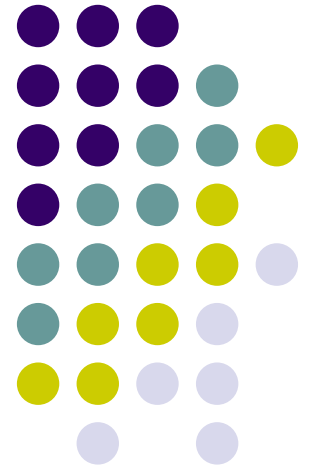


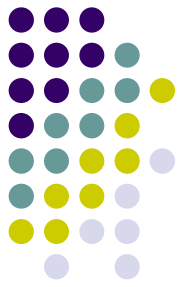
# How to Write Short Reports and Proposals

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*February 6, 2004*  
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# Overview:

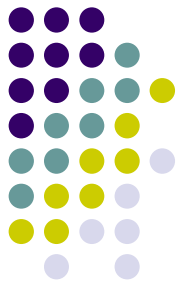
## Short Reports & Proposals

What are they?

Why write them?

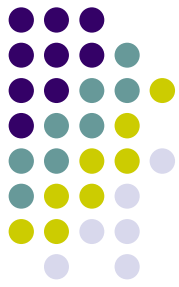
How do you write them?

- Process Tips
- Tips on how to make them better



# What are short reports & proposals?

- Professional “real world” communication
  - Efficient
  - Action-oriented writing
- **Persuasive:**
  - Focused arguments to “sell” your ideas
    - Through your expertise
    - Through your novel approach
    - Through meaningful evidence



# Why write short reports & proposals?

## Writer (You):

- Teaches you to write concisely
- Helps you plan your project
- Provides a record of your work

## Reader:

- Efficient means to assess your work
- Project planning: Allocation of resources

# How do you write short reports & proposals?



## Steps in the research/writing process:

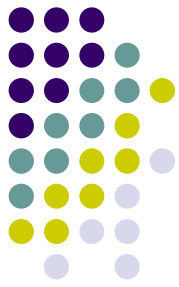
1. Review the assignment
2. Read assigned readings or background materials
3. Brainstorm
4. Construct a coherent focus
5. Organize & develop ideas with evidence
6. Revise for completeness & organization
7. Edit—lean, readable prose
8. Print and proofread

# Step 1: Review the Assignment



- What does it want you to do?
- Identify topic and scope
- Identify key words
  - Discuss
  - Explain
  - Summarize
  - Analyze
  - Compare

# This Week's Assignment



“The design of the Therac-25 system was reviewed at many different times by many different individuals and organizations. Engineers and management at Atomic Energy of Canada Limited must have reviewed the initial design. Regulators at both the Food and Drug Administration and the Health Protection Branch of Canada reviewed AECL’s application to the market the machine as a medical device. Medical facilities evaluated the machine before purchasing it. And when problems started appearing, AECL hired outside consultants to perform a safety review. Yet many problems remained undiscovered even after patients were seriously injured. Choose the vantage point of an individual or organization and discuss a warning sign that was missed. Discuss how this warning was indicative of one or more design flaws; explain these flaws and how they should have been addressed. Leveson and Turner assert that it is not possible to make a system safe by focusing on particular bugs, and that critical flaws may exist in software that has been used for years without incident. Do you agree? If so, then how can safety-critical software ever be created?”

# Break down to the question



“ . . . Choose the vantage point of an individual or organization and discuss a warning sign that was missed. Discuss how this warning was indicative of one or more design flaws; explain these flaws and how they should have been addressed. Leveson and Turner assert that it is not possible to make a system safe by focusing on particular bugs, and that critical flaws may exist in software that has been used for years without incident. Do you agree? If so, then how can safety-critical software ever be created?”



# Break down the question: What should you do?



## Vantage point : individual or organization

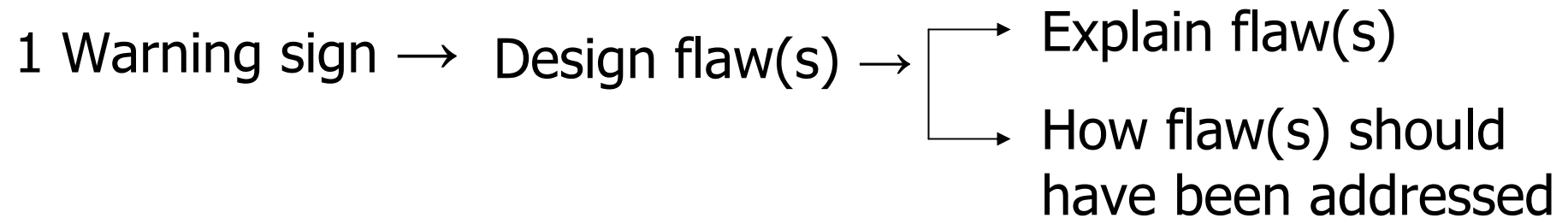
1. Discuss a warning sign that was missed.
2. Discuss how this warning was indicative of one or more design flaws;
3. Explain these flaws, and
4. How they should have been addressed.
5. “. . . it is not possible to make a system safe by focusing on particular bugs, and that critical flaws may exist in software that has been used for years without incident.”
  - a. Do you agree?
  - b. If so, then how can safety-critical software ever be created?”

# Identify **key words**, **scope**



1. Discuss a warning sign that was missed.
2. Discuss how this warning was indicative of one or more design flaws;
3. Explain these flaws, and
4. [Explain] How they should have been addressed.
5. “. . . it is not possible to make a system safe by focusing on particular bugs, and that critical flaws may exist in software that has been used for years without incident.”
  - a. Do you agree? [yes/no] [Why?]
  - b. If so [yes], then how can safety-critical software ever be created?”

Vantage point : individual or organization



Always flaws in safety critical software? [y/n]

↓  
If [y], how can safety-critical software be created?

# Step 2: Review Background Material

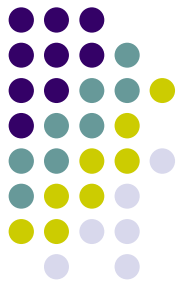


## “Mine” material:

- Technical readers read for content
- Efficient reading:
  - Summarize – What, Why, How
  - Use sidebars and figures
- How can you use this material?
  - Make a note and/or cite

## Step 3: Brainstorm

## Step 4: Construct a coherent focus

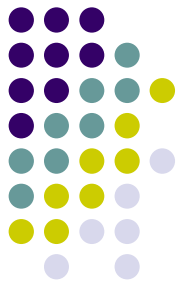


### Brainstorm

- Outline, web, random notes
- Think of more possibilities than you will use
- Consider rebuttals & problems

### Construct a coherent focus

- Distill your main plan into a single sentence
- Organize supporting ideas around that focus into a series of supporting claims



# Step 5: Organize & develop evidence

## Organize into large units

**P1:** Warning sign pointed to design flaw(s)

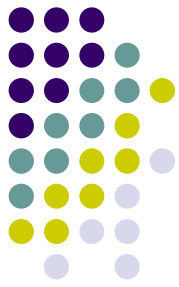
**P2 (+ P3):** Explain design flaw(s) and how should have been addressed

**P4:** Larger question about safety-critical software

## Develop

- Move between generalizations and examples
- Concrete, compelling evidence
- Simple language
- Don't forget "So what?"

# Example: Developing evidence to support a claim



**Topic sentence:  
Claim**



Hardware, on the other hand, can be equally as unreliable as software. Unlike software, hardware is susceptible to errors caused by repeated use. Over

**Backing: Why?**

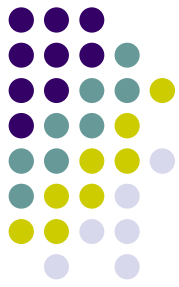


time, hardware components have a tendency to degrade and fail, and the consequences of these hardware failures can be as serious as software problems. The key to ensuring safety, therefore, lies in redundancy. . . .

**Example**



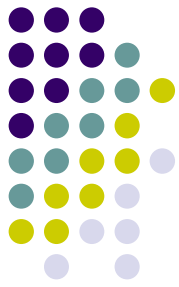
An example of this type of redundant setup can be found in the Therac-20 system. An analysis of the Therac-20 system showed that . . .



# Step 6: Revise for Completeness & Organization

1. Do you answer all of the question?
2. Do you have a focus?
3. Do you have appropriate examples?
4. Is each example sufficient evidence?
5. (Are counter-arguments considered?)
6. Do the sections link logically?
  - Are there clear connections across paragraphs?
  - Is there a cause-effect relationship?





# Step 7: Edit for lean, readable prose

- **Delete “empty” introductions**

“Very important lessons may be learned from the Therac-25 accidents.”

- **Delete fluff**

“Some of the most widely cited software-related accidents in safety-critical systems involved a computerized radiation therapy machine called the Therac-25.”

- **Avoid argument via restatement**

“The primary reason that Therac-20 killed fewer people than Therac-25 was that Therac-20 had hardware interlocks. These hardware interlocks were not on Therac-25. Hardware interlocks made Therac-20 safer.”

- **Eliminate slang and jargon**

“They fried people.”

- **WEAK**

**Significant are** the Therac accidents.

The reason that the Therac-25 failed **is because** it did not have hardware interlocks

Programmers often view code reuse as an excuse to avoid testing and documenting particular parts of a system. **This** can allow minor bugs to go undetected.

- **BETTER**

The Therac accidents are significant.

The Therac-25 failed because it did not have hardware interlocks.

Programmers often view code reuse as an excuse to avoid testing and documenting particular parts of a system. **This improper reuse** can allow minor bugs to go undetected.



- **WEAK**

The errors were not documented. (*Passive*)

I think that this design is problematic. I think they could have improved the system by . . .

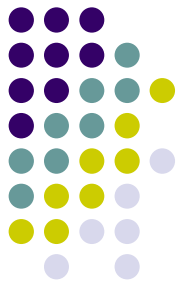
The software of the Therac-25 was developed in PDP 11 assembly language by a single person.

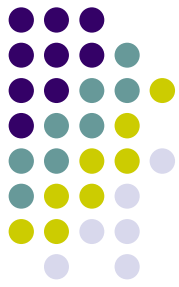
- **BETTER**

The engineers failed to document the errors. (*Active*)

The engineers could have improved the design by . . .

The Therac-25 software was developed by a single person, using PDP 11 assembly language.





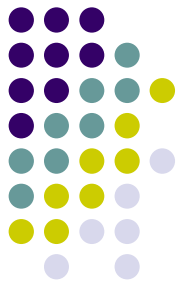
## Step 8: Print and Proofread

- Printed copies are more accurate for proofreading
- Check for page break errors
- Check figures (if included). Do all elements print?
- Proofread document in reverse
- Check for typos that spell-check will not find  
“Teach” spell-check



# Format

- Word processed
- 2 copies
- Your name, the name of your recitation instructor, & your section meeting time at the top of the page.
- 11 or 12 point font
- Enough leading (vertical space between lines) so that graders can make comments.
- Check page length requirements
- Do you need to cite sources?



# Writing Help

- Model papers on 6.033 website
- Writing Center  
[web.mit.edu/writing](http://web.mit.edu/writing)
- Writing practica
- *Mayfield Handbook of Technical and Scientific Writing*
- 6.033 Writing Program contact:  
Mya Poe ([myapoe@mit.edu](mailto:myapoe@mit.edu))