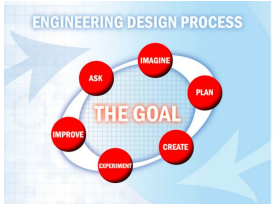
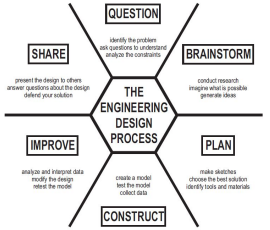
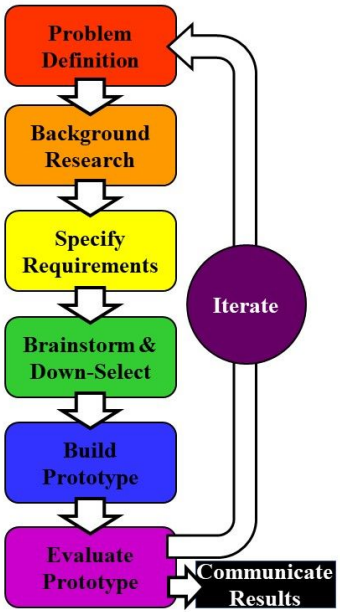




Comparative Analysis Assignment

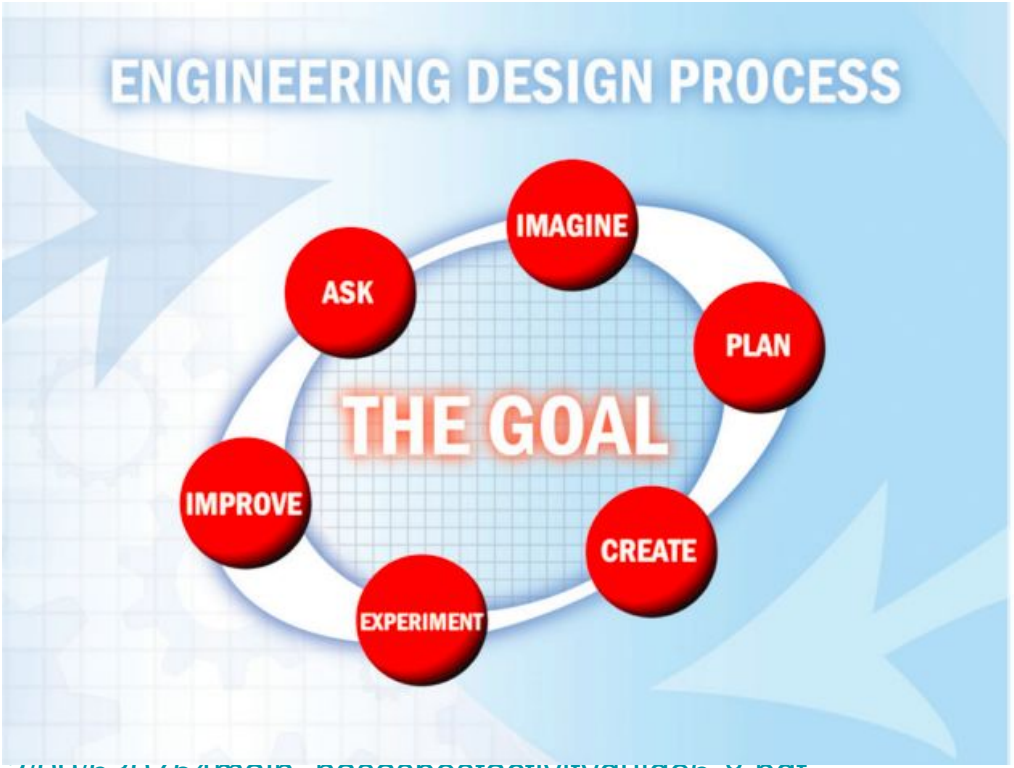


Haroula Argiros

#1 NASA's Engineering Design Process

The goal

1. Ask
2. Imagine
3. Plan
4. Create
5. Experiment
6. Improve



https://www.nasa.gov/wp-content/uploads/2012/09/630754main_nasasbestactivityguide6-8.pdf

#3 Teaching Channel's Engineering Design Process

The goal

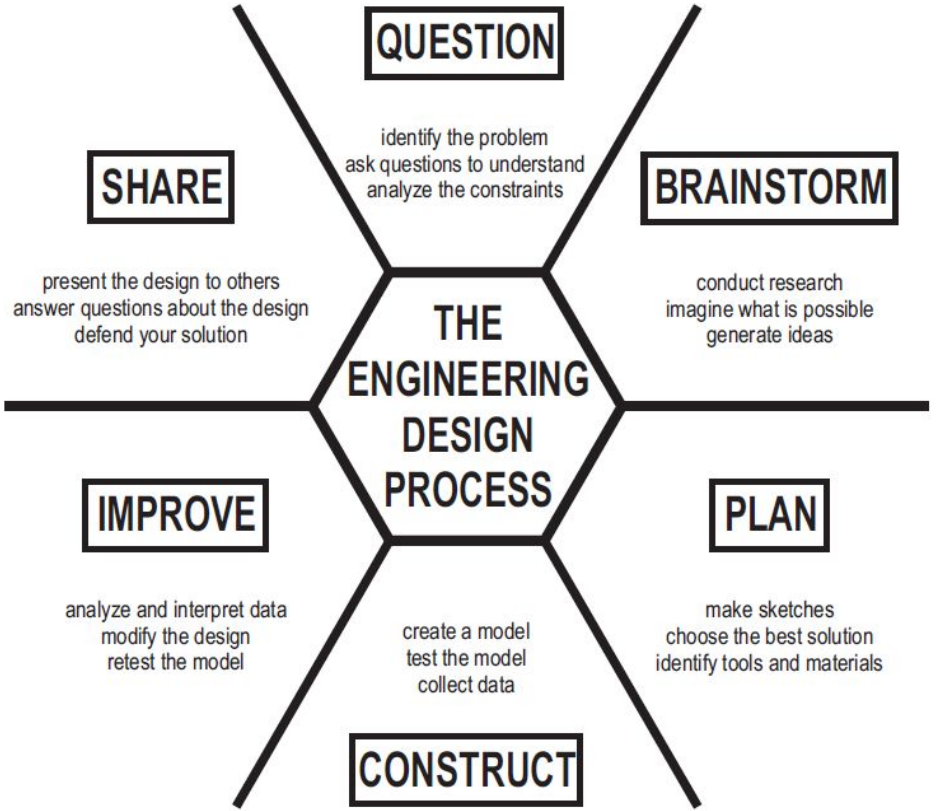
1. Define a problem
2. Identify what's needed to solve problem
3. Brainstorm solutions
4. Make and test best solutions
5. Evaluate results
6. Share results
7. Improve the solution

https://www.teachingchannel.com/k12-hub/blog/engineering-design-process/

#3 University of Arkansas' STEM Education Engineering Design Process

1. Question — identify the problem, ask questions to understand, analyze the constraints
2. Brainstorm — conduct research, imagine what is possible, generate ideas
3. Plan — make sketches, choose the best solution, identify tools and materials
4. Construct — create a model, test the model, collect data
5. Improve — analyze and interpret data, modify the design, retest the model
6. Share — present the design to others, answer questions about the design, defend your solution

https://stem.uark.edu/graduate-certificate-k-6-stem-ed/engineering-design-process-text.php

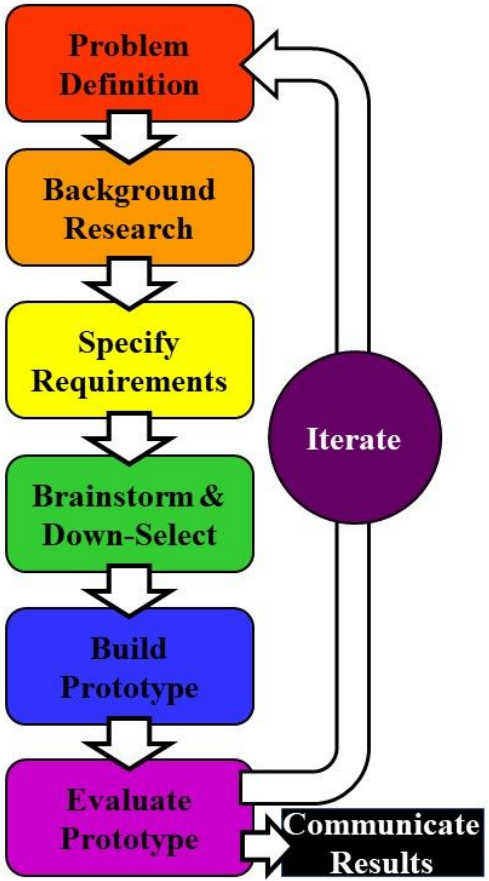


#4 University of Florida's Engineering Design Process

The goal

1. Problem defined
2. Background research
3. Specify requirements
4. Brainstorm
5. Build prototype
6. Evaluate prototype →repeat to 1 when needed
7. Communicate results

https://ufl.pb.unizin.org/engineeringcapstone/part/main-body/



My analysis

	STEP 1 problem	STEP 2 research	STEP 3 Plan out	STEP 4 Create	STEP 5 experiment	STEP 6 Improve	STEP 7 Share
NASA	Problem defined or question asked	Imagine a possible solution	Plan out a design and draw out ideas	Create and construct a working model	Experiment and test that model	Improve and try to revise that model	
Teaching Channel	Define a problem	Identify what is needed to solve a problem (research)	Brainstorm solutions	Construct and test the best solutions	Evaluate the results	Share results	Improve on results
University of Arkansas	Identify a problem	Brainstorm and conduct research	Plan out a design; choose the best solution	Construct and create a model	Improve after analyzing & interpreting data	Share results	
University of Florida	Problem defined	Background research	Specify requirements	Brainstorm ideas and solutions	Build prototype	Evaluate prototype	Communicate or share results

One page summary click here: https://docs.google.com/document/d/1Eu7BVzlZb_VdubxO6vmyv4UZe8Eor22-h6LggkUdDiI/edit

Comparative Analysis Assignment on Engineering Design Processes. By Haroula Argiros

I evaluated four different Engineering Design Processes from the following resources: NASA Engineering, Teaching Channel, University of Arkansas and University of Florida. Although each had their own flow chart or infographic to describe their engineering design process, I found that all four had many similarities and overlap in how to execute an engineering design project successfully. I will discuss in this analysis all 7 steps that I found to exist amongst these processes and compare these four types to each other by examining similarities and differences.

On the last page of the Google Slide document I created a color coded table with all 7 steps as well as the four different Engineering Design Processes. As seen on the very first row of this table and after analyzing each resource, I designated the 7 steps, each with its own color following the rainbow, as follows:

Step 1: Problem (red)
Step 2: Research (orange)
Step 3: Plan out (yellow)
Step 4: Create (green)
Step 5: Experiment (blue)
Step 6: Improve (purple)
Step 7: Share (pink)**

From this analysis, the only resource that actually goes through each of these seven steps in detail is the the Engineering Design Process from the Teaching Channel, where there is not only clear steps to evaluate→ share→improve but that the improvement step is placed in the middle of the infographic to show that it is connected in almost every step along the way. Interestingly, the NASA engineering design process does not heavily discuss the second step, research, in detail (hence this is labeled in light orange). Rather, the second step is to "imagine" a possible solution. This imagining a possible solution does hold some value however I do think it falls short of explaining that after a person imagines a solution the next thing to do is to research a solution to help identify what might be needed to solve the problem. Imagining this only has its limitations and can only take you so far and sometimes is not adequate enough to help engineers move onto the next step. I noticed that in the 3 other design models, research (highlighted in orange) was heavily discussed as being the second step needed to help set the foundation of planning out the design seen in step 3.

Next in my evaluation, I noticed that the University of Florida added a unique step that no other design had which was "specify requirements." I labeled this as a shade between orange and yellow because it was something that should be done after background research and before planning out (hence it falls between step 2 and 3). It is a great idea to specify requirements that are needed but I am not sure if it warrants its own step as this can be considered to be part of background research. Therefore, with the exception of the University of Florida's design, every design follows each of these steps: problem defined (step 1), research (step 2), plan out (step 3), create (step 4), experiment (step 5). The University of Arkansas lumps step 5 (evaluate) and step 6 (improve) together (hence an indigo color or blend of colors of both these steps). Interestingly, NASA's design however diverges again from the other designs I evaluated in that it does not have a step that clearly explains communication of ideas or sharing of results. I indicated this step as step 7 (pink) in the analysis table. It was the only design that lacked this while the University of Florida was also the only design that lacked Step 6 (improve). Taken together, I think the most comprehensive and well-thought out design model was that generated from the Teaching Channel because it not only contained all 7 steps with a clear and well defined explanation of each step, but it also had a unique addition to the infographic by showing the improve the solution idea at the center of its model pointing outward to various other steps along the design process such as improving what is needed to solve the problem or improving the construction process.