Applying the IDEO Design Process to your “Bug”

1. Understand the problem (20 min)
Complete the following list. Have one group member record your discussions on a computer.
   a. **Client.** Who would sponsor or pay for a project like this?
   b. **Market.** Who does the problem affect and how many people would be affected in the USA? The population of the USA is 301 million.
   c. **Technology.** How is the problem currently solved, or what are the competing devices? It might be good to do a brief web-search. Even if something similar already exists, you may be able to design a modified version, make one cheaper, or make an improvement.
   d. **Constraints.** Anything that limits or restricts your design. For example, what is the maximum weight, battery life, cost, . . .

2. Observe people in real life situations (10 min)
Complete the following list. Have one group member record your discussions on a computer.
   a. Why did the "bug" that you chose "bug" you?
   b. Have you noticed other people experience this problem?
   c. What did they do when they experienced the problem, or how did they fix the "bug"

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**Brainstorming** — See brainstorming PowerPoint

3. Visualize new to the world solutions
   a. **Create a mind map** showing your perception of the problem (25 min) – take a cell phone picture of your finished mind map to turn in with your next homework.
      i. start with a large piece of paper with the problem written in the middle (~3 ft x 3 ft)
      ii. over a 2-minute period, each person should write down words or short phrases that come to mind when thinking about how to solve the problem (battery-powered, fast, healthy, light-weight, rolls, flies, smooth, shiny, conductive, strong, cheap, . . .)
      iii. the group uses the words written down by each team member to **start** a mind map, and they add words and connections to more fully develop the mind-map

   b. **Brainstorm** to find possible SOLUTIONS to the problem (20 min) - have one group member record and number your discussions on a computer.
      i. try to think laterally
      ii. write down and number EVERY idea or piece of a solution (or sketch out ideas)
      iii. defer judgment and encourage wild ideas
      iv. go for quantity (need at least 20 ideas)

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**Brainstorming example for “remote controlled dog” problem from homework 9:**
   1. what if we put buzzers on the dog harness to direct the dog?
   2. we could use cell phone motors to vibrate the harness
   3. using lasers would be neat
   4. what if we had specially trained mosquitoes to bite the dog in
5. how about ESP?
6. we could hire a team of psychics to use brain waves to talk to the dogs
7. we could learn dog barking language and just tell them what to do
8. the dog could communicate with back using a microphone
9. a touch sensor might work for communicating back to headquarters
10. yeah, the dog could scratch itself (ha ha) to trip the touch sensor
11. what about using RF communications from a RC plane overhead
12. use GPS to get dog position
13. what if we used a cell phone to communicate with the dog
14. we could use smell to direct the dog – yeah like a big
15. We could deploy a bunch of RC cats, and the dogs could chase the cats – by controlling the cats, we would control dog position

Narrowing – replay part of IDEO video on narrowing
At this point, you should have a lot of ideas. You can add more after class. As part of your next homework, you will come up with three design alternatives. These alternatives may be completely different ways of solving the problem, or they may be variations of the same general idea.

a. Each person gets to vote their top four ideas (put their initials by the numbered ideas from the brainstorming session. For example, my favorite four ideas may be 1, 2, 8 and 12 from the “remote controlled dog” example above.

b. Develop several design concepts based on the votes from part a. For example, the following concepts might emerge for the “remote controlled dog” problem:
   a. CONCEPT 1: Buzzer placed in the dog’s ear where the frequency of the sound means right, left, forward, back, stop, or return home; RF communication to and from headquarters, GPS to know dog position, . . .
   b. CONCEPT 2: Cell phone vibrating motors mounted on a harness to direct the dog, RF communication to base, GPS for dog position, . . .
   c. CONCEPT 3: A cell phone in the dogs ear to hear the voice of a trainer, GPS to know dog position transferred back to base by RF, trainer would hear dog bark when something found through cell phone, . . .

b. Select the top three design concepts by voting

Pugh method – As part of your next homework, use the Pugh method to evaluate your top three concepts for homework. An example for the dog problem is shown below.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Concept 1</th>
<th>Concept 2</th>
<th>Concept 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>1</td>
<td>(+) +1</td>
<td>(+) +1</td>
<td>(-) -1</td>
</tr>
<tr>
<td>Reliability</td>
<td>3</td>
<td>(0) 0</td>
<td>(+) +3</td>
<td>(0) 0</td>
</tr>
<tr>
<td>Max land area covered</td>
<td>2</td>
<td>(0) 0</td>
<td>(0) 0</td>
<td>(0) 0</td>
</tr>
<tr>
<td>Comfort for dogs</td>
<td>2</td>
<td>(-) -2</td>
<td>(+) +2</td>
<td>(-) -2</td>
</tr>
<tr>
<td>Ease of training</td>
<td>3</td>
<td>(-) -3</td>
<td>(+) +3</td>
<td>(+) +3</td>
</tr>
<tr>
<td>Score</td>
<td>-4</td>
<td>+9</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

If we only planned to develop one concept, we would go with concept 2. We could build prototypes of more than one concept if we had the resources and time. We always have the flexibility to go back to other concepts or elements of other concepts later if needed.