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ESD.051 / 6.902

Engineering Innovation & Design

Topics

- Design Evaluation
- 10-Step Design Process
- Ideas of Innovation

Homework

Critique Of Design

- What did you do?
- What makes for a good critique?

The 10-Step Design Process

Research (steps 1-6)

- **1) Identify Needs**
 - What's the problem?
- **2) Information Phase**
 - What exists?
- **3) Stakeholder Phase**
 - What's wanted? And who wants it?



Napoleon Toothbrush <http://en.wikipedia.org/wiki/File:NapoleonToothbrush.jpg>

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Research (steps 1-6)

- **1) Identify Needs**
 - What's the problem?
- **2) Information Phase**
 - What exists?
- **3) Stakeholder Phase**
 - What's wanted? And who wants it?

Research (cont.)

- **4) Planning/Operational Research**
 - What's realistic? What limits us?
- **5) Hazard Analyses**
 - What's safe? (What can go wrong?)
- **6) Specifications**
 - What's required?

Design (steps 7-9)

- **7) Creative Design**
 - Ideation
- **8) Conceptual Design**
 - Potential solutions
- **9) Prototype Design**
 - Create a version of the preferred design

Verification (step 10)

- **10) Verification**
 - Does it work? If not, redesign
- **End Solution**

Verification (step 10)

- 10) Verification
 - Does it work? If not, redesign
- End Solution.....?

Design Process Exercise – Map steps to **cooking dinner**

- 1) Identify Needs
- 2) Information Phase
- 3) Stakeholder Phase
- 4) Planned Research
- 5) Hazard Analyses
- 6) Specifications
- 7) Creative Design
- 8) Conceptual Design
- 9) Prototype Design
- 10) Verification



Design Process Exercise – Map steps to throwing a surprise party for your best friend!

- **1) Identify Needs**
- **2) Information Phase**
- **3) Stakeholder Phase**
- **4) Planned Research**
- **5) Hazard Analyses**
- **6) Specifications**
- **7) Creative Design**
- **8) Conceptual Design**
- **9) Prototype Design**
- **10) Verification**



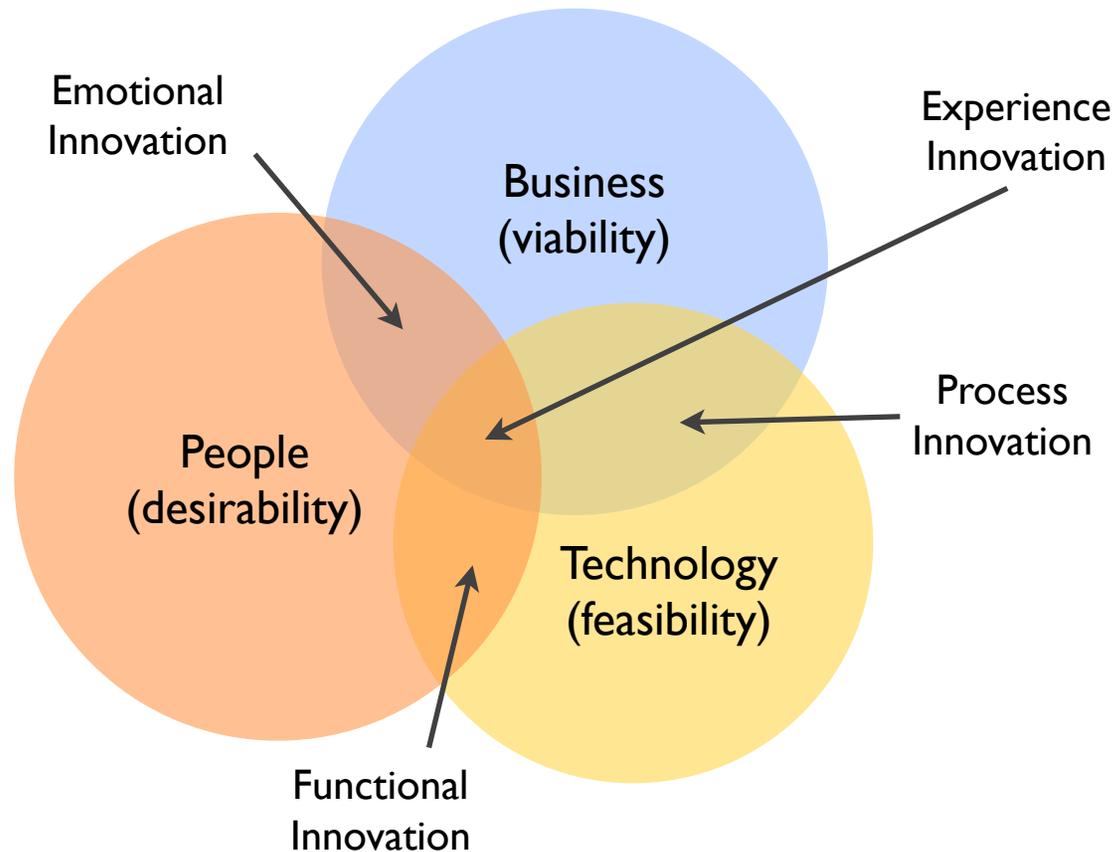
Design Process Exercise – Map steps to **making a car fueled a nuclear reactor**

- **1) Identify Needs**
- **2) Information Phase**
- **3) Stakeholder Phase**
- **4) Planned Research**
- **5) Hazard Analyses**
- **6) Specifications**
- **7) Creative Design**
- **8) Conceptual Design**
- **9) Prototype Design**
- **10) Verification**



On Innovation

Innovation: a design-consultant's view



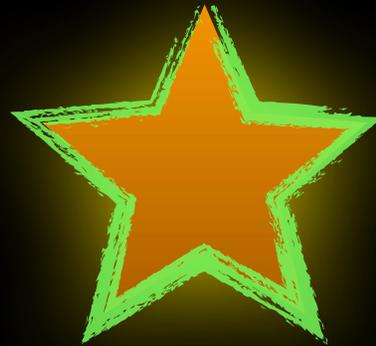
The Reality of Innovation

Innovation is the result of resolving...



The Reality of Innovation

**A designer reconciles the
seemingly irreconcilable**



**Desire &
Require**

Homework

- 1) Design a 2-player game
- 2) Maximum cost of materials < \$5
- 3) **Must** include an element of chance
- 4) **Must** be able to be taught within 3 minutes



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ESD.051J / 6.902J Engineering Innovation and Design
Fall 2012

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