BiD, Wicked Problems & Design Thinking

- UC Berkeley Interdisciplinary Design Seminar, Spring 1989
Wicked Problems: Define by two UC Berkeley Professors

- Death and life Jayne Jacobs, wicked problems 1961
Wicked Problem Framing the Foundation for Design Thinking

• May not be solvable. Solutions may be better or worse.
• Can only be understood within socially complex contexts.
• Solutions require social learning processes.
• Requires iteration.
• Design methods & tools require developing a shared understanding of the problem.
Rittel’s Inspiration to Design Thinking

- Peter Rowe, 1987: Underlying structure of inquiry common to all designing. Limitations of a procedural view.
- **Peter Rowe** summarizes well-defined, ill-defined, and **wicked problems** from Horst Rittel.
Berkeley’s Model of Design Thinking & Skills Development

Concrete

Abstract

(Re)Frame
insight: deep understanding
assumptions
mental models
ladder up and down

Ideate
defer judgment
play

Observe
Notice
empathy
curiosity
mindfulness

Test
make things
take risks
tolerance of “failing”

Analysis – Asking Why?

Synthesis – Asking How?

increase tolerance for ambiguity
internalize locus of control
adopt a growth mindset
Sophi’s Hand

- Berkeley Prosthetics Project
- Daniel Lim, Chris Meyers & Alexa Koening

http://engineering.berkeley.edu/magazine/fall-2015/sophies-super-hand
✓ **Tangible Design Roadmapping Puzzles**
A set of puzzles for team based activities for managers, designers, and engineers. Euiyoung Kim

✓ **Tangible Design Roadmapping Worksheets**
A set of worksheets for individual design roadmapping exercises.

[Link to Design Roadmapping: User Experience Focused Strategy]

[Links to Design Roadmapping Worksheet (1/2) and (2/2)]

[Links to http://best.berkeley.edu/best-research/design-roadmap/]

Tensegrity Robots: Space Exploration ➔ Co-Robots

- 10 kg probe deliver 1 kg payload 1 km away
- Only lasts for hour or two (must be quick)
- Deliver payload accurately
- Handles difficult terrain (e.g., 30% slopes)
- Lower costs in mission to the Moon, Titan
Tensegrity

• Coined by Buck Minster Fuller
• Art explored by Kenneth Snelson in 1960’s
Robot Built from Tensegrity Structures

- What is a tensegrity structure?
  - Structure build from rods and cables
  - Rods do not touch each other
Multi-Function: Unpacking, Landing, & Mobility
Hopping and Rolling Tensegrity Robots
Lee-Huang Chen Kyunam Kim
Demo: 3:20-5:00 Jacobs Hall
Diversifying Engineering

ENGINEERING IS
Exploring Space with Shape-Shifting Robots
Synaptic Motion: Tensegrity-Inspired Dance (Colin Ho & Jodi Lomask)
Future: UAV dropped Analog Demonstration
Future: SUPERBall Bird – Crash Proof Flight
Future: Tensegrity, Biology & Co-Robots

Dr. Donald Ingber, Harvard U.

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