rinse and repeat” with deployable prototype

System Design

So you are up to the Definition stage.

Make sure each team member understands the societal problem.

Choose an approachable design concept that answers some portion of the societal problem.

Approachable = performance, cost, time, and scope.

Arrive at a team “buy-in” to the design idea. Some of the details will be filled in later, but general process should be unanimous!

For example - Analog sensors, wireless interface, wired base station, XXX microcontroller, XXX software,  and so on.

Design Idea

Based on your understanding the societal problem you are addressing, state the nature of your design idea.

This design idea statement is fairly specific and will cover the technology employed, the resources needed and your skills applicable to the design.

Design Idea

The design idea is a concept.

Examples of a design idea:

Integrate renewal energy sources and local energy storage in a residential setting.

Wirelessly monitor various life signs in small mammals in the animal’s natural setting.

The design idea is more fully defined by its list of features.

Examples of features:

- measure temperature
- wirelessly communicate measurand
- monitor household energy consumption
- control appliance with regard to grid status
- store building state variables for later trend analysis

Design Idea

You will prepare a written Design Idea Contract.

Design Idea Contract means you are agreeing to supply all of the features listed in your design idea in the form of a deployable prototype in the process of Senior Systems Design.

The contract is reviewed by the instructor and accepted or sent back to the team for amendment with specific reasons why the original was not acceptable.

Once accepted by the instructor, the contract forms the work agreement that you follow in your senior design course in addition to the course assignments.

# Change orders.

Despite your best research and information, you later discover that some portion of the design idea must be amended.

You must submit a change order request to the instructor in writing.

Clearly state why you need to change the design idea.

In the instructor’s sole opinion, you may or may not be granted the permission to change your design idea.

Loss of a team member is NOT grounds for a change in the design idea.

# Written Report Requirements:

Fully discuss your design idea over the September to May project.

Adhere to the IEEE format.

Cover page

- Assignment
- Team member names
- Due date of the assignment
- Instructor’s name and Course Number
- Abstract
- Keyword Index

Introduction

Written Report Requirements:

Main body of the reports with section titles appropriate to your design idea.

Conclusion

References

Appendixes – as needed

Glossary – as needed

Resumes of each team member.
You can leave out addresses or other potentially sensitive information – discuss this with the instructor for clarification.

## Appendixes: continued

Resources you anticipate needing to complete the project – lab space, test equipment, software, or other unusual support. Support is not guaranteed – discuss special support requirements with the instructor.

Budget:

- Estimate of the parts cost of your project
- Estimate of the man hours of your project
- The sources of your project funding

No set report length but typical reports are 10 to 15 pages in length plus references and appendixes.

Design Idea

Oral Presentation of your design idea:

Elevator Pitch - First state your design idea in a manner that anyone can understand in 150 characters or less.  Yes, that is 150 characters and not 150 words.

Introduce all team members.

Next describe your design idea in considerable detail.

- How does your idea address the problem?
- What is unique about your idea?
- What technologies are needed for your design?

Include sufficient information about other approaches to the problem so that you establish why your effort is unique and worthwhile.

Design Idea

First summarize the Design Idea in terms of required features.

Then detail the features one by one:

Hardware

- Specific physical devices if known
- Generic type of devices if specific devices are not yet identified

Software

- Specific software platforms and languages if known
- Generic type of software if specific target not yet identified

Personnel

- Who will be assigned to this feature
- Why will be assigned? Skill set or personal goal.

Completion criteria – how will you know the feature has been properly implemented?

Oral Presentation Requirements:

Finally summarize your project and ask for questions.

Time Limit: 20 minutes

Who talks? All team members – smooth flow between speakers.

Audience handout – one page handout for all lab members.

# REFERENCES

[1] J.P. Lewis, *Fundamentals of Project Management*, 3rd ed., New York, 2007

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