Texas A&M student project: The Creative Process

http://www.youtube.com/watch?v=JiM2j0z72GU
Announcements

• Assignment 4 due the week after next
• Journals
  – integrate them into your work
  – review the instructions
  – improve
An Engineering Design Process

Client Need -> Problem Definition

Problem Definition -> Conceptual Design

Conceptual Design -> System-level Design

System-level Design -> Detail Design

Detail Design -> Design Communication

Final Design
Conceptual Design

Generate concepts of candidate designs:

5. Establish design specifications
6. Generate ideas
Questions

• What is creativity?
• Are some people born naturally creative?
• Should the rest of us be resigned to the mundane?
• Where do great ideas come from?
• What keeps us from being more creative?
Draw four straight lines that pass through all the dots, without picking up your pencil.
Why is this hard?

Mental Blocks
Did you limit yourself unnecessarily?
Did you limit yourself unnecessarily?
Common Mental Blocks

• Perceptual: define problem too narrowly
• Fixation: can’t get past one idea
• Emotional: anxiety, fear of failure, frustration
• Cultural: social patterns that blind us to possible solutions
• Environmental: distractions, poor atmosphere
Conceptual Blockbusting

- First step is to recognize them.
- Second, use structured techniques to break out of your current thinking pattern.
Idealistic Learning Curve

Success!
Realistic Learning Curve

Success!
Where do ideas come from?

Stanford Professor on Creativity

http://www.youtube.com/watch?v=yPLxf2ynmMU
Where do new ideas come from?

• Adaptations of existing ideas to new contexts
  – Generalize the problem, look for others’ solutions
• Combining existing ideas
• Analogy
Technique 1: Brainstorming

• List all ideas
  – individually first, then as a group
• No criticism or evaluation!
  – encourage crazy, outlandish ideas
  – have fun!!
Build on Ideas by Asking…

• Adapt?
• Modify?
• Magnify?
• Minimize?
• Substitute?
• Rearrange?
• Combine?
Lateral Thinking

• Stimulate thinking by picking a random word, and free associate.
## Technique 2: Morphological Chart

<table>
<thead>
<tr>
<th>Function</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>Function A</td>
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<td>Function B</td>
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<td>Door</td>
<td>Gravity chute</td>
<td>...</td>
</tr>
<tr>
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<td>Bag</td>
<td>Vacuum</td>
<td>...</td>
</tr>
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<td>Mortar &amp; pestle</td>
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# Example

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Exercise

• In your teams, identify the 5 or so primary functions of your design problem.

• For each function, think of 4 or more ways that function could be accomplished.
  – Ignore all other functions!!

• What combinations of ideas look interesting?