# Engineering Design Process:

## Satellite "Swat" Team

**ASK**: *What do we need to know to get started? What are we trying to accomplish?*

We need a prototype engineered to help the team of the STS-51D flip a switch on a satellite. This tool needs to be attached to the end of an extension arm and be designed to catch and release a switch on a satellite from a set distance away. This is where we need your engineering help!

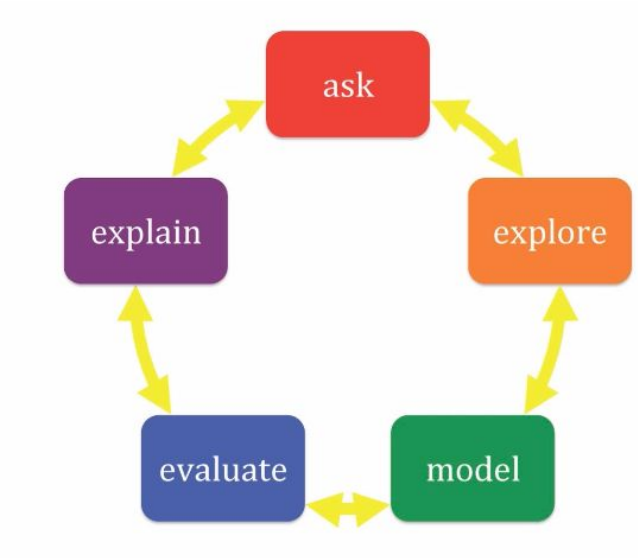
How can you engineer a prototype, following specific criteria and constraints, to help the team of the STS-51D solve the problem and flip the switch on the satellite?

**EXPLORE**: *How are we going to complete the task? What materials will you use?*

**Criteria/Constraints**

Should include the following elements

- ❏ Must be flexible, yet strong
- ❏ Have a reach of at least 1 yard
- ❏ Include a "catch and release" system
- ❏ Fully flip the switch (light switch)
- ❏ Be attached to the end of a ruler/yardstick




Materials Available:

- Aluminum Foil (1 sheet)
- Plastic Page Protector (1 sheet)
- Rubber Bands (6 assorted sizes)
- Wooden dowel rod (1) (preferred, could substitute an unsharpened pencil)
- 1 Yard of Duct Tape (preferred, could also use Masking or Scotch Tape)
- "Mystery Material" (ONE additional material that may have been on board)

Construction Tools (*Not allowed in solution):

- Scissors
- Ruler

**MODEL**: *Sketch a technical drawing of your individual idea and 1+1=3 collaborative design.*

You have 5 minutes to brainstorm individually. You have 10 minutes to brainstorm your design as a group and sketch and label a technical drawing. Once the 10 minutes is up, only those with a sketch will be able to start to build the prototype that was designed. You will have 30 minutes to build and test your solution to the challenge.

Your Idea:

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Your "1+1=3" Collaborative Idea:

**EVALUATE**: *Carry out your plan and test your model.*

*Was it successful? Why or why not?*

To test the design, make sure that your design solution meets most of the following criteria. If you don't have all the boxes checked, please think about how to try to redesign your model to include what is missing.

Test Checklist:

- ❏ Must be flexible, yet strong
- ❏ Have a reach of at least 1 yard
- ❏ Include a "catch and release" system
- ❏ Fully flip the switch (light switch)
- ❏ Be attached to the end of a ruler/yardstick

*Sketch a technical drawing of your FINAL design below.*

Your Final Solution:

**EXPLAIN**: *What was good about your design? What can you make better?*

As a group, respond to the following:

What was one thing you liked or were proud of related to your team design?

What is one area to improve on for next time?

What did you see that you liked in the other group's design?