



Spring 2004

Systems Problem 1 System Requirements & Teamwork

Handed out:	Thursday, February 5, 2004
Answers due:	Friday, February 13 2004, 5:00 p.m.

Learning Objectives

At the end of this systems problem you should be able to:

- Synthesize system functional requirements utilizing available resources
- Articulate system functional requirements
- Articulate system development resources and constraints
- Organize system functional requirements in a systematic manner that will facilitate system development and analysis
- Develop and document design ideas that are intended to achieve functional requirements
- Articulate your sentiments on teamwork in a concise and focused memo

Discussion

You are being charged with the task of developing a *system* that will participate in an aerial competition in late April 2004. At the competition you will have at your disposal a team of five (5) personnel, a radio controlled model aircraft, and associated equipment. You will be given a baseline aircraft at the beginning of the semester. During the semester you have the opportunity to modify the aircraft and design and optimize a *system* that will win the competition. You will be assigned to a team of five (5) individuals, and four (4) hours per week per team member has been allotted to activities related to this project. Various materials and resources will be made available to you to help you organize and manage your project, and to help you develop, analyze, and optimize your winning system.

At competition day your system must do the following: Take off carrying no payload and fly two (2) laps of a closed indoor circuit for speed. Land and load one (1) to four (4) eggs, which we will give you, as a payload. Then takeoff with the egg payload and fly for endurance (maximum time aloft) in any manner you wish within the indoor track and land. You will be judged on your time to complete empty and loaded parts of the competition. You will be judged on the amount

of time it takes to load your payload. Shorter times to complete the empty laps are better. Greater amounts of time in the air are better for the laps with the egg payload. And your time in the air with payload is multiplied by a factor proportional to the number of eggs that you carry. Shorter amounts of time loading the egg payload are better. Crack or break the egg handling, loading, or landing, and you are eliminated from the competition.

The approximate dimensions of the rectangular boundary of the indoor circuit are 185'x95'. Your system must be designed with the possibility that the competition may eventually take place outdoors.

Good system design and development begins with a thorough understanding of system functional requirements. This is an exercise in understanding and articulating customer needs and specifying *what* needs to be accomplished. After *what* needs to be accomplished has been established then *design* and analysis lead to the development of a *system* (hardware, software, people, and procedures) that determines *how* customer needs are met and functional requirements are achieved.

Good project resource and risk management leads to the *timely* development and delivery of the system. A thorough understanding of available resources and constraints will aid in both the development and timely delivery of the system.

Your assignment in this system problem is to start doing excellent system design and development. You are to use available resources to assess and synthesize system functional requirements for the aerial competition. Then you are to articulate and document these functional requirements in a brief system requirements document. You are also asked to document system resources and constraints. Next, you are asked to organize the system functional requirements in a manner that will facilitate design and analysis of your system, and management of your project. Finally, you are asked to develop a preliminary strategy and preliminary design ideas that realize your system requirements.

Teams develop systems. Well functioning teams can efficiently and effectively conceive, design, implement and operate (CDIO) systems with minimal interpersonal drama. A shared understanding of expectations can facilitate high performance in teams. The ability to effectively communicate expectations is paramount. You are also tasked in this assignment with drafting a one (1) page memo capturing the essence of your expectations of the assigned task and team processes. An expert in teamwork is working with us this term to provide a teamwork diagnostic to the class. Be prepared to complete an anonymous online survey this week if assigned.

This is an individual assignment. This is also an important assignment, as you will be sharing your work with your other team members when you first meet and begin to develop strategies for your aerial competition system and develop strategies for working well in a group.

Assignment

1. Utilize available resources to assess and synthesize the aerial competition system's functional requirements. Then write a brief systems requirement document for the aerial competition

system in the format shown in Charlie Boppe's "Satellite Sensor System Requirements" document.

2. Make a preliminary list of resources (time, material, people) and constraints (time, material, people) for the development of your system based on information in available resources. Use your list to add two sections to your system requirements document: 4.0 Resources, 5.0 Constraints
3. Document your system requirements using Prof Slocum's FRDIARRC table.
4. Develop at least one detailed strategy, and translate your strategy into design ideas (DI) in your FRDIARRC table.
5. At a minimum complete the Analysis and References columns for your functional requirements and design ideas.
6. First read J Craig's notes on composing a memo, then follow the instructions in J Craig's teamwork assessment memo and compose a one page memo capturing the essence of your project and team expectations.
7. If assigned this week, please complete by Internet the first of about four anonymous (4) planned teamwork diagnostics being provided to the class.

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Name	Time Spent