

EE/CprE/SE 491 – Senior Design I and Professionalism

Project Plan

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In preparing for battle I have always found that plans are useless, but planning is indispensable. – Dwight D. Eisenhower

Why Project Planning

- As a team, prepare your work over the next 2 terms by creating a *project plan*:
 - Objectives/deliverables
 - What are your specifications, your goals, and your deliverables
 - Work breakdown structure
 - What and how are you going to achieve this project
 - Who is going to do what
 - Schedule and visualization (e.g. Gantt chart)
- Ultimately, the success of your project must be evaluated based on whether it accomplished what it was supposed to achieve, within its approved schedule /budget

Some Obvious Questions / Concerns

- We do not fully know what to do
 - This is to help you know more and start the process
- We do not have a full commitment from the client on specifications
 - Here is a place that you need to push for
- No matter how we plan we will deviate
 - Yes, but this is the first map, the map will be fixed as you learn, this is the first sketch
- Is this “IT”, the final one?
 - No, this is the first version (week 5), there are 2 more opportunities for improvement (week 10, week 15)

Project Plan: Main Sections

1. Frontal materials
 2. Introductory materials
 3. Proposed approach and statement of work
 4. Estimated resources and project timeline
 5. Closure materials
- These are all required – senior design project documentation is not a great time to showcase your individuality and creativity

Section 1: Frontal Material

- This section consists of up to six components and, as the title indicates, appears at the beginning of the document.
 1. Title page
 2. Table of contents
 3. List of figures
 4. List of tables
 5. List of symbols
 6. List of definitions
- As with textbooks, the pages in this section, with the exception of the title page, shall be numbered in the following form: i, ii, iii, etc.

Section 2: Introductory Material

- This section of the plan sets the stage for the work that is being planned:
 1. Acknowledgement
 2. Problem statement
 3. Operating environment
 4. Intended user(s) and intended use(s)
 5. Assumptions and limitations
 6. Expected end product and other deliverables

Section 2: Introductory Material (cont.)

- **Acknowledgement:**
 - If a client, an organization, or an individual has contributed or will contribute significant assistance in the form of technical advice, equipment, financial aid, etc, an acknowledgement of this contribution shall be included in a separate section of the project plan.
- **Problem Statement (two paragraphs+):**
 - This is included so that the reader will have the correct conception of the problem and the solution approach upfront. Each shall be written in a non-technical manner that a lay person would understand.
 - Consists of two components, each separated and clearly identified:
 - General problem statement – defines the general problem area
 - General solution approach – defines the proposed solution approach

Section 2: Introductory Material (cont.)

- **Operating Environment (one paragraph+):**
 - For any end product other than simply a calculation or simulation, it is essential to know the environment in which the end product will be used or to which it is expected to be exposed or experience. For example, will the end product be exposed to dusty conditions, extreme temperatures, or rain or other weather elements?
 - This information is necessary in order to design an end product that can withstand the hazards that it is expected to encounter.
- **Intended User(s) and Intended Use(s) (two paragraphs+)**
 - To properly design an end product that will provide the maximum satisfaction and perform in the most efficient manner, it is essential to understand the end user and the associated end uses.

Section 2: Introductory Material (cont.)

- **Assumptions and Limitations:**
 - Two separate lists, with a short justification as needed.
 - Extremely important, as it can be one of the primary places where the client can go to determine if the end product will meet their needs.
 - Examples of assumptions: The maximum number of simultaneous users/customers will be ten; Blue is the best background color and will be used; The end product will not be used outside the United States.
 - Example of limitations: The end product shall be no larger than 5"x8"x3" (client requirement); The cost to produce the end product shall not exceed one hundred dollars (a market survey result); The system must operate at 120 or 220 volts and 50 or 60 Hertz (the most common household voltages worldwide).
 - For limitations, include tests not performed, classes of users not included, budget/schedule limitations, geographical constraints, etc.

Section 2: Introductory Material (cont.)

- **Expected End Product and Other Deliverables:**
 - List the end product and any other items, along with a brief description, that will be delivered to the client prior to the end of the project.
 - If the end product is to be commercialized, the description shall be of the commercialized end product.
 - It shall be in the form of a technical product announcement, as opposed to a product advertisement, and shall not include a list of technical specifications.
 - Any other items that will be delivered to the client shall also be included and described unless their definition and description are obvious.
 - Examples might include a household power supply to eliminate the need for batteries, a user's manual, or other project reports.
 - There shall be at least a one-paragraph description for each item to be delivered.
 - Delivery dates shall also be specified.

Section 2: Introductory Material (cont.)

- Related work / market survey / literature review:
 - Include relevant background/literature review for the project
 - If similar products exist in the market, describe what has already been done
 - If you are following previous work, cite that and discuss the advantages/shortcomings
 - Note that while you are not expected to “compete” with other existing products / research groups, you should be able to differentiate your project from what is available

Section 3a: Proposed Approach

- The approach subsection shall include the following components as relevant to your project, as a list with each item accompanied by a brief description:
 1. Functional requirements (required)
 2. Constraints considerations (required)
 3. Technology considerations (required)
 4. Technical approach considerations
 5. Testing requirements considerations
 6. Security considerations
 7. Safety considerations (required)
 8. Previous work / literature review (required)
 9. Possible risks and risk management (required)
 10. Project proposed milestones and evaluation criteria (required)
 11. Project tracking procedures (required)
- Include a concept sketch or system block diagram in this section, and refer to it as needed

Section 3b: Statement of Work

- Depending on the type of project, the resultant end product can vary significantly:
 - An actual hardware/software product
 - The design of a product
 - A process to accomplish something
 - A service to be performed
 - A simulation or a set of calculations
 - Some combination of the above
- For the statement of work, number and describe for each task to be completed, 1) the objective of the task, 2) the task approach, and 3) the expected results

Section 4a: Estimated Resources

- Three separate components make up the estimated resource requirements; these include: (1) personnel effort requirements, (2) other resource requirements, and (3) financial requirements.
 1. Include a detailed estimate in the form of a table accompanied by a textual reference and explanation. This estimate shall be done on a task-by-task basis and should be based on the projected effort required to perform the task correctly and not just “X” hours per week for the number of weeks that the task is active
 2. Identify the other resources aside from financial, such as parts and materials that are required to conduct the project.
 3. If relevant, include the total financial resources required to conduct the project.

Section 4b: Project Timeline

- A realistic, well-planned schedule is an essential component of every well-planned project
- Most scheduling errors occur as the result of either not properly identifying all of the necessary activities (tasks and/or subtasks) or not properly estimating the amount of effort required to correctly complete the activity
- A detailed schedule is needed as a part of the plan:
 - Start with a Gantt chart showing the tasks and associated subtasks versus the proposed project calendar. The Gantt chart shall be referenced and summarized in the text.
 - Annotate the Gantt chart with when each project deliverable will be delivered
- Completely compatible with a Agile development cycle if that's your thing

Section 5: Closure Materials

- **Closing Summary:**
 - This component should leave the audience with the belief that the project is important and that the project team's proposed approach will solve the problem satisfactorily.
 - One way to accomplish this is to briefly summarize the problem, the proposed approach, and the anticipated solution. Like the rest of the project plan, the closing summary should be well and tightly written.
- **References**
 - This component shall completely identify any material taken from other sources and used in the development of the project to date or are known that will be used during the remainder of the actual project
 - These references shall be complete so that any member of the plan's audience could find them
- **Appendices**
 - Any additional information that would be helpful to the evaluation of the project plan or should be a part of the project record shall be included in the form of appendices
 - Examples of project documentation that might be included are property plat layouts or microprocessor specification sheets germane to the proposed project.

Getting Started

1. Don't stress out! You have time to revise / iterate / improve
2. Work as a TEAM, and coordinate as needed
3. Work with your advisor and client (although they may not know the requirements of the project planning document, they should understand the requirements of the project)
4. Look at previous projects, as well as the grading rubric

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