BiD, Wicked Problems & Design Thinking

- UC Berkeley Interdisciplinary Design Seminar, Spring 1989

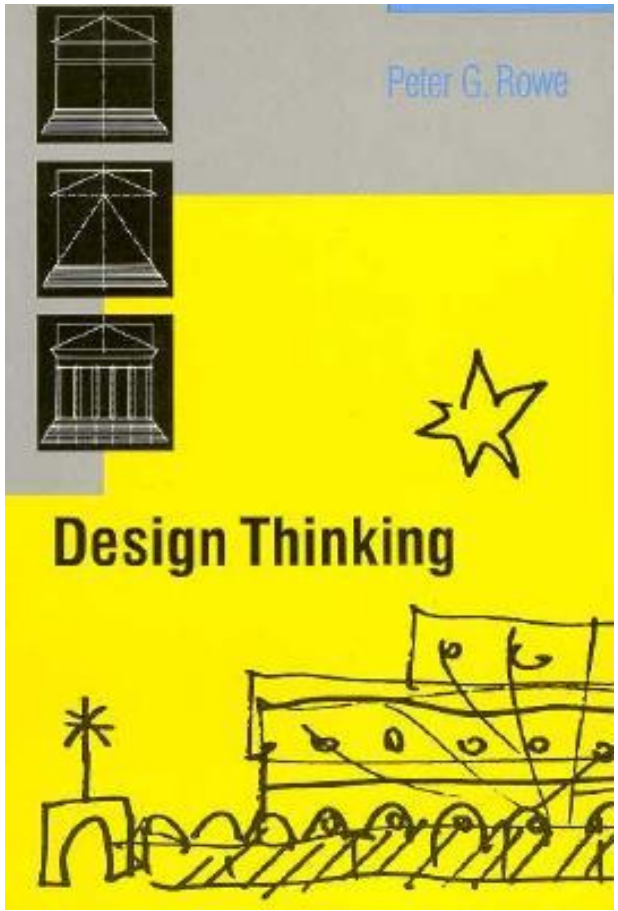
Wicked Problems: Define by two UC Berkeley Professors

- Rittel, Horst W. J.; Melvin M. Webber (1973). "Dilemmas in a General Theory of Planning" (PDF). *Policy Sciences* **4**: 155–169.
- Churchman, C. West (December 1967). "Wicked Problems". *Management Science* **14** (4), 1967. doi:10.1287/mnsc.14.4.B141. (learned the expression from a Horst Rittel lecture at Berkeley)
- Death and life Jayne Jacobs, wicked problems 1961

Wicked Problem Framing the Foundation for Design Thinking

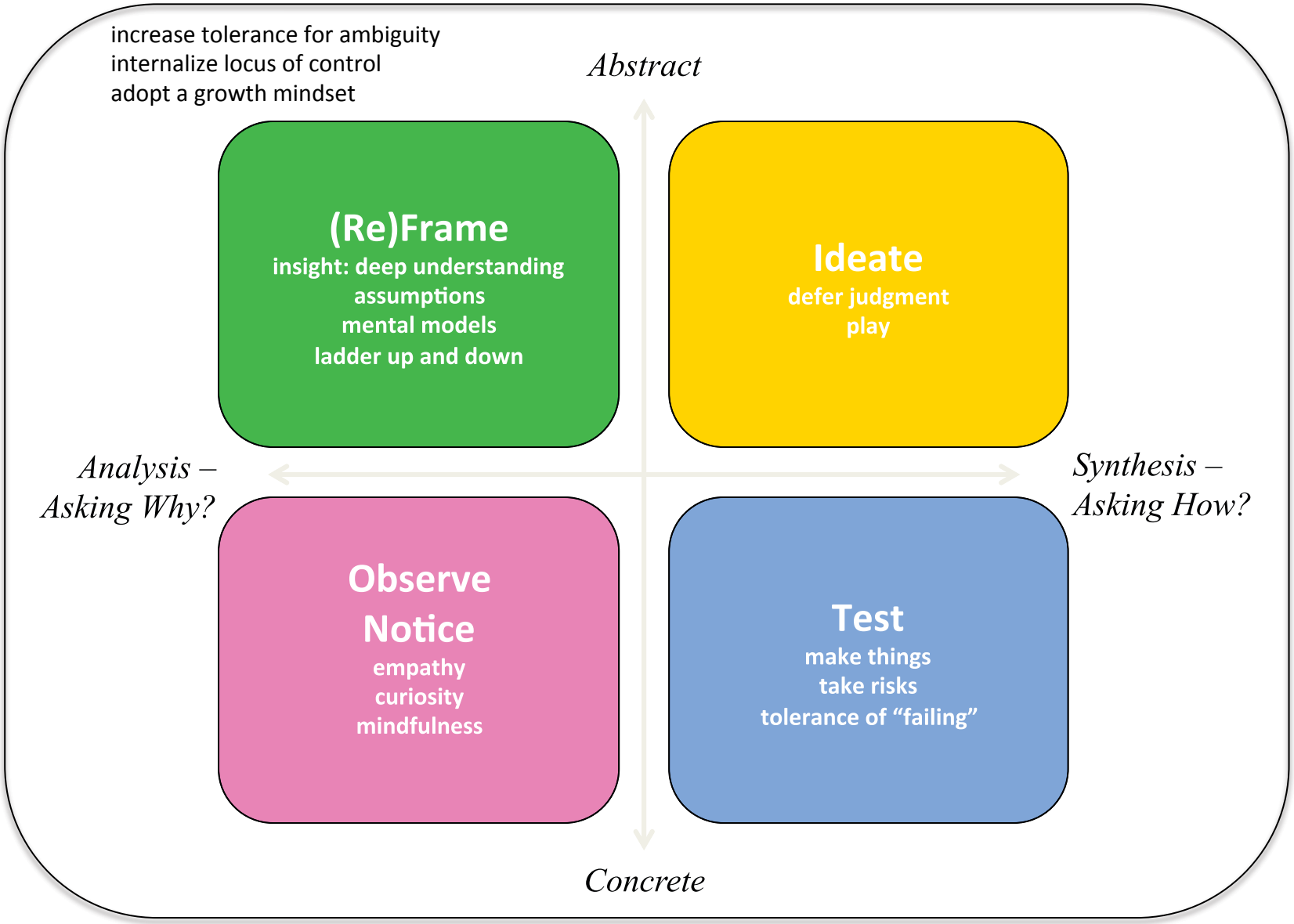
- May not be solvable. Solutions may be better or worse.
- Can only be understood within socially complex contexts.
- Solutions require social learning processes.
- Requires iteration.
- Design methods & tools require developing a shared understanding of the problem.

Rittel's Inspiration to Design Thinking



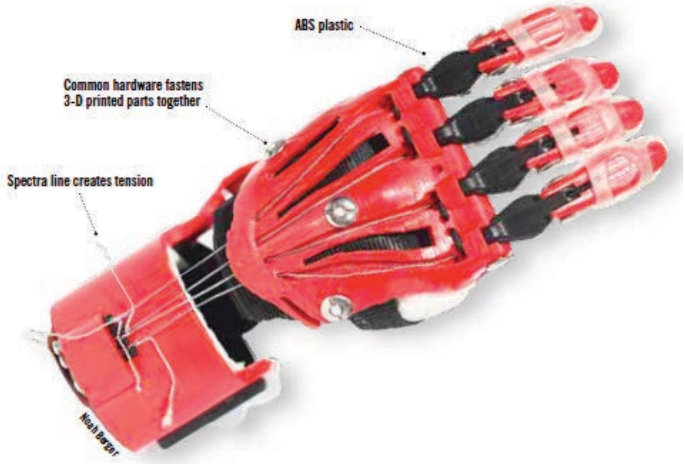
- Peter Rowe, 1987: Underlying structure of inquiry common to all designing. Limitations of a procedural view.
- **Peter Rowe** summarizes well-defined, ill-defined, and **wicked problems** from Horst Rittel.
- Design Thinking symposium, Delft University of Technology, 1991.
- Buchanan, Richard, "Wicked Problems in Design Thinking," *Design Issues*, vol. 8, no. 2, Spring 1992.
- Brown, Tim, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, 2009.

Berkeley's Model of Design Thinking & Skills Development



Sophi's Hand

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

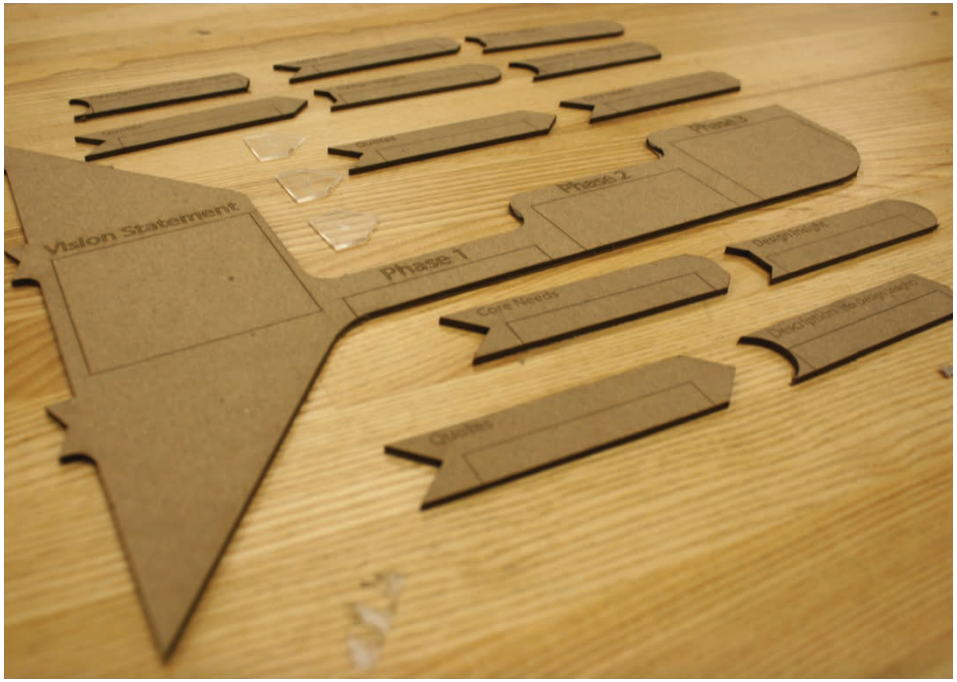


http://engineering.berkeley.edu/magazine/fall-2015/sophies-super-hand

Design Roadmapping: User Experience Focused Strategy

✓ **Tangible Design Roadmapping <u>Puzzles</u>**

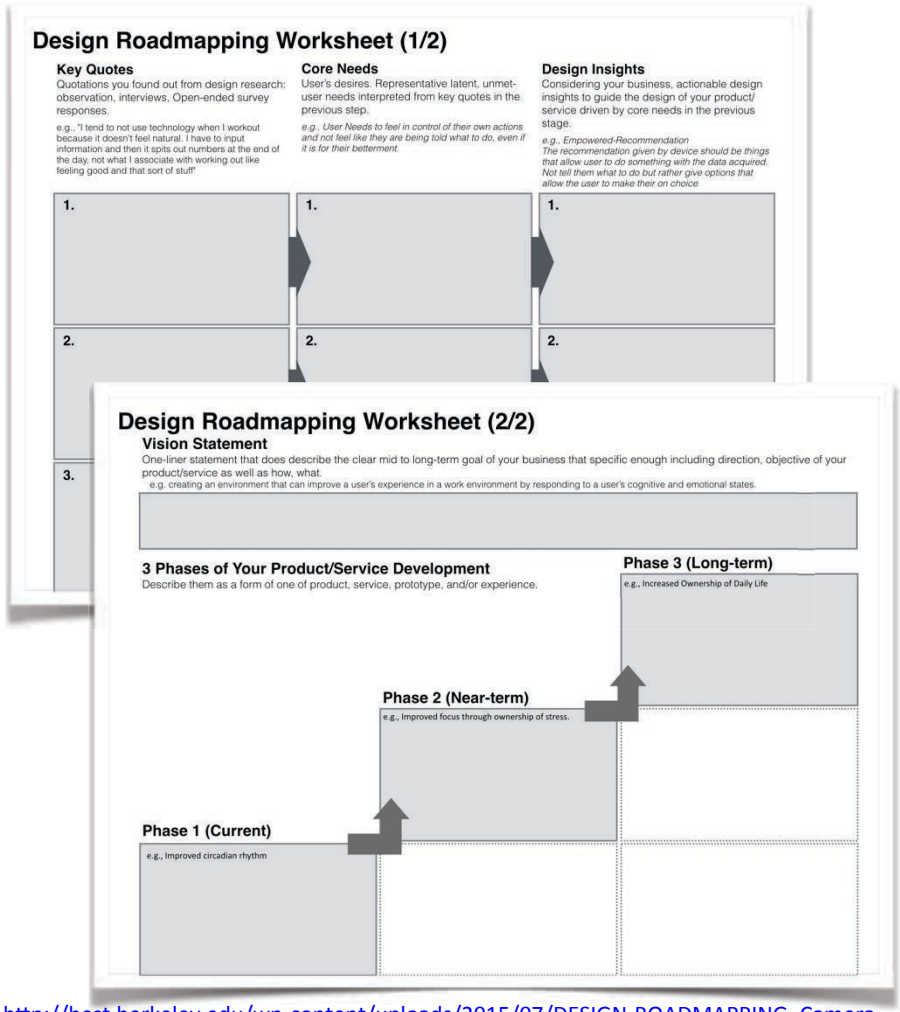
A set of puzzles for team based activities for managers, designers, and engineers. Euiyoung Kim



http://best.berkeley.edu/best-research/design-roadmap/

✓ **Tangible Design Roadmapping <u>Worksheets</u>**

A set of worksheets for individual design roadmapping exercises.



Design Roadmapping Worksheet (1/2)

Key Quotes
Quotations you found out from design research: observation, interviews, Open-ended survey responses.

e.g., "I tend to not use technology when I workout because it doesn't feel natural. I have to input information and then it spits out numbers at the end of the day, not what I associate with working out like feeling good and that sort of stuff"

Core Needs
User's desires. Representative latent, unmet-user needs interpreted from key quotes in the previous step.

e.g., User Needs to feel in control of their own actions and not feel like they are being told what to do, even if it is for their betterment.

Design Insights
Considering your business, actionable design insights to guide the design of your product/service driven by core needs in the previous stage.

e.g., Empowered-Recommendation
The recommendation given by device should be things that allow user to do something with the data acquired. Not tell them what to do but rather give options that allow the user to make their on choice

1. 1. 1.
2. 2. 2.
3.

Design Roadmapping Worksheet (2/2)

Vision Statement
One-liner statement that does describe the clear mid to long-term goal of your business that specific enough including direction, objective of your product/service as well as how, what.
e.g. creating an environment that can improve a user's experience in a work environment by responding to a user's cognitive and emotional states.

3 Phases of Your Product/Service Development
Describe them as a form of one of product, service, prototype, and/or experience.

Phase 3 (Long-term)
e.g., Increased Ownership of Daily Life

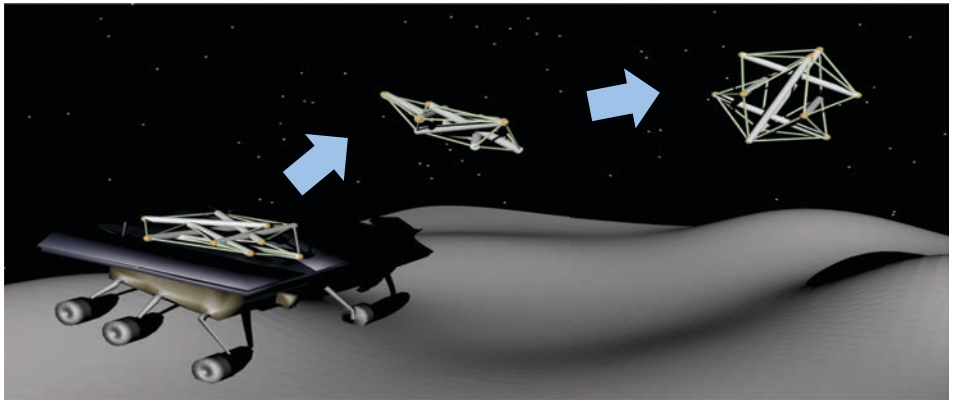
Phase 2 (Near-term)
e.g., Improved focus through ownership of stress.

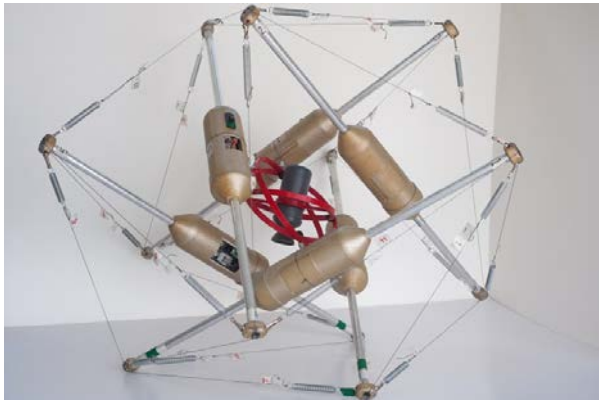
Phase 1 (Current)
e.g., Improved circadian rhythm

http://best.berkeley.edu/wp-content/uploads/2015/07/DESIGN-ROADMAPPING_Camera-Ready_Final_with-Abstract_Letter.pdf

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



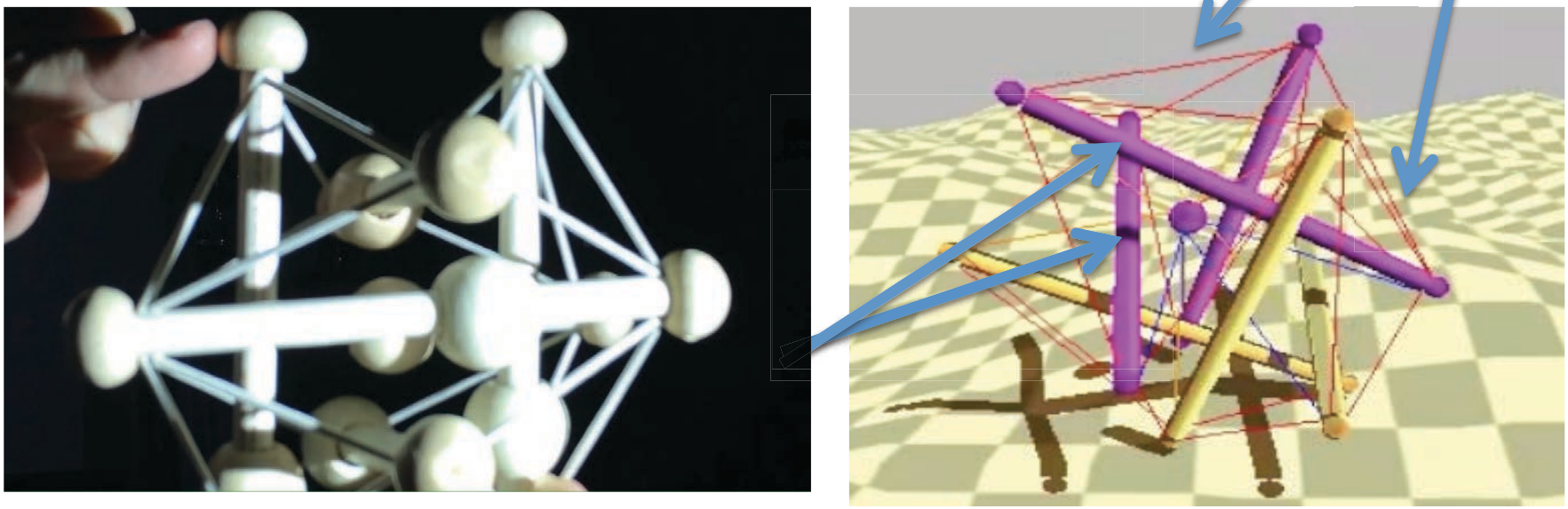


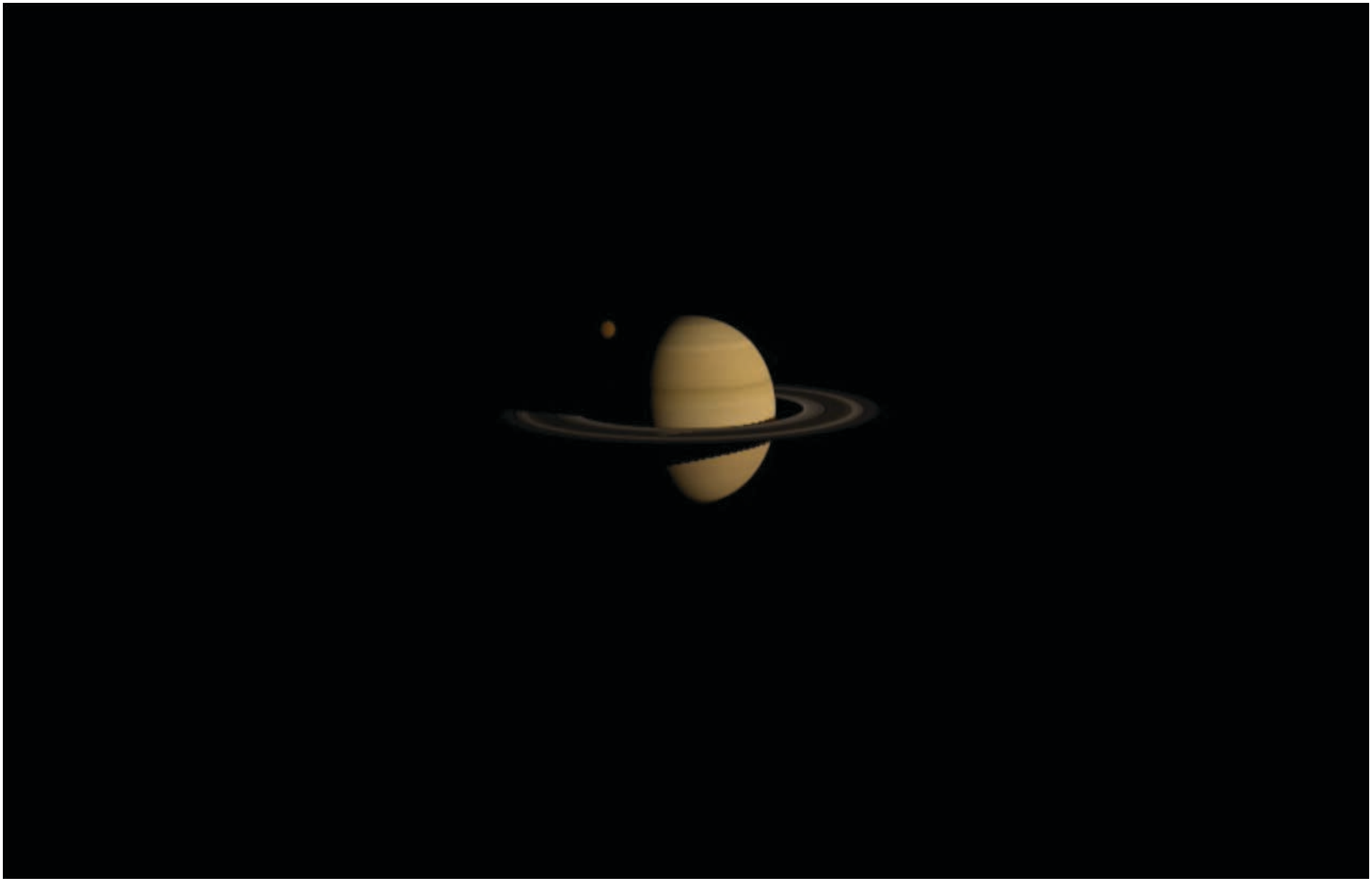
Tensegrity

- Coined by Buck Minster Fuller
- Art explored by Kennith Snelson in 1960's

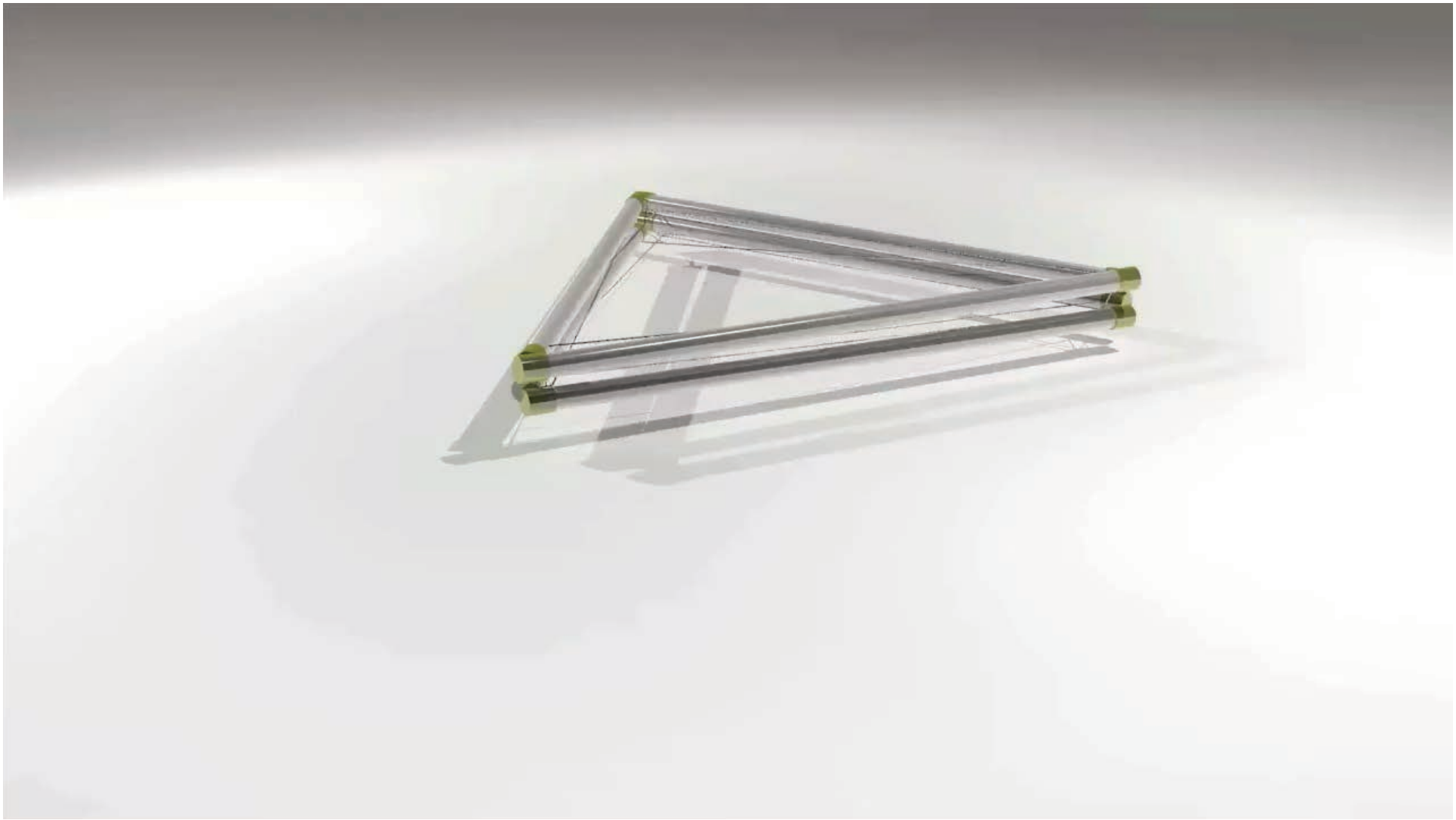
Robot Built from Tensegrity Structures

- What is a tensegrity structure?
  - Structure build from rods and cables
  - Rods do not touch each other





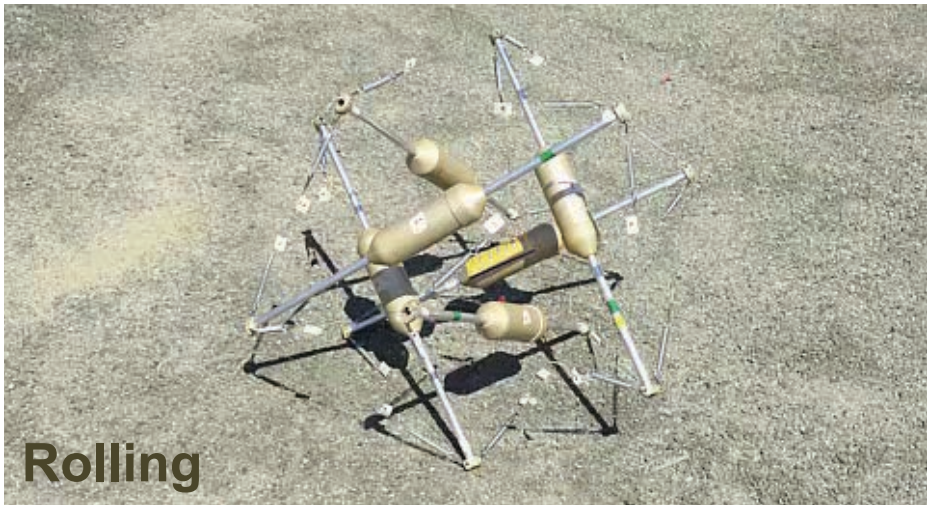
Multi-Function: Unpacking, Landing, & Mobility

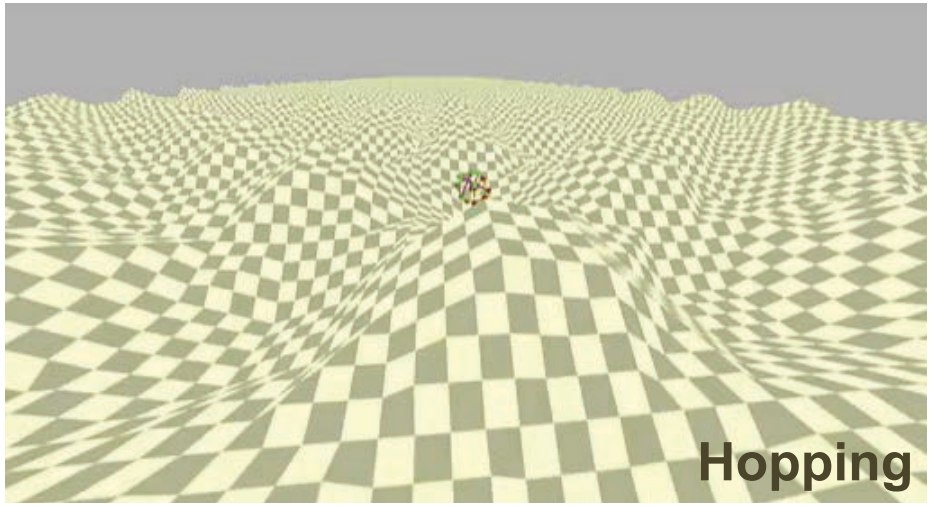


Hopping and Rolling Tensegrity Robots

Lee-Huang Chen Kyunam Kim

Demo: 3:20-5:00 Jacobs Hall

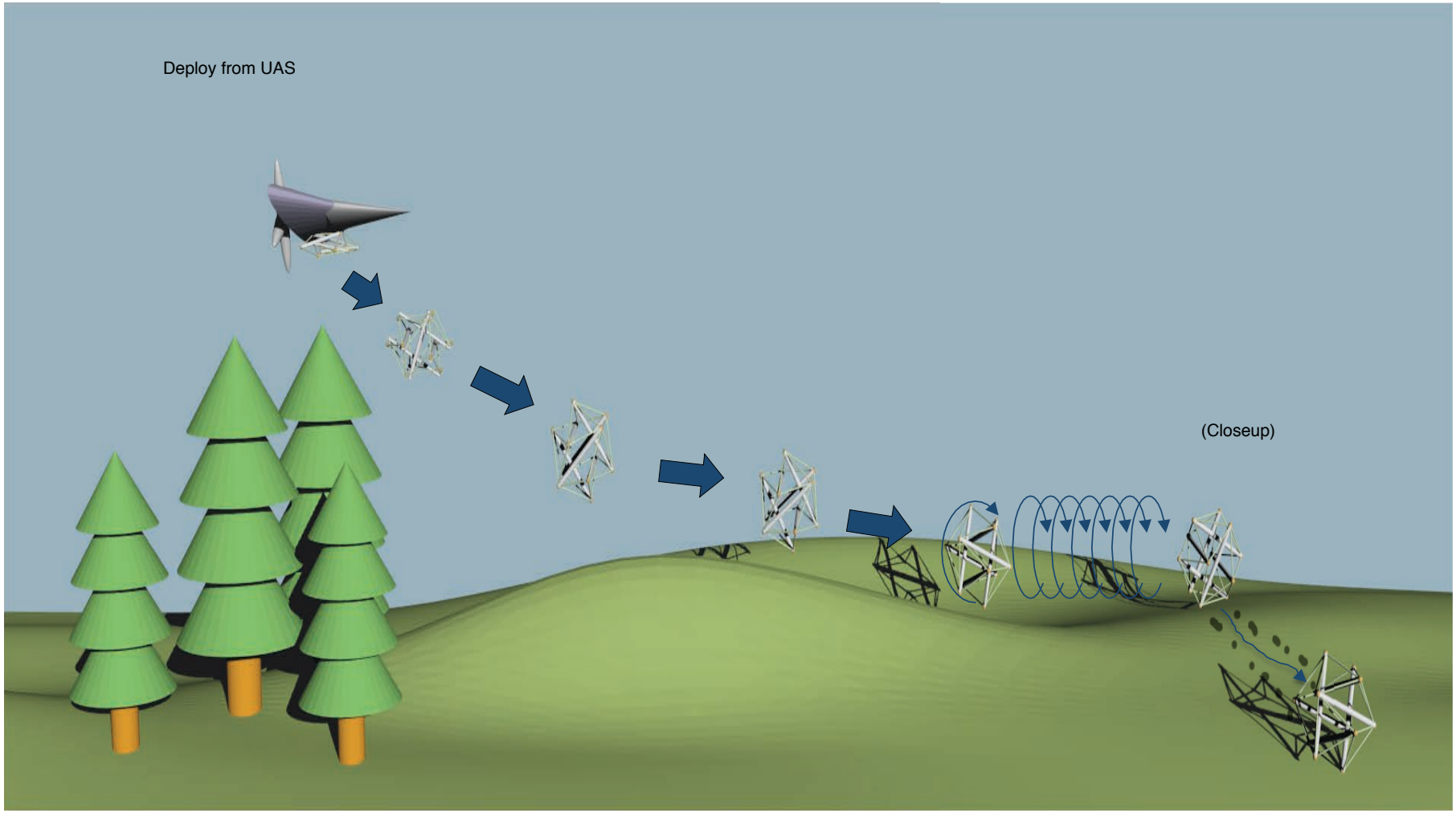




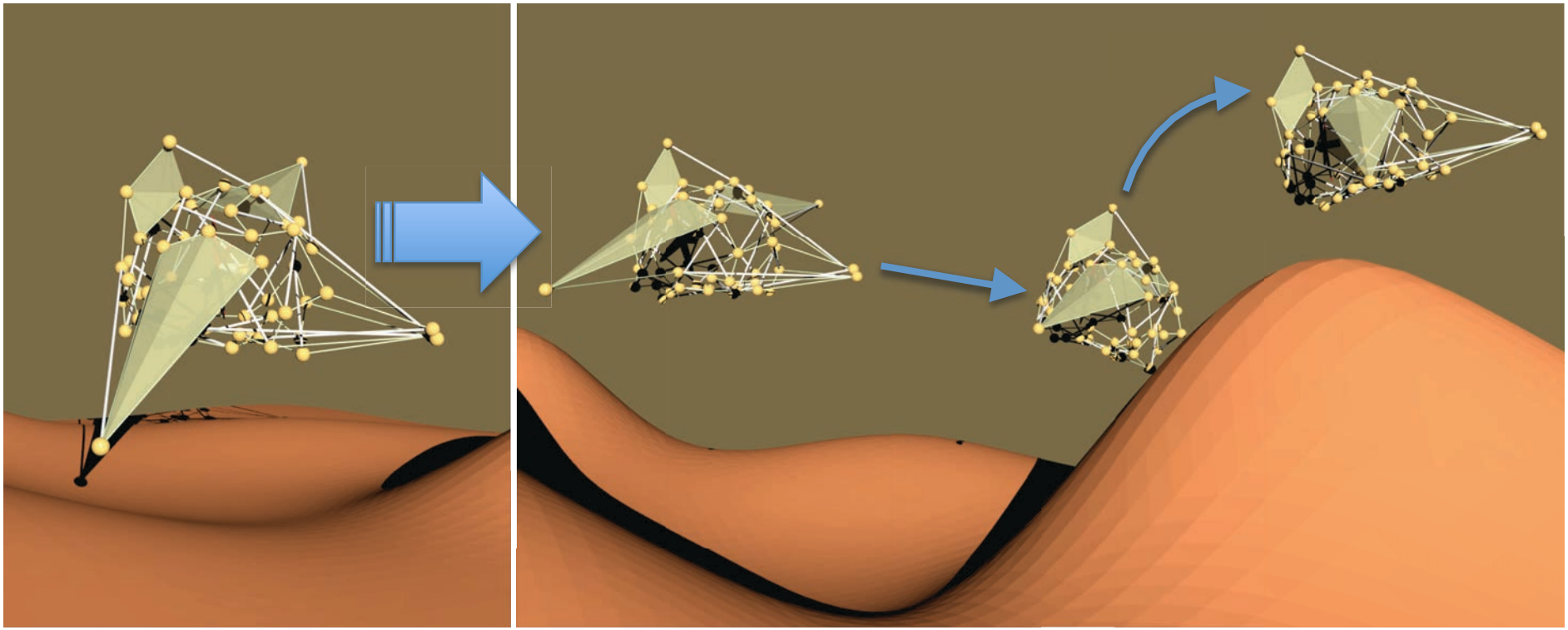
Diversifying Engineering

Synaptic Motion: Tensegrity-Inspired Dance (Colin Ho & Jodi Lomask)

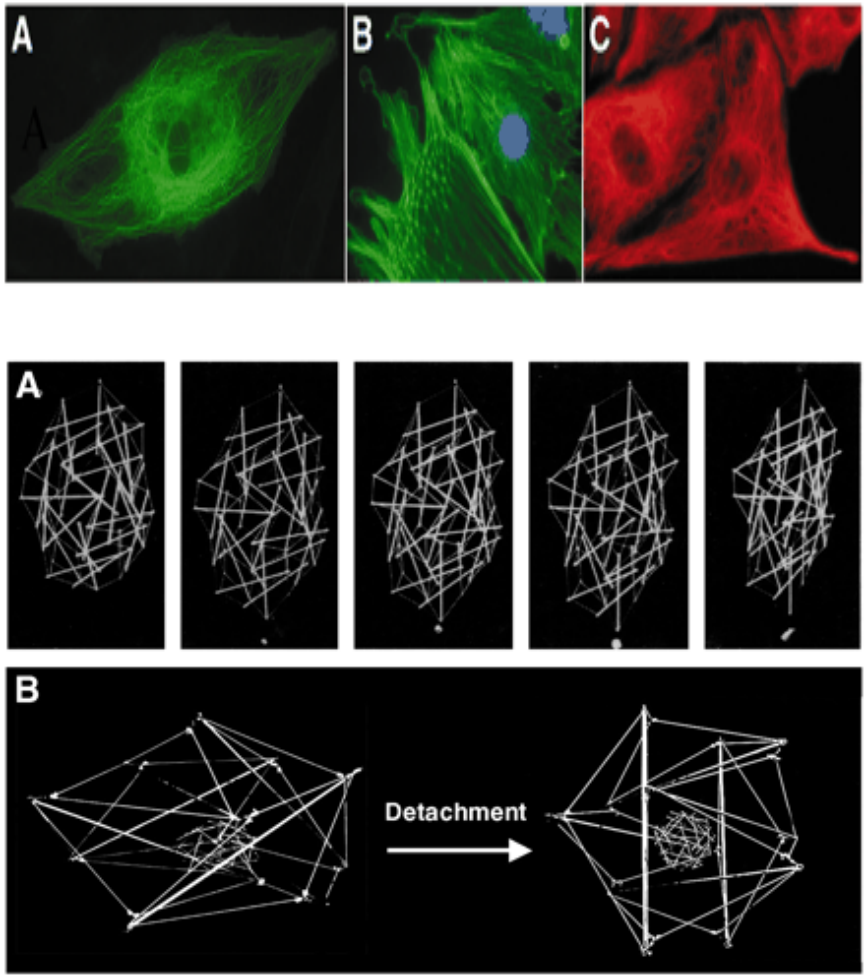
Future: UAV dropped Analog Demonstration



Future: SUPERBall Bird – Crash Proof Flight



Future: Tensegrity, Biology & Co-Robots



Dr. Donald Ingber, Harvard U.

Copyright 2006 Tom Flemons

Copyright 2006 Tom Flemons