IE 477 – IE 478 Systems Design

Suggested Contents for the Project Proposal Report

Last Revised on October 15, 2023

The project proposal report is the first report you will submit as a part of your project. Although it is the first report, extra care must be given as this report will not only determine the outline and the roadmap of your project but also will be the basis of the reports that will follow it. The role of this report was specified in the lecture conducted in the beginning of the semester. If you feel you need a refresher, you can watch the video again on the course website.

Please follow the instructions described in the document titled ***Report Format*** while preparing your report. **Make sure that neither the format information nor the below description affects the way that you select the section titles that you use in your text. We expect you to select those to reflect your project work rather than being generic.**

The project proposal report is expected to include the following information - here presented in mainly seven sections for convenience:

1. **Description of the System:** Provide some general information about the company and describe its current operations (services, manufacturing processes). Try to give numeric information as much as possible to understand the position in the sector, span of products and services, number of employees, markets, etc. whatever you find relevant. The information in the company web page is not what we ask for, as you can always give a reference to that page without much mention. Any relevant information that will support your problem definition is reasonable to be included in this section.

2. **Current System Analysis and Problem Definition:** This section is primarily composed of analysis of the current system and the problem definition.

   A. You need to **analyze the current system:** The purpose of this subsection is to confirm that the symptoms and the complaints heard from the company actually lead to the problem considered. Provide a detailed description of the current operations related to your problem. Make data analysis to support the symptoms and complaints. Use numerical information as much as possible, along with charts if needed to help the reader to appreciate the size and scope of the problem. You may not want to limit yourself to analyze only the part of the system you are asked to be responsible as you may go beyond that to understand where your problem is in the big picture.

   B. You are expected to **state the problem and its scope:** The problem definition may be similar to what was stated to you in project description, but of course in a more elaborate and mature way, using IE jargon and being relatively much more precise. This subsection is expected to be a natural consequence of your discussion in Subsection A.

3. **Review of Resources:** In this section, we usually consider the review of the relevant literature, as well as set(s) of information, which will be possibly needed to carry out the study. At this point, we do not expect a thorough literature review to be completed; however, knowledge and relevance of some basic material pertinent to possible aspects of the problem statement should be presented.
   A. Relevant Work in the Literature: Basic material may include textbooks and reference books of the courses you took (or currently taking), other similar books you can find in the library and some basic papers on the topic. Other additional resources can be a tool you may need to learn for your project,

information you may find from publicly available data or anything you consider as relevant for the project. Make sure you correctly cite the resources you utilize and have them in the References.

B. **Engineering Standards and Regulations:** Your solution strategy should conform to any relevant engineering standards or regulations that the company must follow. Hence, you should review all relevant engineering standards (like TSE or ISO) that are applicable to the scope of your project with your industrial advisor. *Some examples to these standards can be CDL driving time requirements for logistics distribution via trucks, maximum weight and dimension requirements for pallet packing.*

4. **Proposed Solution Strategy:** This section should contain your contributions to tackle the problem you defined in Section 2. As you work on your project in the rest of the semester, this section will be extended to contain more details. Below are the items you should consider in this report.
   A. **Critical Assumptions**: You may not be able to model the entire system, so your solution approach may consider a subset of the real system. While doing this, what critical assumptions do you have to make? *Some examples: no lost customers when there is shortage in inventory, forklift operators know the shortest path to reach between two points in the warehouse…*
   B. **Major Constraints:** Your critical assumptions will impose certain constraints on your model. However, there could be other major constraints that are imposed via:
      i. **Company Regulations or Restrictions:** Company may have certain constraints that are unchangeable. *Some examples: there are only two types of busses with capacities 23 and 57 that could be considered in the methodology, the maximum work in process inventory between the consecutive stations is four units due to space limitations…*
      ii. **Relevant Engineering Standards:** State any constraints imposed with any engineering standards applicable to your project discussed in Section 3.B.
   C. **Objectives:** What will be achieved as a result of your project? Are you going to minimize costs, increase forecast accuracy, reduce inventory levels, improve vehicle utilization...etc? Which one/ones could be **critical objective(s)**? Note that these objectives are expected to be quantifiable and are functions of "decisions" which you are considering obtaining values for in your proposed solution strategy.
   D. **Solution Approach:** How are you planning to achieve your objectives? What are you going to use - a linear programming model, a forecasting model, an inventory model, a heuristic algorithm, or any other mathematical model depending on the requirements of the problem you defined - to satisfy the expectations of the company?

5. **Outcome and Deliverables:** This section should contain the outputs of your contributions.
   A. **Outcome:** Your solution approach should produce an output that the company can use to achieve the objectives. This could be a production plan at a given time, series of productions plans over a given time horizon, an inventory policy, vehicle routes…etc. depending on your problem.
   B. **Deliverables:** The company will be able to seamlessly implement your solution approach. Depending on your problem, this could be done periodically or whenever required. You need to provide the company a tool to interact with your solution approach. This is generally a standalone decision support system that will ask for input(s), run your approach and provide the user the output. Along with this decision support system you should also provide a User Manual and any other tool/document that will complement your main deliverable.
   C. **Benefits to the Company:** When the company uses your solution approach utilizing your deliverable(s), what benefits are expected to be realized as compared to their current ways of doing it? Is there a target improvement level to be achieved? How will this project eliminate the problems in the current system? This should be in line with the objectives you defined. However, you should also elaborate on the cases when the critical assumptions are not met. Also note that you may want to show these benefits for more than a few possible future scenarios.

6. **Project Plan and Work Package Assignments**: Your project should always have a plan with timing that all the stakeholders would understand and agree on. The plan is expected to be less detailed in the beginning, and as you proceed we think the detail level is going to increase as an indication of your enhanced understanding and intention on what and how to do certain aspects of the project. Specifically, we would like you to state the work packages you are intending to have, an assignment of a responsible person or people to each work package, and finally a timetable indicating how and when each work package is expected to be completed. Consider the deadlines provided in the course syllabus and the deadlines of the second semester provided in the first presentation as a guide to determine the stages that are expected to be completed in your project. Remember that you are a group of 6 or 7 students. The work package assignments should be made in such a way that will allow for parallel tasks to be handled simultaneously by different members, as well as sufficient time and resources to bring these parallel tasks to a common consistent ground for the project.

7. **References:** This section should contain a list of references that you cited throughout your report.