Proposing a Design Strategy

Mary Caulfield

Lecturer-Writing Across the Curriculum

March 19, 2010

Agenda

Techniques for **starting** the proposal

Using the proposal's **structure** to document and manage your design process

How the parts of the proposal **inform** your reader

The Grand Challenge marks a move from instructor-led tasks to team work on complex, **interdependent** systems.

Team members are now challenged to think as **designers** and **innovators**.

Design is a process fraught with **uncertainties**

Devise a strategy for **solving** problems as they emerge and for providing **specific detail** about systems under development

Use the proposal as a **tool** for documenting the design strategy, allocating **tasks** to team members, and holding the team **accountable** for producing deliverables

Readers want **specific** reasons to **trust** your design strategy

As stakes become higher

...for instance, when **money** is involved...

the need for **clear plans** becomes even more urgent

Writing the proposal helps **articulate** the system requirements and your team's assumptions

What are the **criteria** for a successful robot?

What are the design **constraints**?

To get **started**, try working on your paper from the **inside** out…

To form the **core** of your proposal, list and explain the design details

Hardware plan and rationale

Control architecture and rationale

Necessary algorithms and rationale

Software plan and rationale

Integrate words and pictures

Design graphics to inform the reader

Label graphics clearly and correctly

Refer to the graphic and discuss/interpret it in text

Figure 3: Proposed finite state machine diagram for robot.

Map out timelines and schedules for deliverables
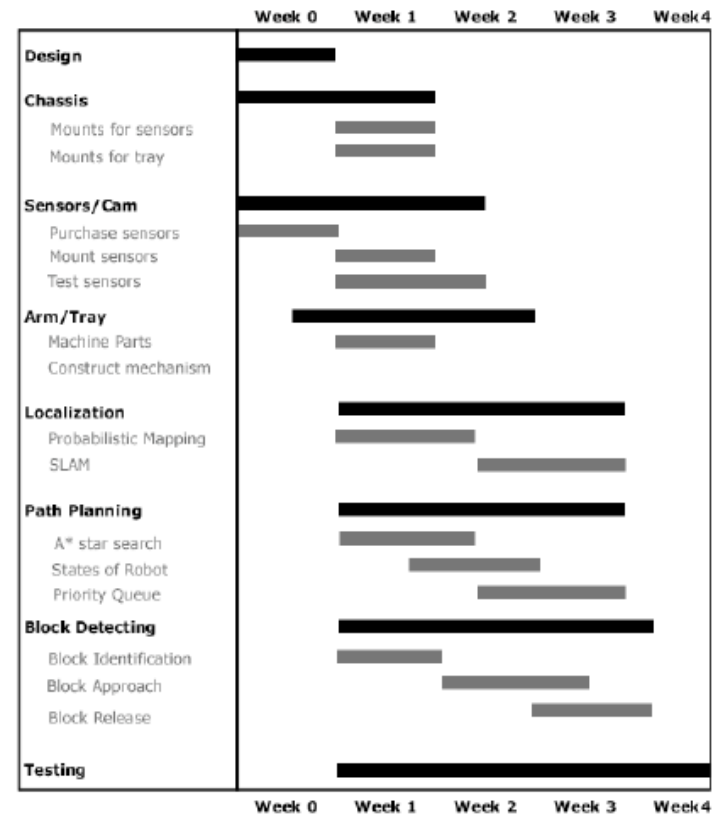
Fabrication

Testing

Redesign

Final implementation

Fig 10 – A chart showing the development plan for the task

The proposal's **structure** gives the team a way to organize a **wealth** of detail

Introduction gives overview of strategy and explains how requirements will be met

Context of challenge

Motivation

High level overview of the proposed
   design

The design description in the **body** of your proposal is organized into **systems** and **subsystems**

Use informative subheadings for details

Organize information under subheadings

Read the sections your teammates write

Risks and assumptions

Are there particular risks to your design strategy?

What assumptions are reasonable, given your design constraints?

The conclusion summarizes strategy, tradeoffs, and open issues

How does the design fulfill requirements?

What are the principal tradeoffs?

How are the tradeoffs justified?

What issues need to be resolved?

Documenting a design strategy makes it **concrete**

Share and discuss inspirations, points of view, and assumptions

Compare the **sections** of the report for redundant information, gaps, or contradictions
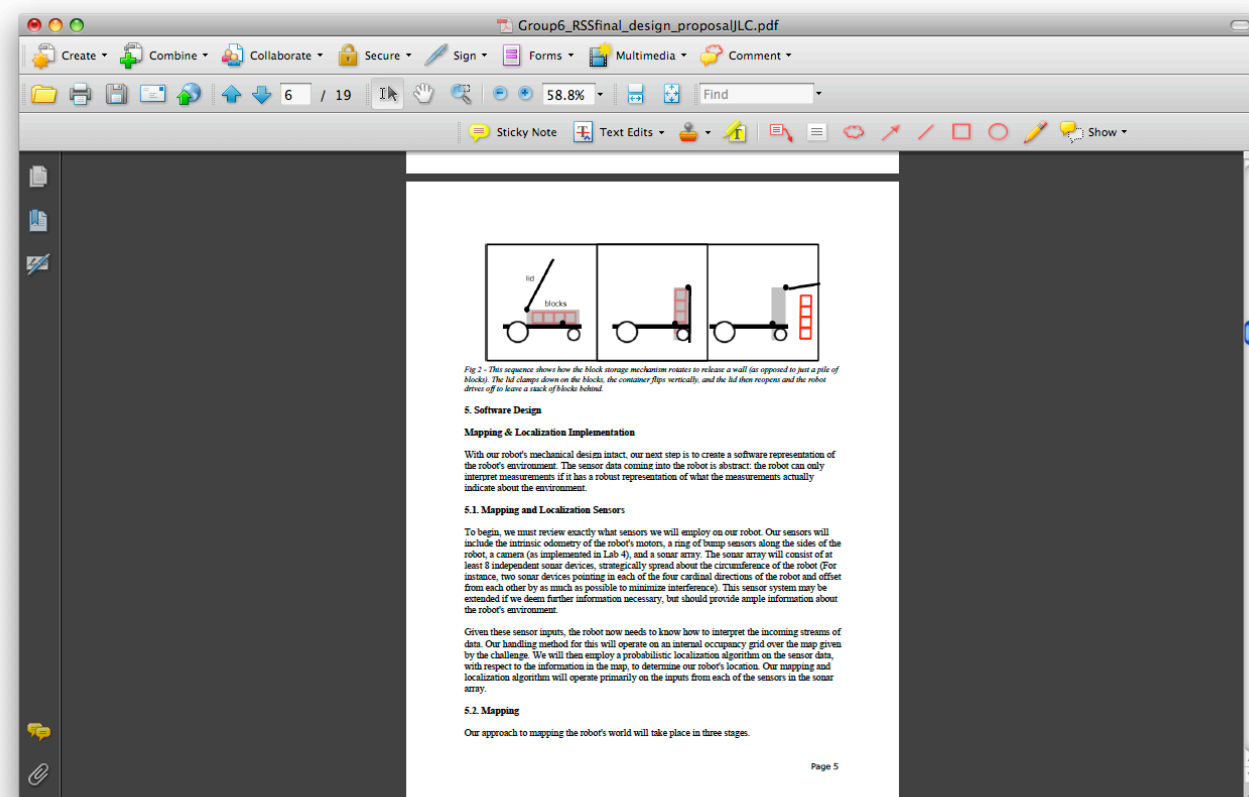
Help each other craft **transitions** and **connections** between ideas

The **process** of organizing the proposal and making the parts work together identifies gaps in the **team's knowledge**

Listing **open issues** gives the team a to-do list and milestones for the next stage of development

Design the document for legibility and easy reference

User interface items

Include a **table of contents**, properly formatted

Make sure **headings** convey **useful** information

Number the **pages** of the proposal

Include team members' names on the **title page**

Create a list of **open issues** and keep it updated

Areas of uncertainty

Questions for further research

Incompatibilities

Innovation forces teams to explore unknown and uncertain territory

Documenting the design strategy helps to structure the work and articulate goals

A well-crafted design proposal is useful for managers and investors – and for the development team

Proposals establish strategy, give a team its common language, and are updated throughout the cycle of development

Acknowledgements

Jennifer Craig and Jane Connor for help in planning this talk

The 2009 students who let me use graphics from their proposals, especially Kim Jackson and Evan Iwerks

Professor Teller and Professor O'Reilly for the use of the hall