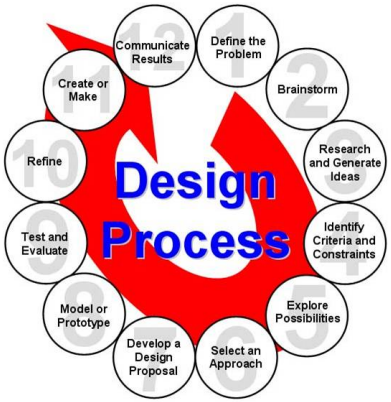
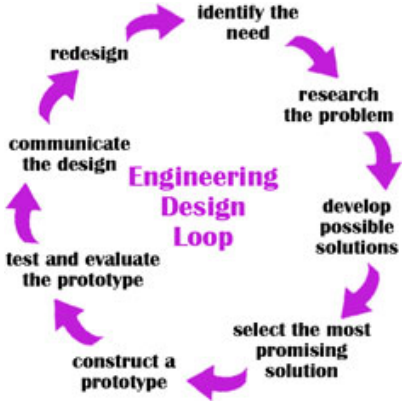
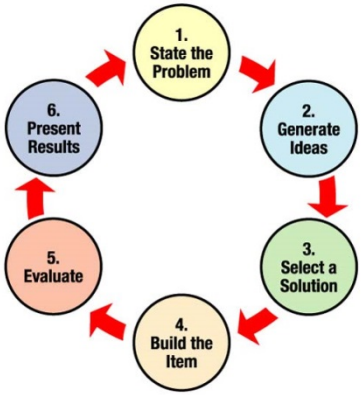
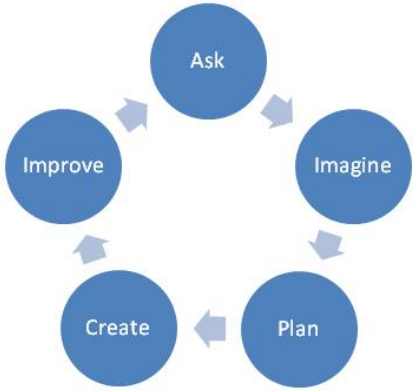








Engineering Design: An Introduction

Chapter 1 & 2

What types of engineers are there?

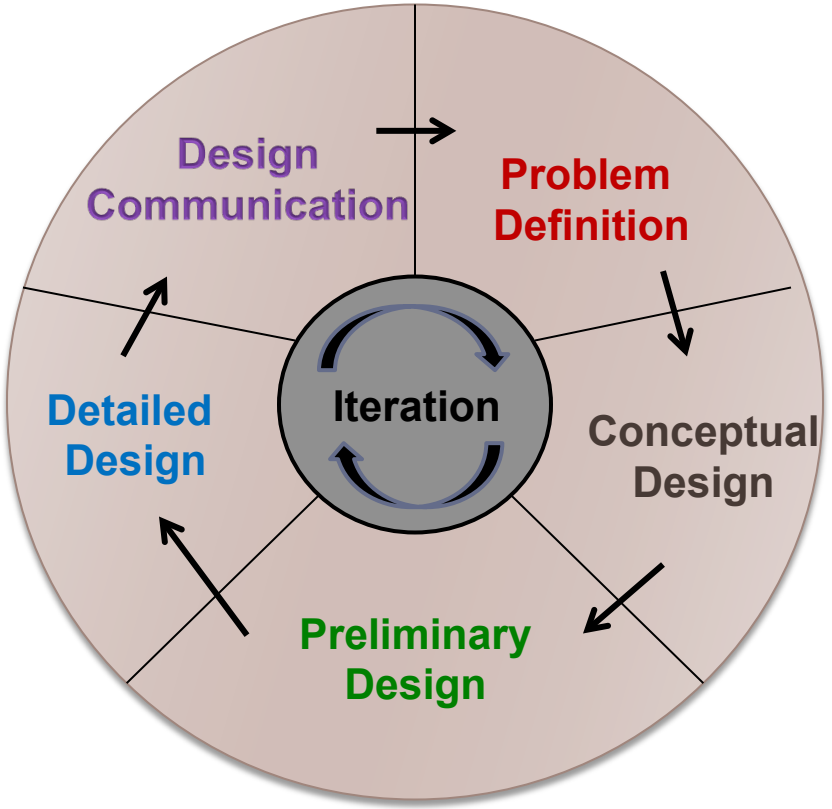
Lets Brainstorm!

Qualities of an Engineer

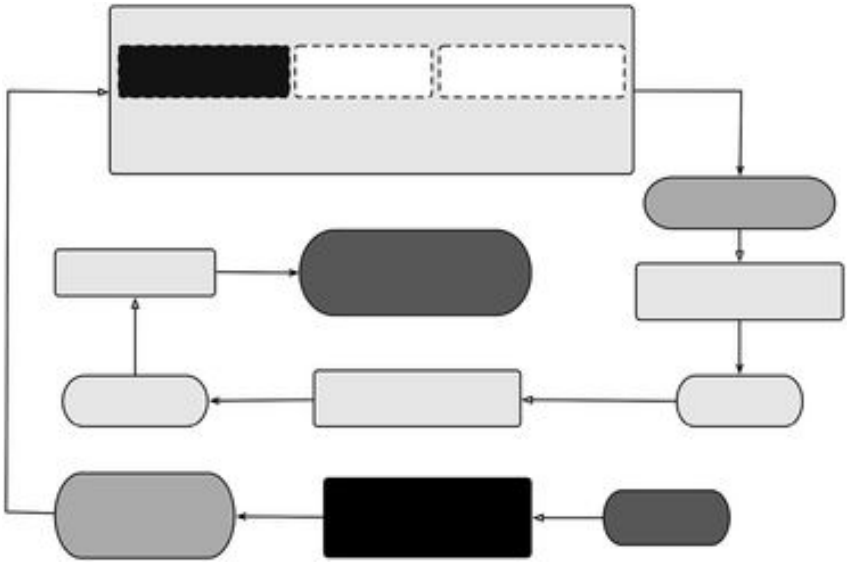
- Problem solving skills
- Effective communication skills
- Highly ethical and professional behavior
- An open mind and positive attitude
- Proficiency in math and science
- Technical skills
- Motivation to continue learning
- Knowledge of business strategies and management practices
- Computer literacy and experience

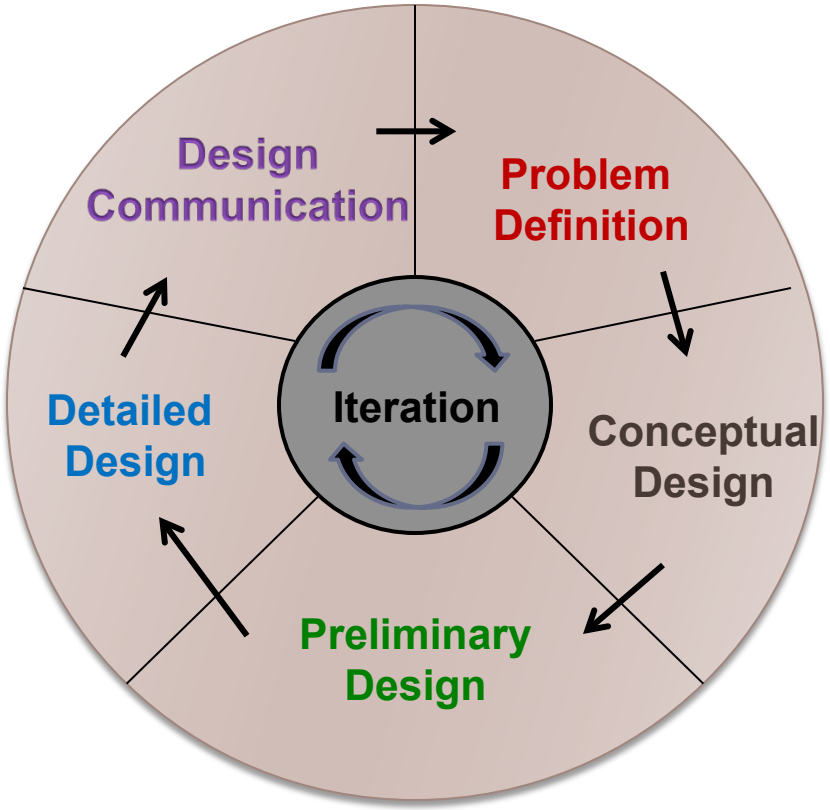
The Design Process

1. Problem Definition
2. Conceptual Design
3. Preliminary Design
4. Detailed Design
5. Design Communication
6. Reflection → Iteration



The Design Process – Our book vs. simplified





1. Problem Definition

- Problem Statement
- Objectives
  - Nth generation redesign:
    - New technology
    - New user needs
    - Respond to competition
    - Reduce costs
- Constraints
  - specifications / limits
  - resources: time, 👪, $, info
- Principal Functions

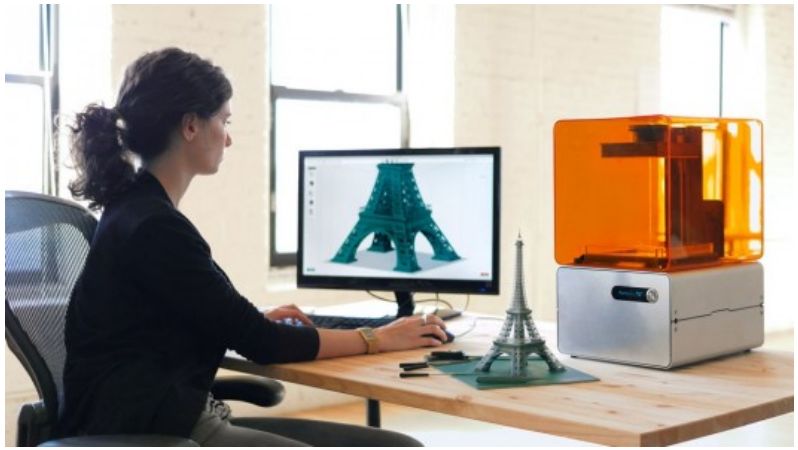
What does the client want?

2. Conceptual Design

- Identify how you will measure design success
  - Metrics

- Acquire Technical Knowledge
  - Existing Solutions
  - Technology Research
  - Patent Searches
- Generate ideas and solutions
  - Creativity!
- You've got a few solutions, which one is best?
  - Thoroughly evaluate +/- and compare alternative solutions
  - Consider the human element: safety, satisfaction, usability

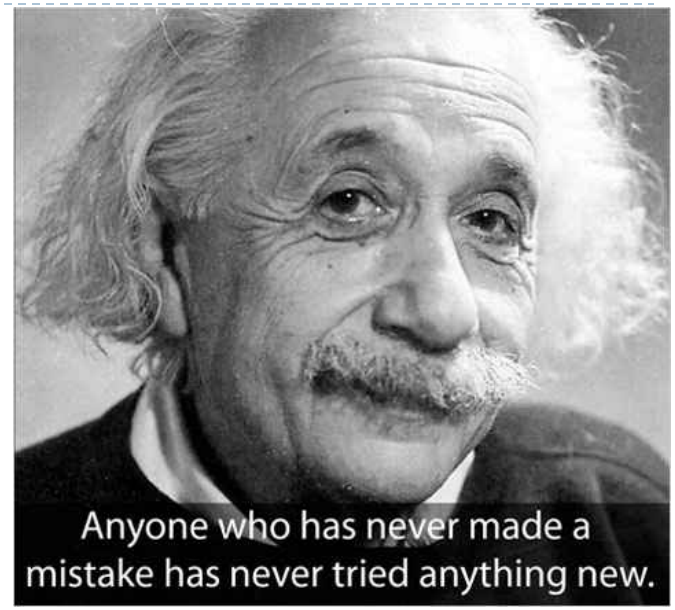
3. Preliminary Design



- 1st attempt!
- Model & Test
  - Prototyping
  - Computers
  - Check ethics, failures, hazards
- LEARN
- Evaluate → Consider Redesign?

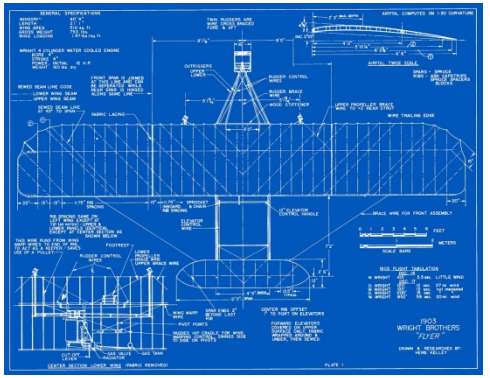
4. Detailed Design

- Learn from early design mistakes
- Refine & Optimize
- Consider manufacturing issues



5. Design Communication

- Present your Work!!
  - Written
    - Reports, white papers, etc.
    - Describe design process
  - Graphical
    - Drawings & detailed designs
    - Fabrication specifications (final measurements)
  - Oral
    - Summary for a specific audience



6. Reflection & Iteration

- Review failures
- Consider lessons
- Revisit discarded ideas
- Apply to future projects
- Address support requirements
- Iterate, Iterate, Iterate, Iterate