



# 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



# Design, Innovation and Invention

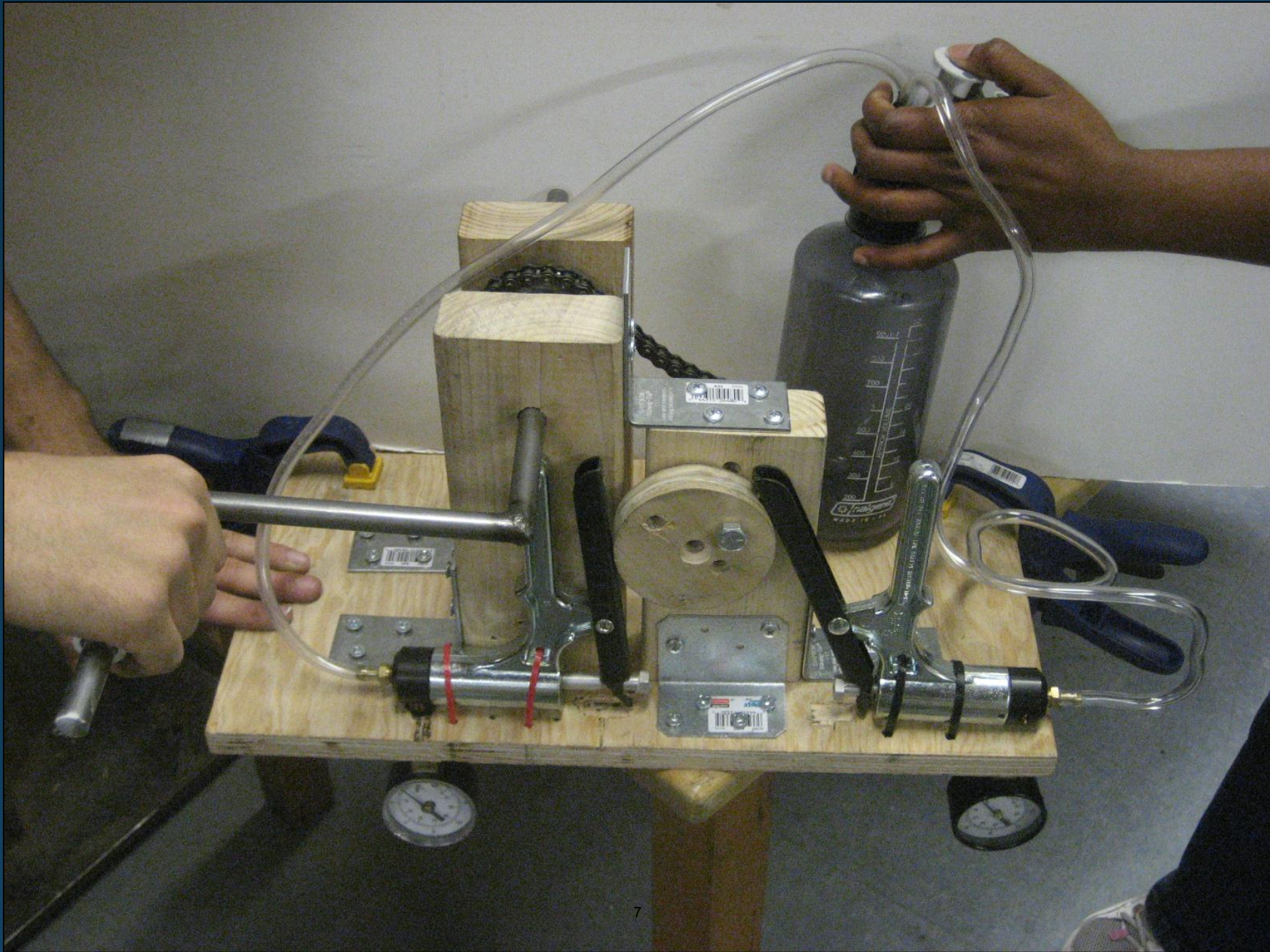


**invent:** to be the first to think of, make, or use something

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

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An abstract, vertical, wavy pattern in shades of yellow, orange, and brown, resembling marbled paper or a close-up of a textured surface, located on the left side of the slide.

# 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

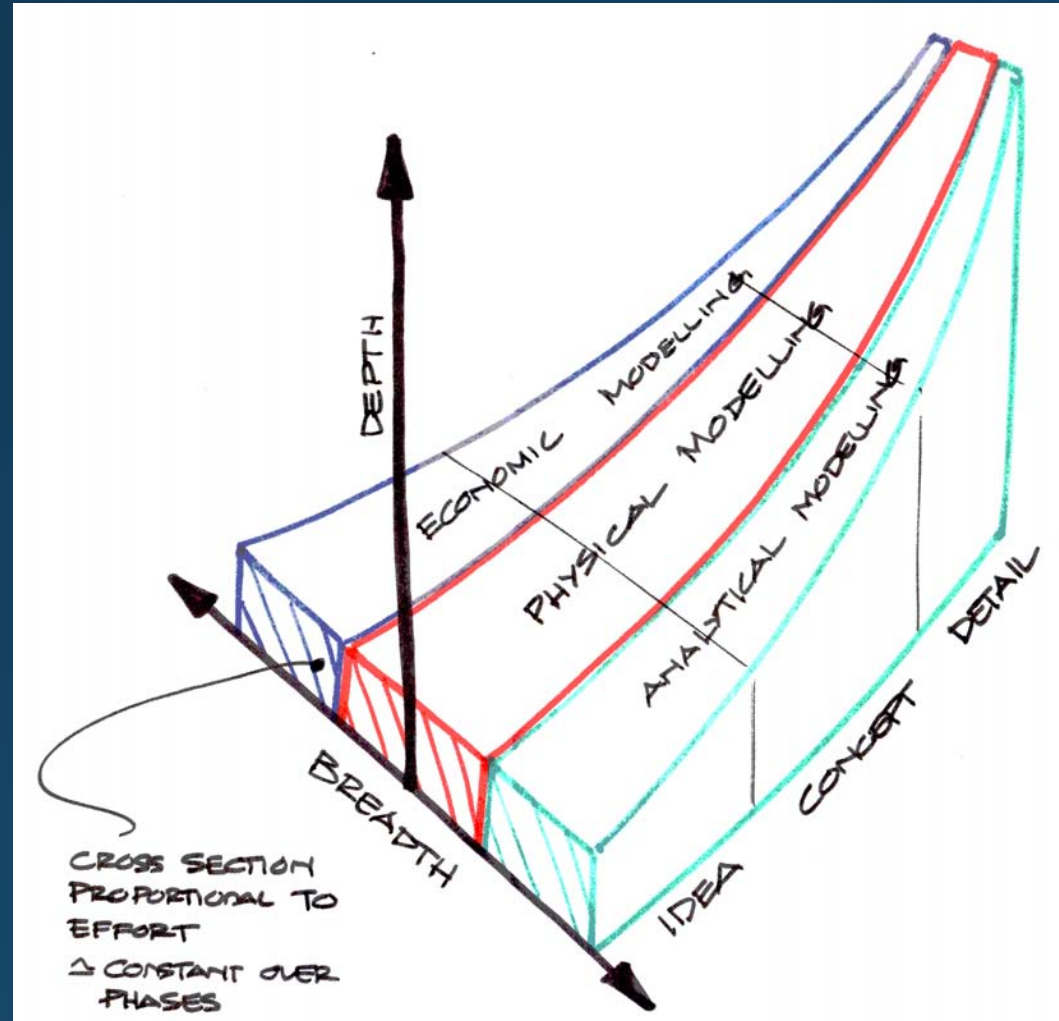
- Information Gathering
- Problem Definition
- Design Specifications
- Idea Generation
- Analysis & Experimentation
- Concept Evaluation
- Detail Design
- Fabrication
- Testing & Evaluation



# The Creativity Caveat

- Don't let the process detract from the product

# The Changing Approach







# The Design Process

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An abstract, vertical decorative element on the left side of the slide. It features a complex, marbled pattern in shades of yellow, orange, and brown, resembling liquid or smoke. The pattern is dense and textured, with various swirls and eddies.

# The Design Process

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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

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



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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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# The Design Process

## Problem

## Solution

Get feedback

Test

Build

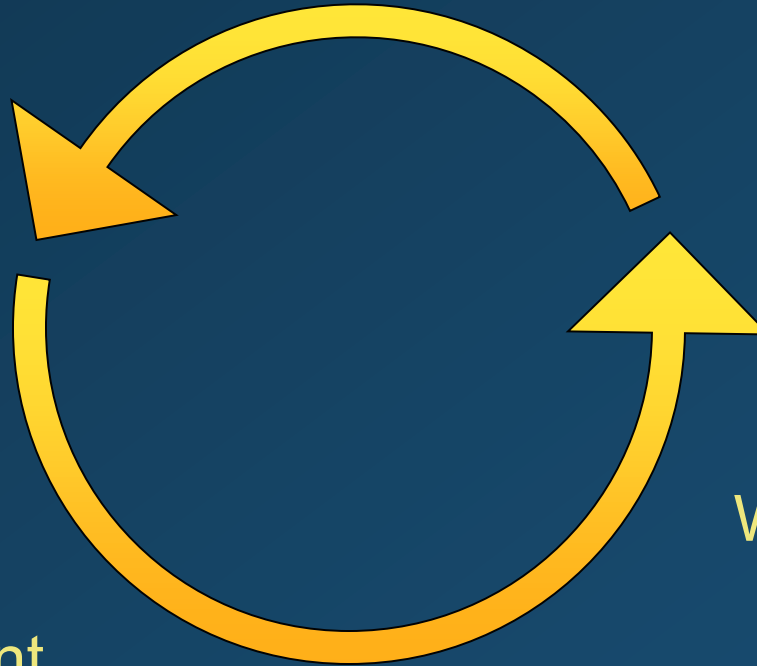
Work out details

Choose the best idea

Experiment


Think of ideas

Gather Information





# Design for Developing Countries



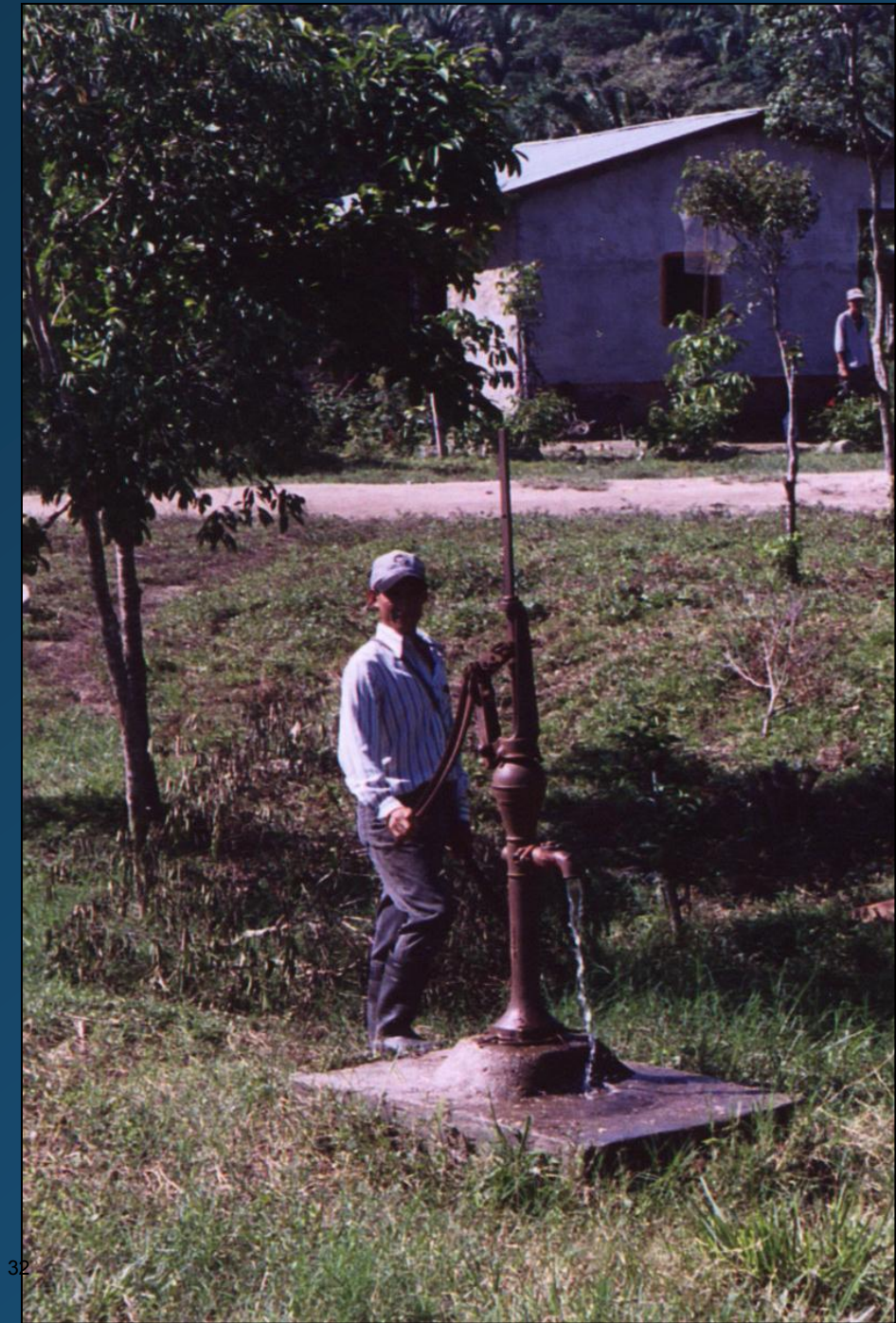
“Brute force engineering options often meet the criteria but somewhere there is a profound solution, which is simple, cheap, and beautiful. Hold out for this as long as possible.”

*-Kurt Kornbluth  
former D-Lab Instructor*













Battery-operated  
field incubator

\$1250



Thermo-electric  
field incubator

\$500

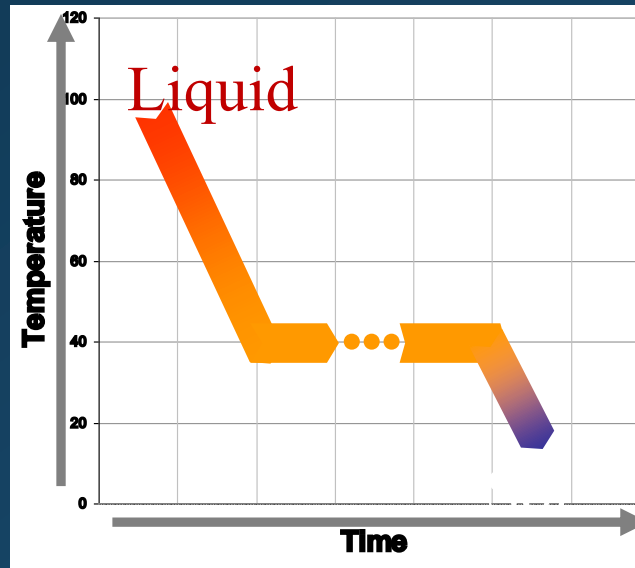
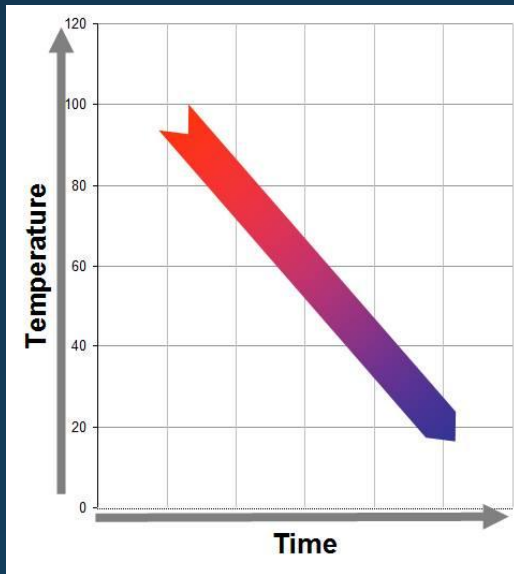


Phase change  
incubator

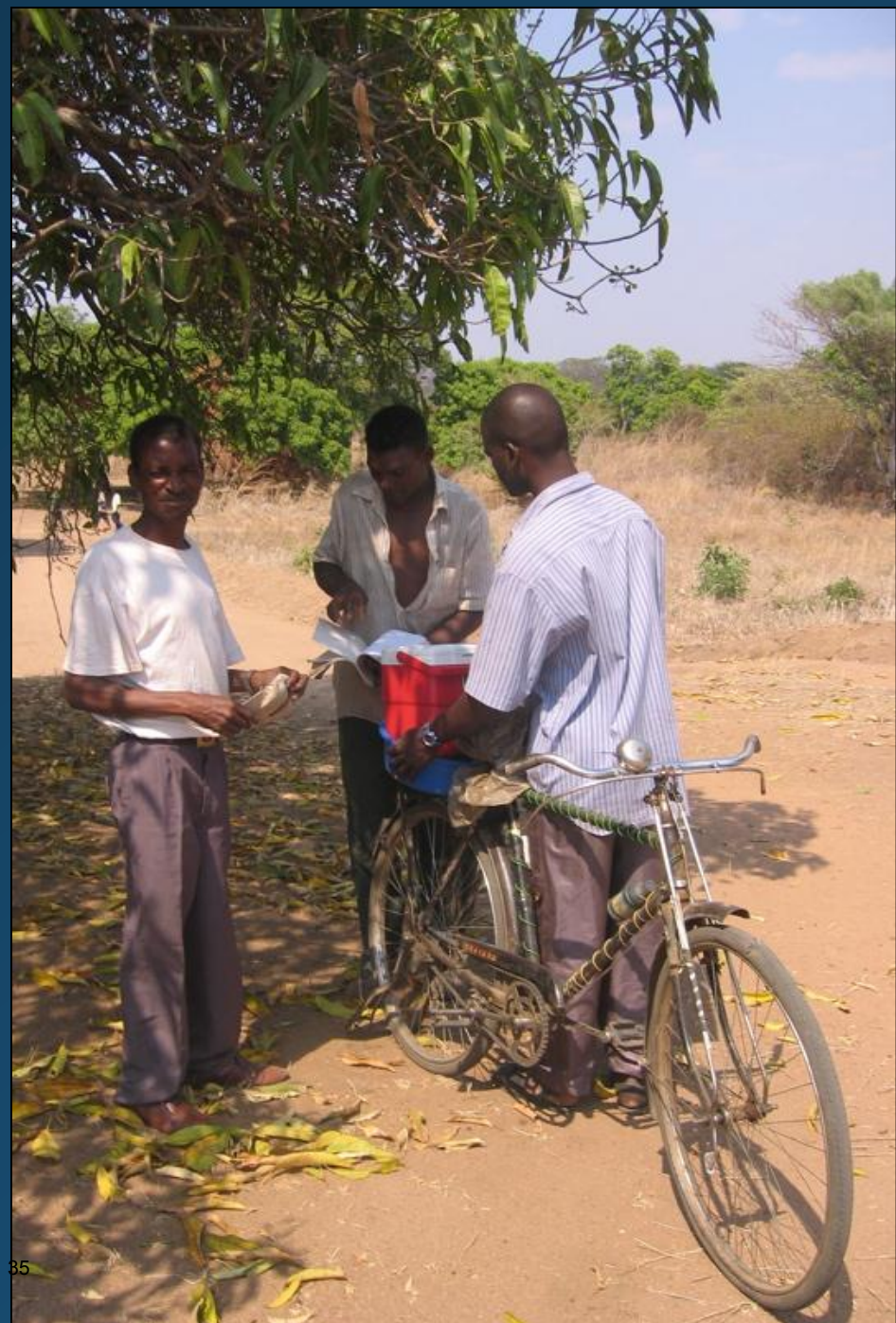
\$100

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# 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

MIT OpenCourseWare  
<http://ocw.mit.edu>

EC.720J / 2.722J D-Lab II: Design  
Spring 2010

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