


D-Lab

Spring 2010

Development through
Dialogue, Design and Dissemination

Today's Class

- Logistics
- Design Box Presentations
- Design, Innovation, Invention and the Design Process
- Discussion
  - Readings
- Case Studies

Some Logistics

- Turning in Homework
- Course website
- Textbooks

Technology Boxes

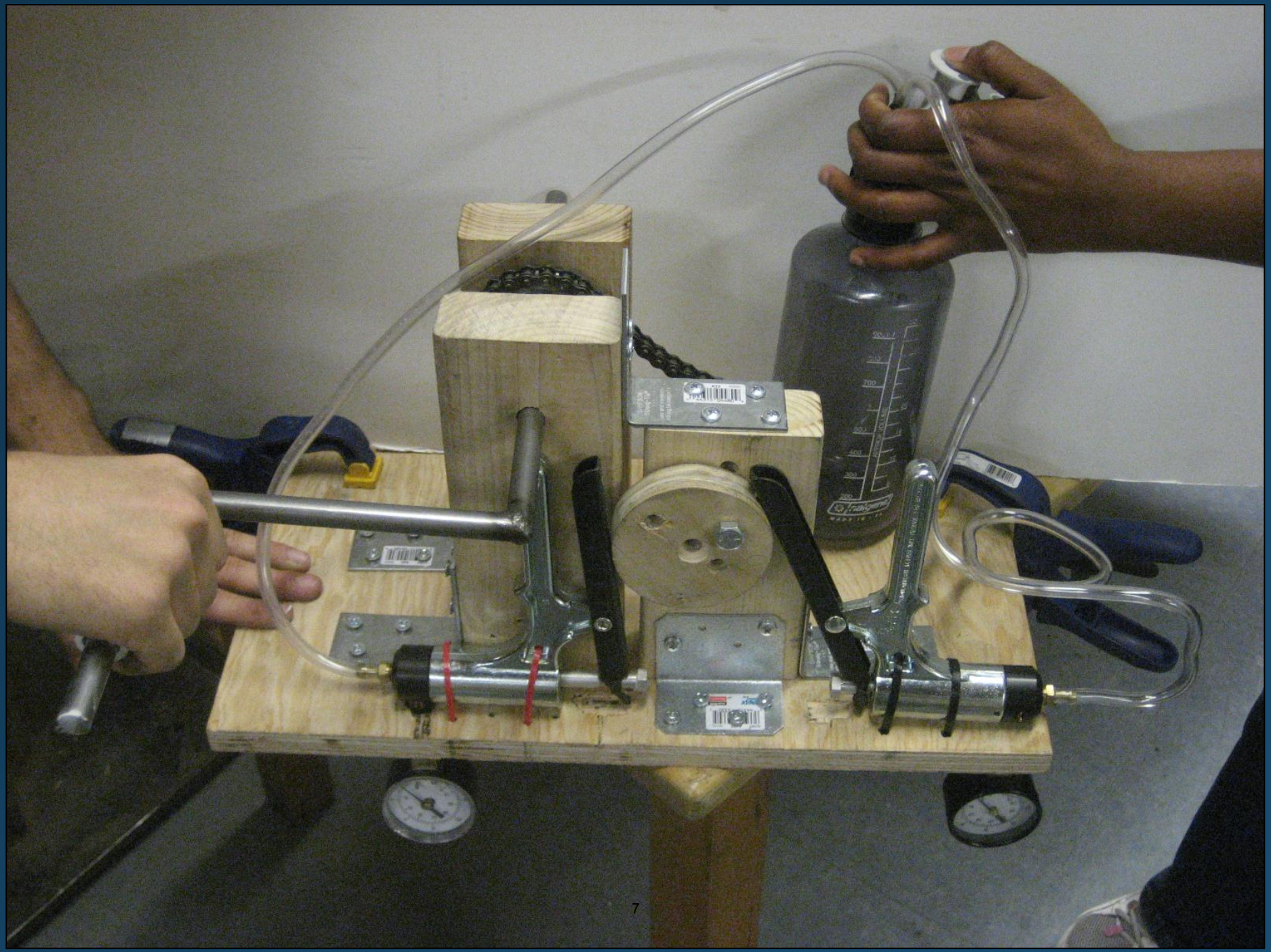
- Which one is your favorite?
- Which one exemplifies the trade-offs that were made

- 2 minutes or less!

Design, Innovation and Invention

invent: to be the first to think of, make, or use something

design: to work out or create the form or structure of something



Innovation

- Clear plastic bottles poking through roof capture sunlight to illuminate windowless rooms

http://www.youtube.com/watch?v=CS3764DmIP4

Harder problems lead to better inventions

Shawn Frayne

Challenges in Design

- Tradeoffs
- Dynamics and long-term effects of use
- Details
- Time Pressures
- Economics
- Use and mis-use
- Ethics

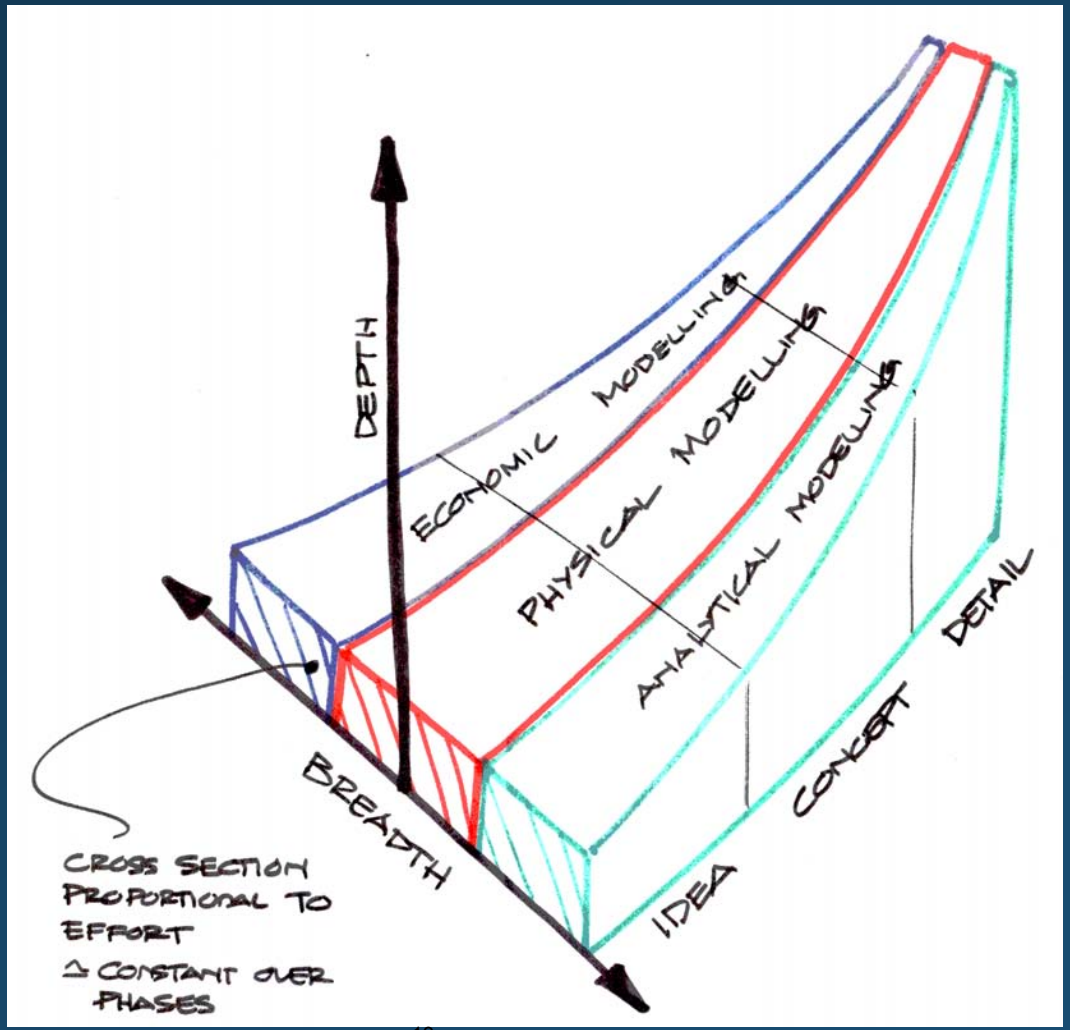
The Design Process

- Information Gathering
- Problem Definition
- Design Specifications
- Idea Generation
- Analysis & Experimentation
- Concept Evaluation
- Detail Design
- Fabrication
- Testing & Evaluation

The Creativity Caveat

- Don’t let the process detract from the product

The Changing Approach



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Design Specifications

- Translate customer needs into quantitative design performance targets
- Define internal basis for measuring success
- Capture the necessary characteristics for a successful product
- Provide a basis for resolving trade-offs

Translating Customer Needs

Need	Design Attribute	Units	Owner
Easy assembly	Assembly time	seconds	Floyd
Safe	Structural safety factor		Lisa
Safe	Fatigue life	cycles	Nathan
Magical	Works like magic	subjective	Meta

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Brainstorming Method

- generate lots of ideas
- explore all classes of solutions
- develop new perspectives
- generate usable information

Brainstorming Rules

- Defer judgment
- Build upon the ideas of others
- One conversation at a time
- Stay focused on the topic
- Encourage wild ideas

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Pugh Chart

	NAIL	RING SHANK	STAPLE	SCREW
				
RATE	S	S	+	−
COST	S	−	+	−
HOLDING	S	+	−	++
EFFORT	S	S	+	−

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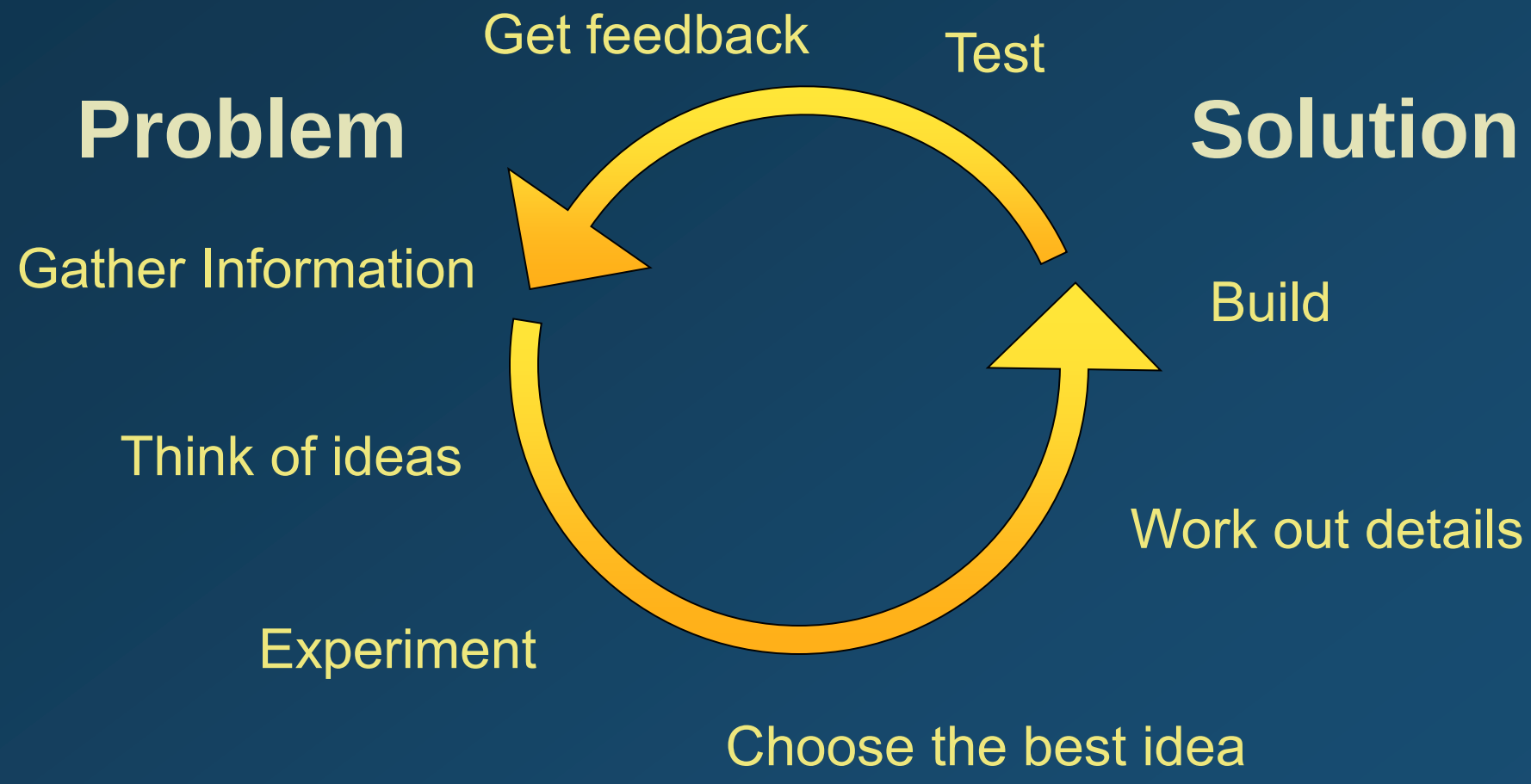


Design for Developing Countries

"Brute force engineering options often meet the criteria but somewhere there is a profound solution, which is simple, cheap, and beautiful. Hold out for this as long as possible."

-Kurt Kornbluth
former D-Lab Instructor

Battery-operated field incubator

$1250

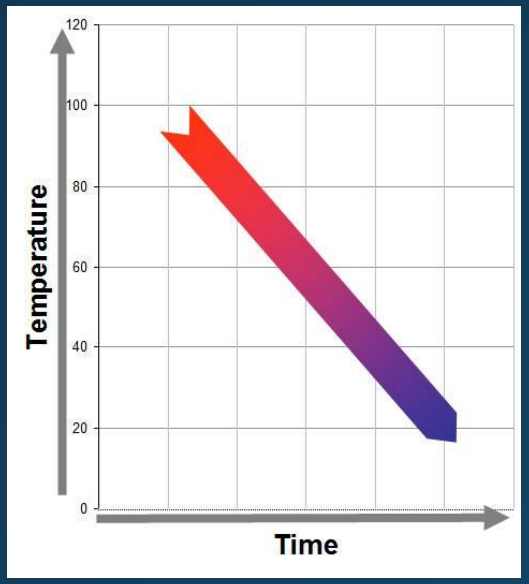
Thermo-electric field incubator

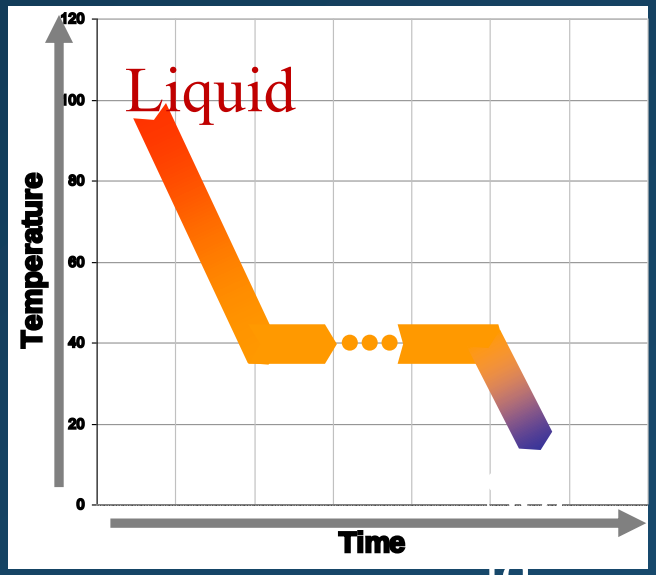
$500

Phase change incubator

$100

The Phase Change Incubator





Guiding Principles for DfDC

- Identify functional requirements
- Encourage participatory development
- Value indigenous knowledge
- Promote local innovation
- Strive for sustainability

Technology Case Studies

Coming up...

- Project Selection (Mar 1)
  - Design challenge descriptions due for review by Wednesday, Feb 17
  - Slides due by noon on Wednesday, Feb 24
- Readings on course website
- Homework 1 (due Feb 10)
- Homework 3 (due Feb 10)

EC.720J / 2.722J D-Lab II: Design
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