The Engineering Design Cycle

Identify the Problem

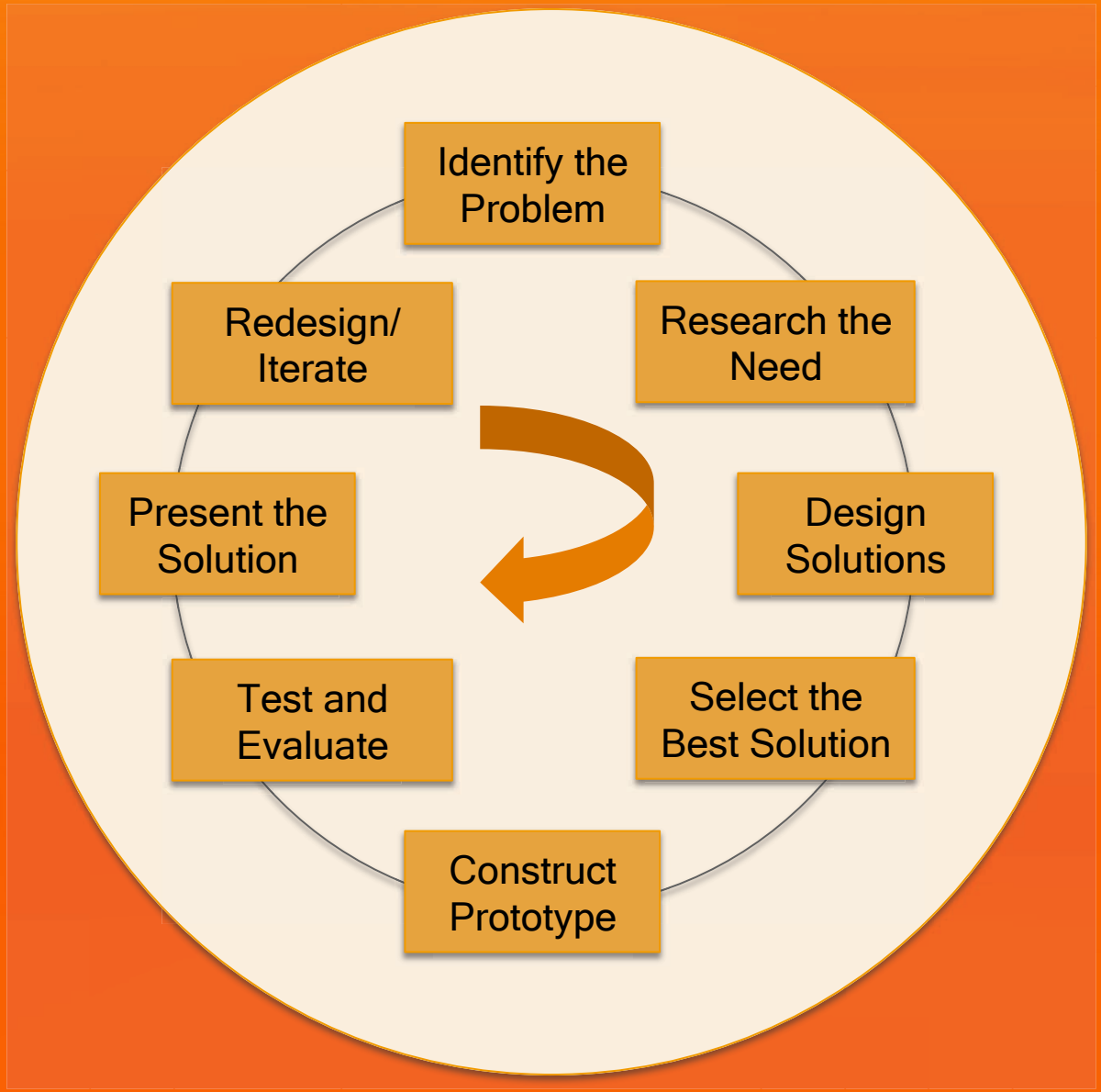
Brainstorming

Brainstorming ideas is often best done alone, so that ideas are not unnecessarily suppressed by group or team dynamics

The Engineering Design Cycle

Brainstorming is not a random walk through a random patch in the chaotic brain. Rather, it is an attempt to explore ideas within a specific set of boundaries that limit what the design engineer or student can pursue within a specific problem context.

At the start of the design cycle (Identify the Problem), brainstorming will seek to identify PROBLEMS, not SOLUTIONS (these come later), that NEED to be solved.



Brainstorming during the

Identify the Problem

phase of the Engineering Design Cycle

State the Goal

Here, we state the overall purpose of the design class or design activity. The goal should focus on defining the boundaries of what "fits" and what does not "fit" so that all subsequent ideas are "fits" rather than "misfits".

An Example: In a Sensors Design Class

To identify sensing systems that meet a significant need in society and which can be designed, prototyped, tested, evaluated, and presented during a single 16 week period (semester).

Brainstorming during the

Identify the Problem

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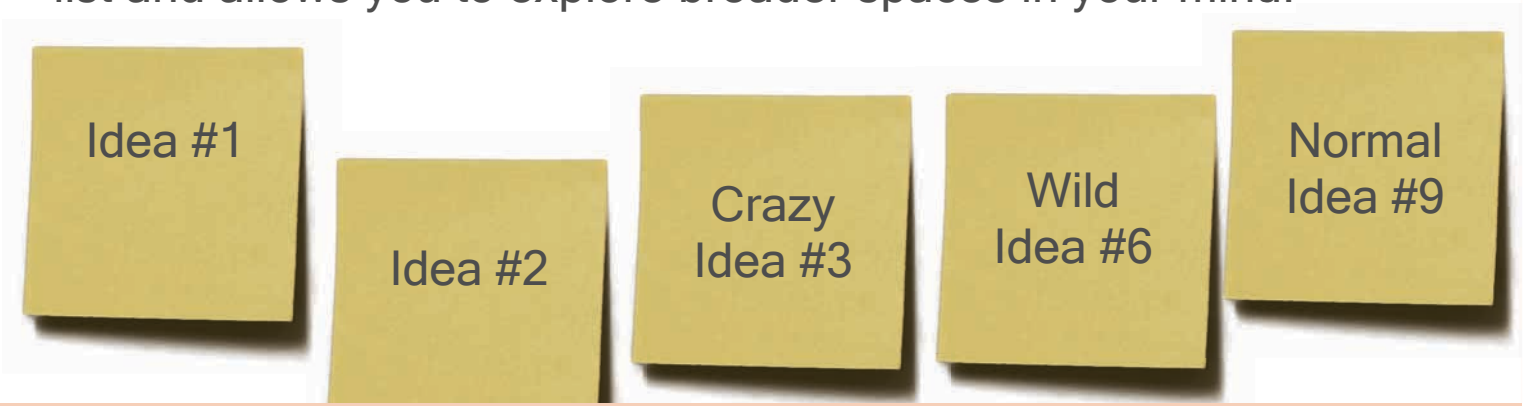
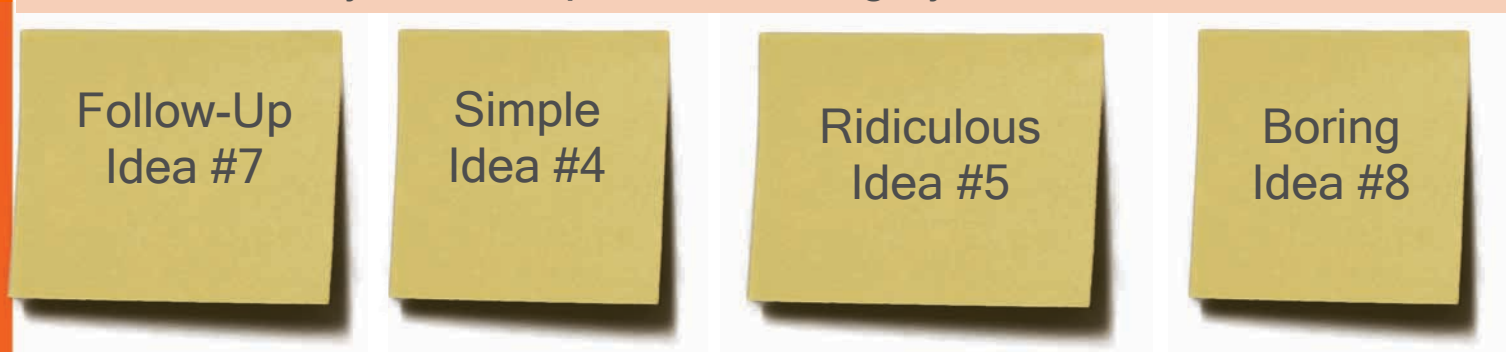
Generate Ideas

While it may sound straightforward to generate ideas, how you choose to do so makes a big difference in the breadth and creativity represented in the final pool of ideas. Try using a "non-linear" mode of generating ideas that avoids the appearance of a list and allows you to explore broader spaces in your mind.



Generate as many ideas as possible, no matter how strange, boring, wild, crazy, or uninspired. Challenge yourself to 20-25 ideas!



Brainstorming during the

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Organize Ideas

Organize ideas according to themes that "emerge" naturally and fluidly as you review your list. Re-arrange your ideas multiple times to identify the organization that makes the most sense to you.

Theme A: Learning more about Thing X

Theme B: Lots of Programming

Theme C: Lots of Building

Pick themes that organize your ideas according to how they appeal to you. This will make it easier to make your top choices!

Brainstorming during the

Identify the Problem

phase of the Engineering Design Cycle

Identify Priorities

Priority 1:
Add specific languages or software to my resume

?

Priority 2:
Learn a lot more about Thing X before I graduate

Priority 3:
Enjoy building things

?

Priority 4:
Build Teamwork Skills

Think about what is most important in the design process. In the classroom, what is most important is usually related to the student's career goals, personal interests, and special skills. In industry, corporate mandates and the interests of others will play a stronger role in determining priorities.

Brainstorming during the

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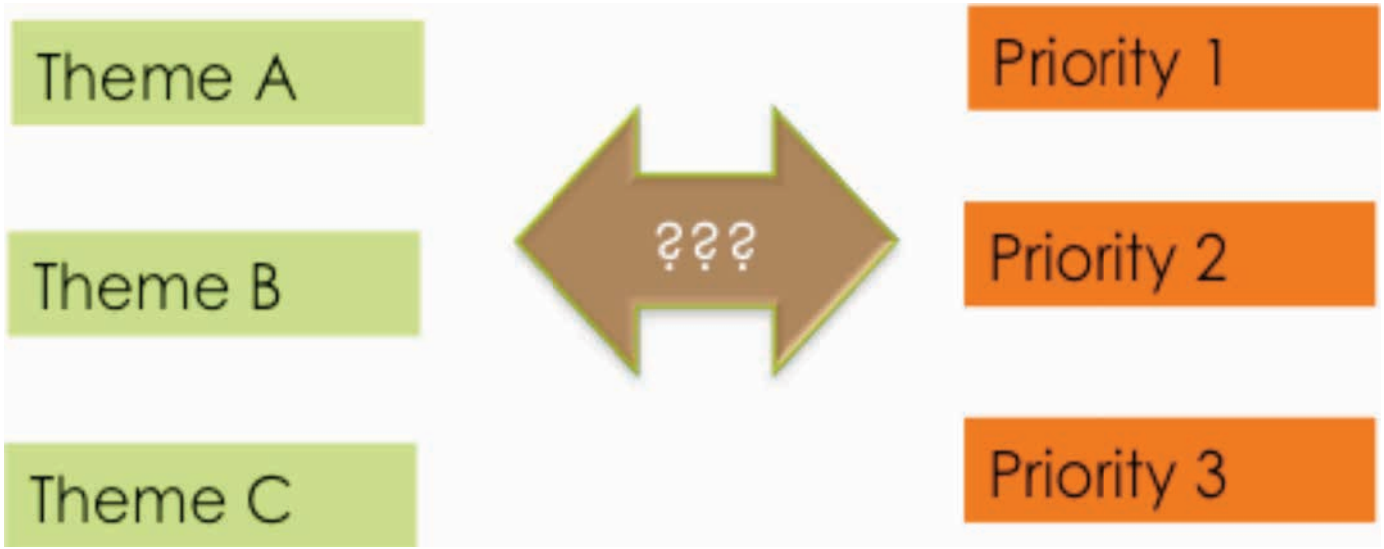
Compare Ideas to Priorities



Look at your ideas and your priorities side by side….

Where is the best match?

Brainstorming during the

Identify the Problem

phase of the Engineering Design Cycle

Pick Top Choices

From Comparing Themes to Priorities…
Choose your top 3-5 choices

Now you're ready to take your ideas to the design team!

The Engineering Design Cycle

Identify the Problem:
Brainstorming

1. State the Goal
2. Generate Ideas
3. Organize Ideas
4. Identify Priorities
5. Compare to Priorities
6. Pick Top Choices