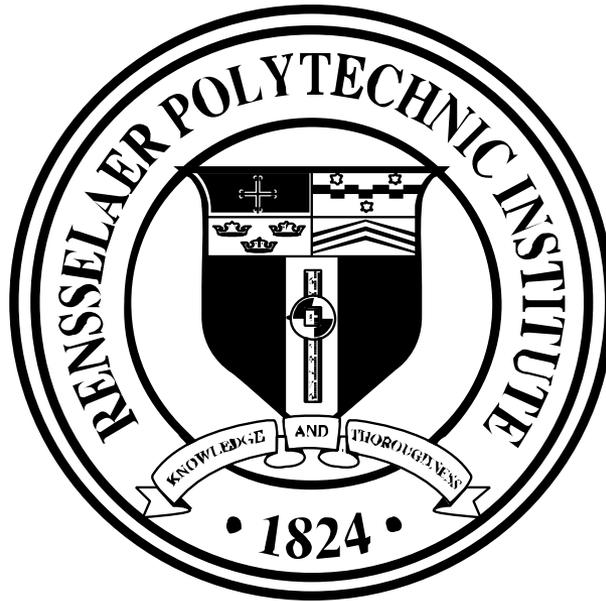# Technical Writing

Jeff Morris, Ph.D.

CORE Engineering

Outline

1. Purpose of Technical Writing

2. Checklist for Effective Technical Writing
   - A. Context
   - B. Organization
   - C. Content
   - D. Editing

iClicker

I would rate my writing skills against my peers:

A. Elite (Top 1%)

B. Better Than Average (Top 30%)

C. Average (Middle 30%)

D. Lower 30%

E. If it's over 160 characters, don't ask me to write

F. I can read

Who's the Best?

- MacFarlane Prize
  - Established in 1924.
  - Awarded to the student(s) who best demonstrate(s) the visualization and documentation of a design.
- Exclusive to IED teams.
- Next award in May 2014 (both semesters).
- Past winner provided report:
  - LMS > Technical Writing Resources

Two general purposes for technical writing:

1. **To provide the reader with factual information**
   - Technical Reports, Service Instructions, System Descriptions
   - Remain as concise as possible, but explain ideas in enough detail to make it understandable to your audience.
   - For each new piece of information tie it in to knowledge the audience already has.

2. **To convince the reader to draw the desired conclusions from the provided information**
   - Proposals, Recommendations
   - Remain objective, logical and provide rational evidence to back up assertions.
   - Answer the question "Why?" "Why is this important?" "Why is this beneficial?" "Why is this a problem?"

iClicker Moment

In a technical report, it is okay to write the information so that the reader can interpret it based on their own perspective.

A. True

B. False

Context

Your goal is to ensure that the ideas you have when writing are the same ideas that your reader has when reading.

Who will read your writing?
What do they already know about your subject?
What do they need to know about your subject?
What relationship exists between you and the reader?

Leave nothing open to interpretation:
This is not poetry

Organization

- One of the surest ways to confuse a reader is to have a poor organizational scheme

- Choose the organizational method based on the document being written and the information going into it

Chronological

- Usually used in describing processes or giving instructions.

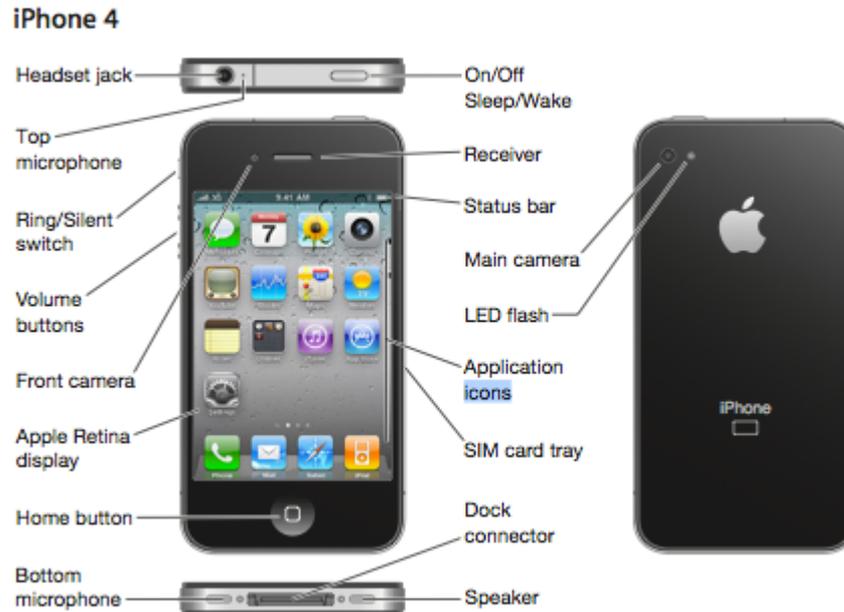© Summit Entertainment 2000

Inductive

- Starts with the smaller ideas and build the larger ideas out of these smaller ones.

© CBS Productions, 2002

Deductive

- Starts with the larger ideas and break them down into smaller parts [4].

Organization

(A)

- Pattern 1
  - Motor A
    - Price
    - Performance
    - Lead-Time
  - Motor B
    - Price
    - Performance
    - Lead-Time
  - Motor C
    - Price
    - Performance
    - Lead-Time

(B)

- Pattern 2
  - Price
    - Motor A
    - Motor B
    - Motor C
  - Performance
    - Motor A
    - Motor B
    - Motor C
  - Lead-Time
    - Motor A
    - Motor B
    - Motor C

No Blogging

"The wheels were glued on to the PVC followed by a cut a across the threaded rod, and then we searched for a drill…"

© Twentieth Century Fox Film Corporation, 2000

"The team stayed up all night and worked real hard..."

- Construction/Assembly process
  - o Appendix **AT BEST**

Introduction

- Do not start describing the design

- Purpose
  - Why are you writing? Be Concise. Be Powerful.

- Background/Problem
  - More detailed.
  - Identify the Expected Benefits from Your Proposed Approach

An iClicker for your thoughts…

Which of these methods is preferred in IED?

A. Deductive

B. Inductive

C. Chronological

Content

- Back up assertions and use logical reasoning

  "The types of blade designs considered for the wind turbine system were the PVC pipe and the airfoil design. The PVC pipe would cost less and be easier to construct, however this material is heavy."

- Check your facts first!

Vagueness

- Need specifics *"support load"* - what type of loading (point/distributed), how much force?

- how will you know what is too much or too little?
  - Is *"until it breaks or cracks"* acceptable?
  - *"fast"* - mph?

- Which is it?

  fast-sailing ship OR fast sailing ship

  (any ship)　　　　(particular)

Signposts: Labels & Headings

Use Headings/Sections to break up paper. These are not chapters for your Novel (see Fig. 1).

- **Label**
  - Tables
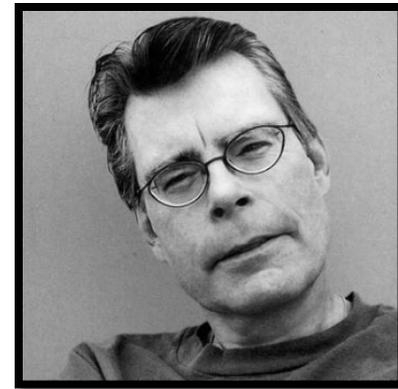 - Diagrams
  - Figures
  - REFER to them in the body of text.

Fig. 1: Master of Horror Novels [5]

Diagrams

- Save words, save boredom

- Avoid wrapping text around figures like this, as it usually creates a formatting and reading nightmare.


© Twentieth Century Fox Television, 1994

Diagrams

- Too much detail in the wrong place can confuse the reader.

Two aluminum cylinders (0.8 inch diameter, 0.76 inch tall) are fastened at one end of the base. Four holes were drilled in the base to accommodate the flange bearing and cylinders. The cylinders account for the height of the compression system and the flange bearing so the two gears are on the same horizontal plane.
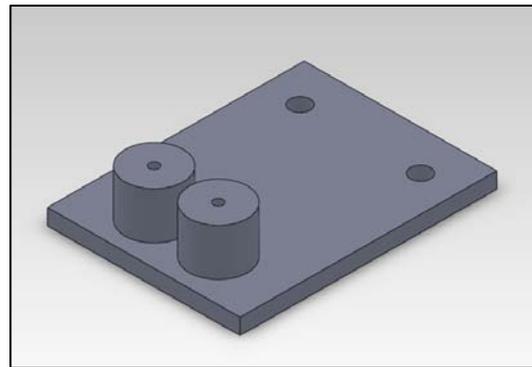
- Without referring to a diagram with labels, this description is useless to the reader!

iClicker

Captions for Tables are placed in what relationship to the Table itself?

A. Right

B. Left

C. Above

D. Writer's Decision

E. Below

Figures

- Should hold a couple of wires, shooting for at least three would be good as that would be the "normal" number of wires on a computer desk
- Should be relatively easy to wind and unwind the wires

Research

When looking for alternatives, I found one design that was very similar to mine, the Razer USA Ltd. "Cable Management System" which has a lot of the same ideas[1].The basic idea is for one wire to be looped through a small assembly and then it can be wound up automatically.

While this is nice, there are some downsides. It can only store one wire, and also the price point is rather high. The whole assembly is $19.99, which is a somewhat high price to only store and organize one wire. With this in mind, the importance of how many wires can be stored and also how overall cheap the assembly is recognized.

Concepts

The first concept for this project involved using a motor to power a cylinder in the middle. In this way, it's somewhat similar to the Razer CMS, except that it would be taller and could hold more wires. However, the problem with this design is that each of the wires would have to be individually powered, because you obviously would not want all of the wires to wind up at the same time since not all wires would have the same length. Doing something like that could not be done mechanically, so if I wanted to do so it would significantly ramp up the cost of the assembly.
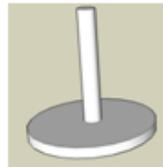
The second concept was somewhat of an evolution of the first concept. Realizing that individually winding the wires would probably be too complicated, the next idea was to instead make one long column that could be wound up with a motor, similar to the image on the right. A drill motor would be hooked up to the
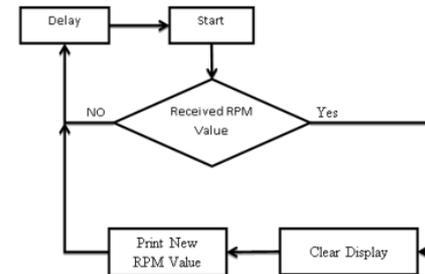

Figure 6.24: Display Microcontroller Pseudo-code Diagram

The base microcontroller pseudo-code diagram is shown above in Figure 6.24, while a full set of code can be found in Appendix I. The above loop is executed ten times per second. With each iteration of the loop, the microcontroller checks if it has received an RPM value from the base microcontroller. If a new value has been received, the microcontroller clears the LCD display and prints out the new RPM value.

6.3.5 Liquid Crystal Display

The liquid crystal display (LCD) is responsible for displaying the current RPM reading of the turbine to the user. The specific LCD display utilized in the monitoring subsystem is the NHD-0216K1Z display by Newhaven Display. The display can display a maximum of 32 characters in a 2 x 16 character array. A picture of the display is shown below in Figure 6.25.
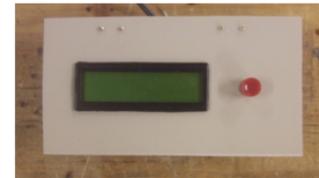

Figure 6.25: LCD Display in Housing

Grammar & Style

- The difference between knowing your sh*t and knowing you're sh*t

- Double space – Instructor Preference
- Comma usage
- Keep Margins approximately 1" – 1.5"

- AVOID First Person "*We*" or "*I*"
- AVOID Contractions
- AVOID starting a sentence with "*So*" or "*But*"

Be Clear & Concise

How many words can you trim from the following sentence?

The following report outlines the different aspects relating to the current feasibility of constructing rotationally stressed reinforcement bar in Northern Maine. (21 words)

~~The following~~ This report outlines ~~the different aspects relating to~~ the ~~current~~ feasibility of constructing rotationally stressed reinforcement bar in Northern Maine. (14)

Editing

"An important conclusion extracted from the result is that there is a correlation between shaft length and mass." (18 words)

"The result is a correlation between shaft length and mass." (10 words)

- **Poor grammar** & **wordiness** is a distraction from otherwise good **content** that may be well **organized** and **in context.**

- The Editor should NOT be the Writer!

iClicker Matching

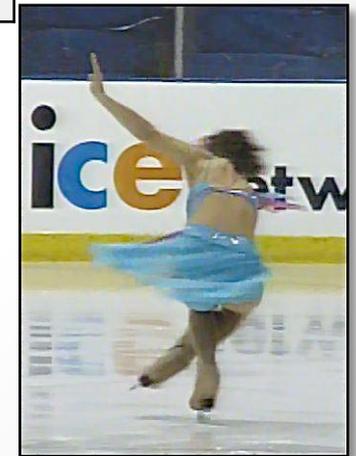|	AXLE	AXEL	AXIL	AXL
A	2	3	1	4
B	3	2	4	1
C	2	4	1	3
D	2	4	3	1
E	4	2	1	3
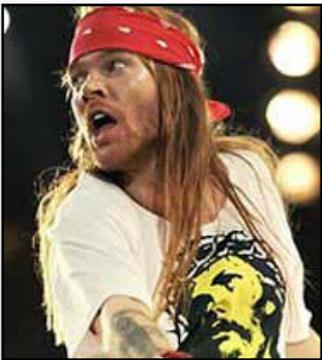
1

2

3

4

Vernacular, Idioms, & Colloquialisms

- my idea "*came into light*"
- This product will "*tackle the problem*"
- That idea was "*thrown out*"
- "*taken out of the picture*"
- this idea "*leaves many doors open*"
- to "*be able to*"
- "*somewhere around*" 5 pounds – use "approximately"
- "*essentially*", "*basically*", "*actually*", "*in essence*"

Data/Code: Appendix

- Raw Data (e.g. spreadsheet, charts)
- Scaled drawing with dimensions
- Pictures/Screenshots
- Analysis
  - Test descriptions/Surveys
  - Projectile Motion Diagrams
  - Free Body Diagrams
  - Spring Force Calculations

References: Wrong

- http://www.mdpub.com/SolarPanel/

- http://en.wikipedia.org/wiki/Peltier_device

- http://en.wikipedia.org/wiki/ABS_plastic

- http://en.wikipedia.org/wiki/Styrofoam

- http://www.emilycummins.co.uk/about

References

- NOT a list of URLs
- MS Word 2010/2013 Reference Tool
- Consistency with YOUR Formatting Style

- More information on the preferred style: **APA**
  - http://www.ccp.rpi.edu/resources/

- http://www.bibme.org/