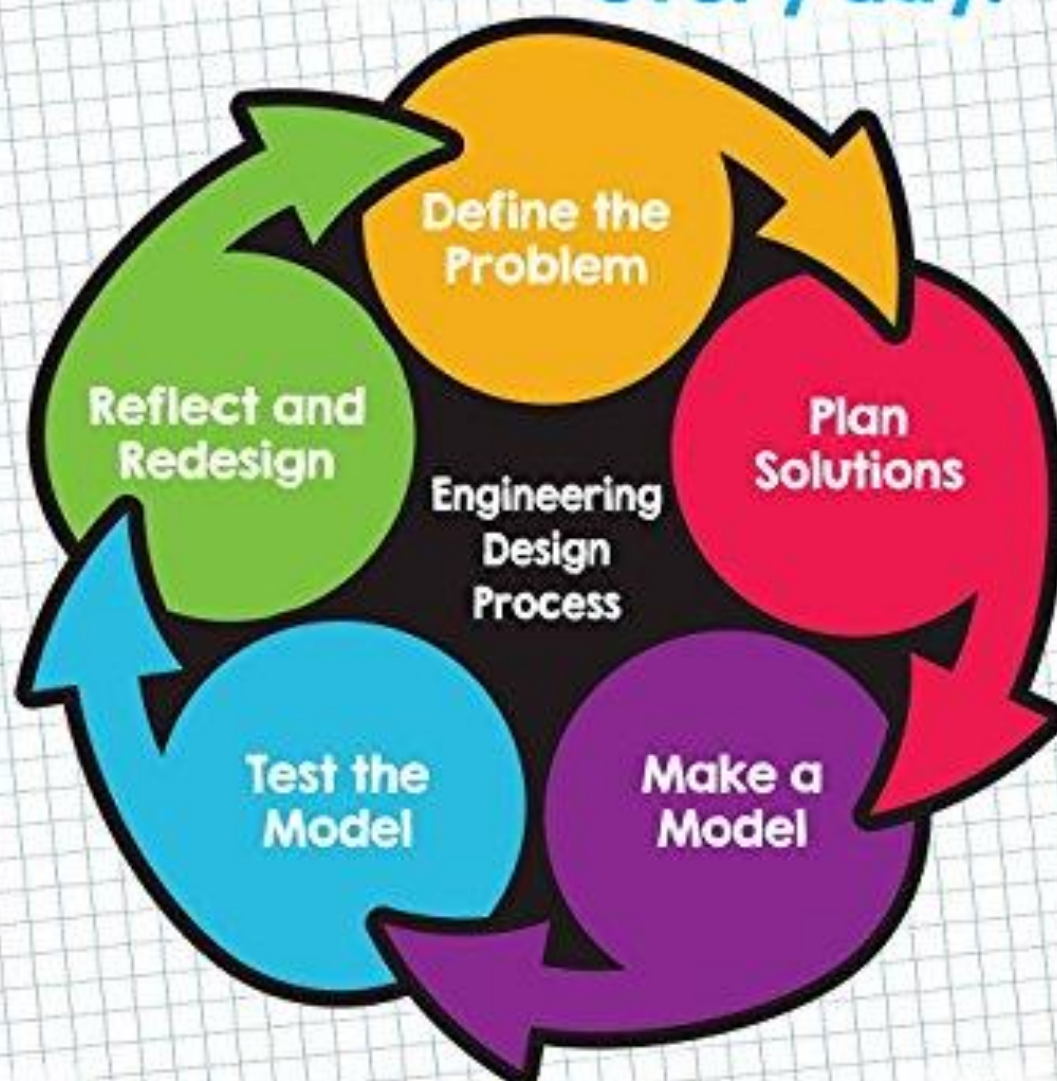


Be an  
**Engineer**  
every day!



# Engineering Design Process

- A series of steps that engineers use to guide them as they solve problems.
- It is cyclical and can begin at any step, or move back and forth between steps. <sup>(1)</sup>



(1) [www.ecybermission.com](http://www.ecybermission.com)

# Engineer

- A person trained and skilled in the design, construction, and use of a system or machine.
- Needs to be well versed in language arts, as well as math and science

Engineering Fields	
Mechanical	Aerospace
Electrical	Nuclear
Chemical	Civil
Biomedical	Computer

# TYPES OF ENGINEERS

## ○ Chemical

- Bioengineering and biochemical
- Ceramic and materials
- Process

## ○ Civil

- Environmental
- Structural
- Transport

## ○ Electrical

- Computer / *software*
- Electronic
- Optical
- Power

## ○ Mechanical

- Aerospace
- Acoustical
- Manufacturing
- Thermal

## ○ Other

- Agricultural / mining
- Biological / Biomedical
- Energy
- Industrial
- Nuclear
- Petroleum



# Innovation vs. Invention

## Invention

A device or process *originated* after study and experiment



## Innovation

A new improvement to an *existing* device or process

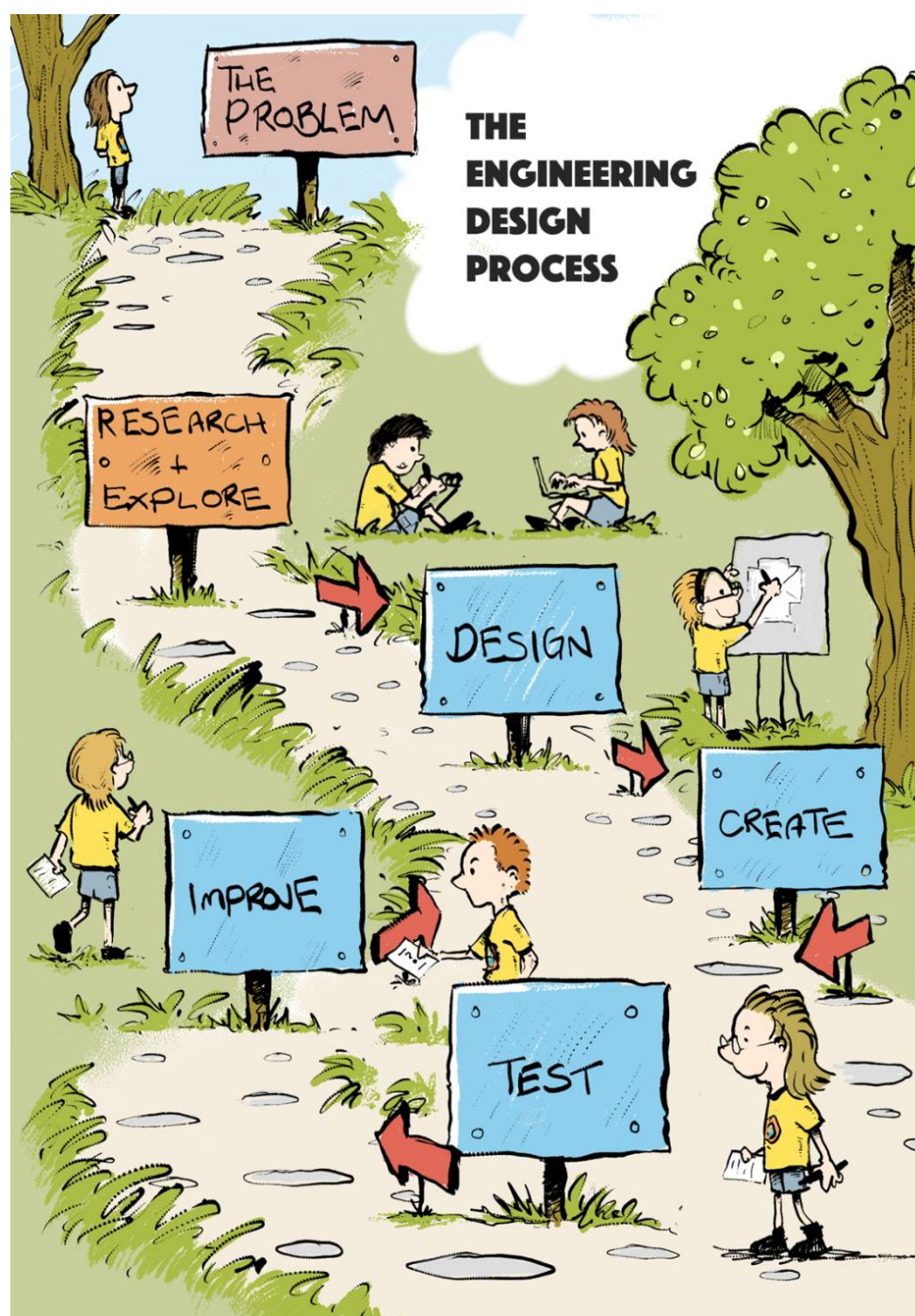


Image taken from: [http://www.novuslight.com/led-market-phasing-in\\_N239.html](http://www.novuslight.com/led-market-phasing-in_N239.html)



Image taken from: [http://lexpower.wordpress.com/2010/07/21/chronological-order-show-me-the-timeline/1000px-bicycle\\_evolution-en-svg/](http://lexpower.wordpress.com/2010/07/21/chronological-order-show-me-the-timeline/1000px-bicycle_evolution-en-svg/)

# THE ENGINEERING DESIGN PROCESS



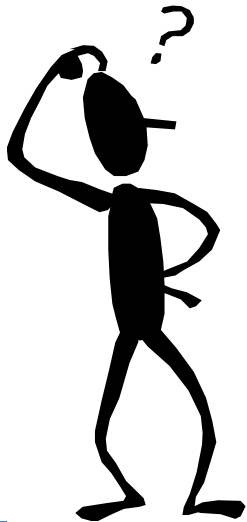
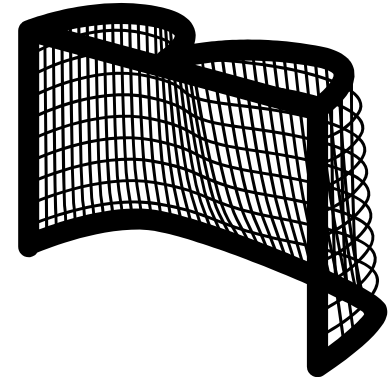
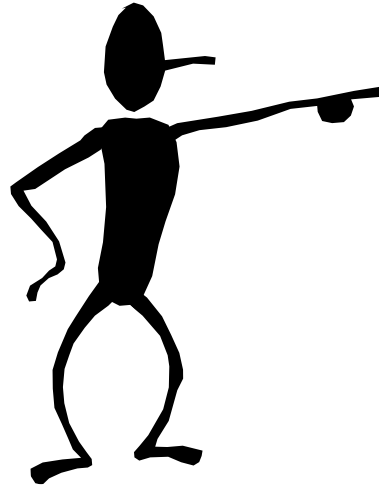
# Engineering Design Process



Click on a "slice" of the Engineering Design Process cycle to learn more about its parts

# Define problem and goal

- Identify and describe the issue and the ultimate objective



- Consider:
  - What do you want to accomplish?
  - What are the requirements?
  - Are there any limitations?
  - Who is the customer?



# Research

- Gather information and investigate existing technologies related to the problem

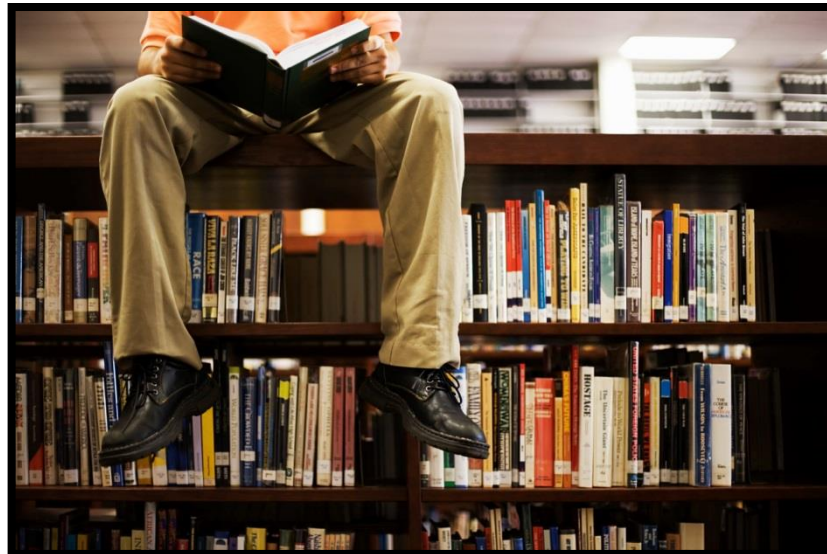


Image taken from: <http://walrus.wr.usgs.gov/infobank/programs/html/facilities/us.archives.html>



# Imagine possible solutions



Image taken from:

[http://www.vinylrecords.ch/JJO/John/John\\_Lennon/imagine-capitol/john-lennon-imagine.html](http://www.vinylrecords.ch/JJO/John/John_Lennon/imagine-capitol/john-lennon-imagine.html)



# Choose a solution

- Select the most feasible idea and assign team tasks.



Image taken from:

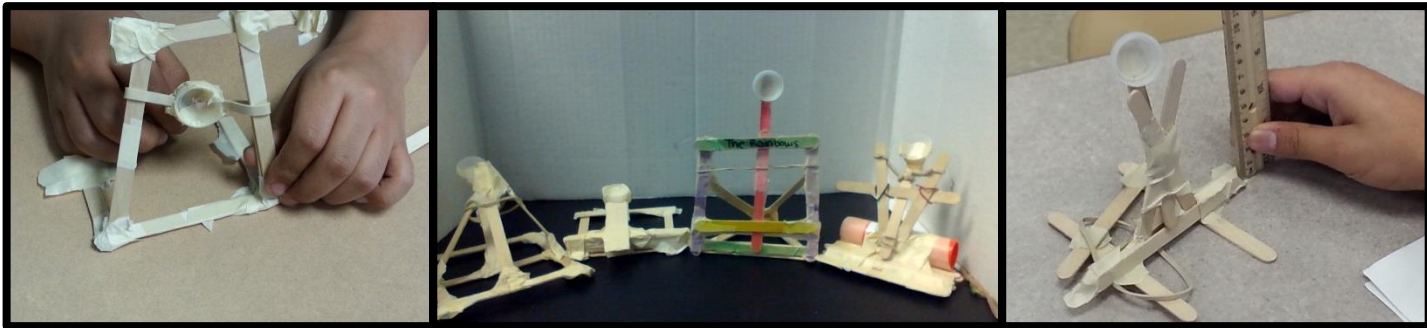
[miny-moe.html](http://miny-moe.html)

Image taken from: <http://andrewmatre.com/how-colors-help-make-websites-successful/>



# Create & test prototype

- Build a **prototype**
  - Prototype - an operating version of a solution.
- Push yourself and the group for creativity, imagination, and excellence in design.



# Improve



Image taken from:  
<http://www.rubymarketer.com/improve-search-engine-ranking/>



<sup>(3)</sup> Ulrich K., Eppinger S. 2000. Product Design and Development. 2<sup>nd</sup> Edition. Irwin McGraw-Hill, Boston.