PS: The Engineering Problem Solving Process

For several reasons, including developing a stronger alignment with the state STEM initiative, the IDOE K-8 computer science problem solving standards reflect an **engineering process model**. We will re-visit this engineering perspective when we look at computer-focused problem solving, but it will be helpful to take an initial look at the model now.

In the Indiana Computer Science standards, grade bands 3-5 as well as 6-8 refer to the following phases in problem solving:

1. Problem statement and exploration
2. Examination of sample instances
3. Design
4. Implementation
5. Testing

The vocabulary of the official engineering problem solving process model described above might present challenges (at least in the younger grades).

A program at the Boston Museum of Science has interpreted the engineering problem solving model from the lens of children. A visual of their model and the classroom dialog it fosters is included below. [You can read more about the program here. Note that the program is highly rated but not all their resources are free. The program does have a free **Video Collection (https://www.eie.org/engineering-elementary/eie-engineering-education-videos)** of materials.]

The Engineering Design Process Model (developed by the EIP educational outreach group at the Boston Museum of Science)

*To solve engineering problems, engineers follow a series of steps called the "**Engineering Design Process.**"*

A Five-Step Process

Because the EiE Project serves young children, the EIP group created a simple Engineering Design Process (EDP) to guide students through engineering design challenges. The EDP model has just five steps and uses terms children can understand.
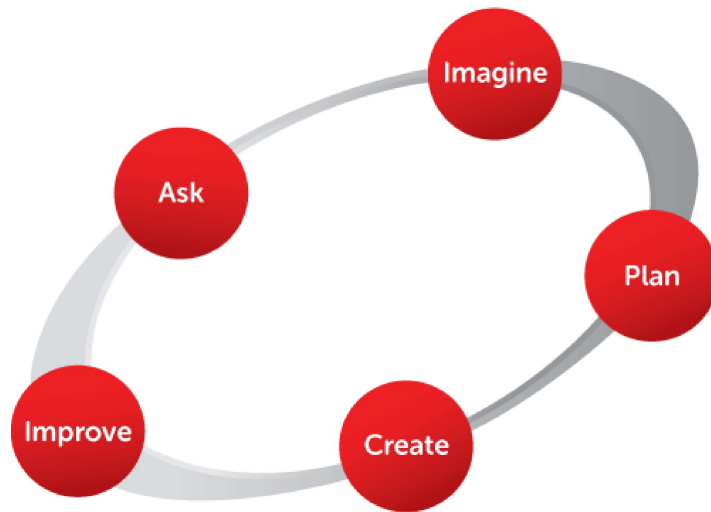
ASK: What is the problem? How have others approached it? What are your constraints?

IMAGINE: What are some solutions? Brainstorm ideas. Choose the best one.

PLAN: Draw a diagram. Make lists of materials you will need.

CREATE: Follow your plan and create something. Test it out!

IMPROVE: What works? What doesn't? What could work better? Modify your design to make it better. Test it out!

We will re-visit the engineering process model later in the course.

Should you wish to learn more about the engineering process model, you can find additional materials in the resource section of this module.

The final general problem solving model we will consider here is **Computational Thinking**. It is intentionally placed at the end of the general problem solving approaches because Computational Thinking can also be purposed as a more computer science focused approach.