

6.111 Papers



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Introduction

- Why documentation is important
- What is a document
- The elements of a 6.111 lab report
- How to write the report
- Focus on the *Overview*

Importance of Documentation

- Clarifies and fixes ideas and procedures
 - For designers
 - For others
- Record of project
 - For further modifications and adaptations
 - For troubleshooting
 - For avoiding needless repetition of work

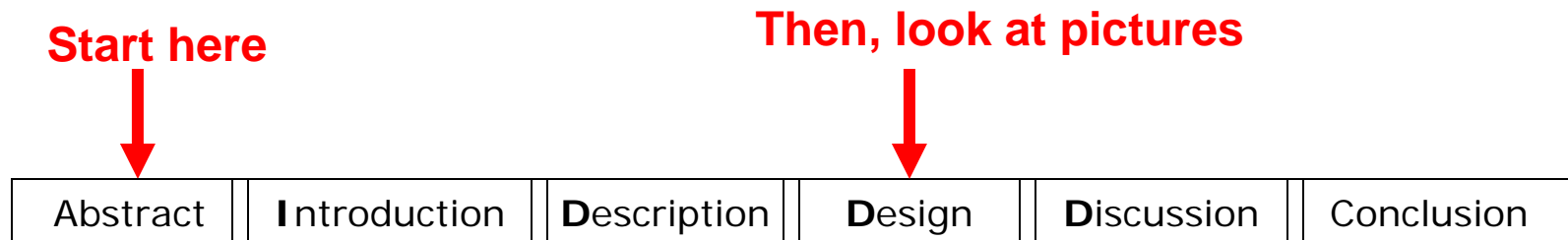


Elements of 6.111 Report

- Title
- Informative Abstract
- Table of Contents
- List of Figures
- List of Tables
- Overview
- Description
- Conclusions
- Appendices

The form also conveys function needed by readership

- Scientific readers maximize potential of the form when they read.
- Makes it is easy to locate data & compare experiments (methods, etc.)
- Easy to write? No
- Easy to read? Yes. Optimized for reading
- Document design and use of figures conveys ethos of scientist.



The grammar of scientific communication also follows its function

Because science readers do not read chronologically and skim, the grammar of science is:

- Prose that is not laden with jargon or vague expressions
- Simple sentence structure S – V – O
- Provides links between text and visuals
e.g., “As shown in Figure 2 . . .”
- Provides time reference (e.g., Methods – past tense)
- Distances subjectivity of the researcher (e.g., passive voice)
- Unambiguous prose It = ??, This = ??

See “The Science of Scientific Writing” By Gopen and Swan

Many writers start off using the outlining approach to writing

Title Page

Abstract

Table of Contents

References (maybe)

Introduction

Background

Discussion*

Conclusion

Acknowledgments

References

Appendix

* Sometimes these sections are combined

Inefficient!

End here

Try the storyboarding approach instead

A “movie-making” approach to writing

Each section of report is a “scene”

Abstract		O verview		D escription		C onclusion
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Try the storyboarding approach instead

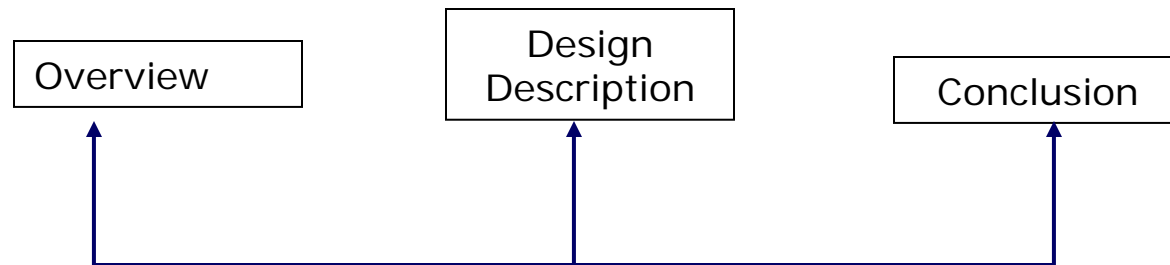
A “movie-making” approach to writing



Movie
design
starts
here

Try the storyboarding approach instead

A “movie-making” approach to writing



Lab report is built around **Design figures**

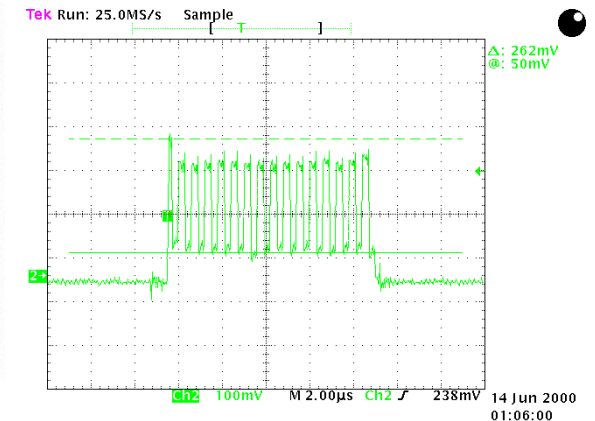
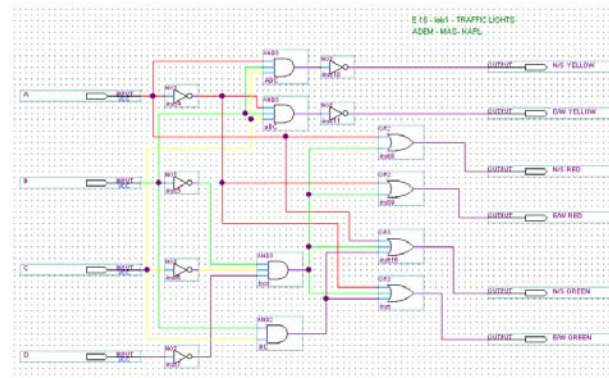
How do you make a movie of your data?

Step 1: Organize your design

Start with figures:

- Assemble hard copies of your figures in a “storyboard”
- Figure out the major technical theme of the report
- Assess how each figure contributes to the major theme
- REVISE figures to focus on the major theme
(develop figures that summarize that major theme)

	P	Q	R	S	$(P \vee Q \Rightarrow R) \ \& \ (R \Rightarrow S) \Rightarrow (\neg S \Rightarrow \neg P)$									
0)	T	T	T	T	T	T	T	T	T	T	T	T	T	T
1)	T	T	T	F	T	T	F	F	T	T	F	F	T	F
2)	T	T	F	T	T	F	F	T	T	F	T	F	T	F
3)	T	T	F	F	T	F	F	T	T	T	F	F	T	F
4)	T	F	T	T	T	T	T	T	T	T	F	T	F	F
5)	T	F	T	F	T	T	F	F	T	T	F	T	F	F
6)	T	F	F	T	T	F	F	T	T	F	T	F	T	F
7)	T	F	F	F	T	F	F	T	T	T	F	T	F	F
8)	F	T	T	T	T	T	T	T	T	T	F	T	T	T
9)	F	T	T	F	T	T	F	F	T	T	T	T	T	T
10)	F	T	F	T	T	F	F	T	T	F	T	T	T	T
11)	F	T	F	F	T	F	F	T	T	T	T	T	T	T
12)	F	F	T	T	F	T	T	T	T	F	T	T	T	T
13)	F	F	T	F	F	T	F	F	T	T	T	T	T	T
14)	F	F	F	T	F	T	T	T	T	F	T	T	T	T
15)	F	F	F	F	F	T	T	T	T	T	T	T	T	T
					1	2	4	3	8	5	7	6		



Step 3: Write in non-linear sequence

- Tables
- Figures
- Overview
- Description
- Conclusion
- Appendices
- Lists of Tables & Figures
- Table of Contents
- Abstract
- Title

Use storyboard as the “backbone” of your report/presentation



Overview

- ❑ Establishes the context and purpose of project
- ❑ Description of the whole before the parts
- ❑ Independent of abstract

Elements of the Overview

- Background and context
- Statement of problem
- Description of device's purpose
 - What does it do?
- Description of device's uses
 - How does a user use it?
- Brief description of subsystem organization
- Road map for reader

Sample Overview IA

In any business or multi-user environment where phone service charges are made on a per call basis, it is desirable to keep a log of phone calls so individual calls may be charged to the actual callers. In addition, it is convenient to be able to dial frequently called numbers easily and to redial the last number that was dialed. The intent of this project is to demonstrate a system which performs these functions.

Sample Overview IA

Context

In any business or multi-user environment where phone service charges are made on a per call basis,

□ Problem and Main Purpose

it is desirable to keep a log of phone calls so individual calls may be charged to the actual callers.

□ Additional Objectives

In addition,

- it is convenient to be able to dial frequently called numbers easily and
- to redial the last number that was dialed.

□ Summary Statement of Project

- The intent of this project is to demonstrate a system which performs these functions.

Sample Overview IB – User Perspective

The user of this system sees an ordinary telephone with a few additional switches and indicator lights. The attached keypad produces the standard telephone tones. When the user picks up the receiver, she is prompted by a light to enter her two digit identification code to gain access to the phone system before being prompted to dial a phone number. The user may, if she wishes, turn on the “set” switch to set a short code. She is then prompted to enter a one digit short code. After entering this digit, the user enters a normal phone number. When she is done, she turns off the “Set” switch. The user may dial normally, automatically redial the last regularly dialed number by entering a *, or may use the autodial function by entering # followed by the short code digit. The user may hang up at any time. If the user wishes to place another call without reidentifying herself, she may press the pre-redial switch.

Sample Overview IC – Additional Functions

At any time when the phone is not in use, the phone call log may be produced. The “Bill” switch is depressed, causing a complete output of all previous calls. The record contains the user’s identification code, the date the call was made, and the actual number dialed. The day can be set to a number from 1 to 366, which specifies the day of the year. Two switches are available to change the date: one to simply increment the day by one, and the one which rapidly increments the counter while the switch is depressed.

Sample Overview 1D – Summary of Design

The project is divided into two main modules, called the “master” and the “slave”. The master monitors the actions of the slave and regulates the flow of information to and from the slave. The slave is responsible for all the interactions with the use, including auto-dial functions. A key element in the project is modularity. The master and the slave can be thought of as two semi-independent systems. For instance, the master has no way of knowing whether normal dialing or auto-dialing has produced a digit. A simple “ready-acknowledge” handshake is used to send digits to from the slave to the master. The two modules are in reality asynchronous, although for convenience they happen to run off the same clock. Because the two systems are modular and asynchronous, they can be tested independently.

Sample Overview IE – Advanced Organizer

This document describes the device's design and performance specifications followed by the testing and debugging procedure used in its development. Two minor technical problems are then noted and recommendations for further development are offered.

Step 6: All the Good Stuff: Edit, Peer Review, Bake, Edit, & Proofread

and . . . Submit!

**Check the
figures!**

1. Edit for **completeness**

Is all relevant information included?

Where might readers have questions?

2. Edit for **organization and document design**

Is each section divided logically using subheadings?

Does the information link clearly across sections?

Do the figures support the text?

3. Edit for **prose style**

Are there irrelevant sentences, sections, plots?

Can you read the report aloud without verbally stumbling?

Importance of Precision

- ❑ Sloppy facts and lack of precision can also destroy things
- ❑ Confusion over units of measure destroyed the Mars Lander
 - Engineers at NASA's Jet Propulsion Laboratory thought they were dealing in *metric* units -- or newtons per second -- when calculating spacecraft thrust,
 - The Lockheed Martin Corp. team that built the system had programmed the measurements in English pounds per second.
- ❑ The difference took the craft about 60 miles off course and into oblivion.