

# IMPROVING INNOVATION WITH THE DIVERSIFYING POWER OF WOMEN ENGINEERS



Society of Women Engineers

*University of California, Berkeley*

**Alice M. Agogino**

**Professor of Mechanical Engineering**

**Chair, Development Engineering Graduate Group**

**Education Director, Blum Center for Developing Economies**

**University of California at Berkeley**





# Defining Engineering

~~ENGINEERING: (1) To lay out, construct, or manage as an engineer (2a) To contrive or plan out usually with more or less subtle skill and craft (b) To guide the course of~~

on your own terms

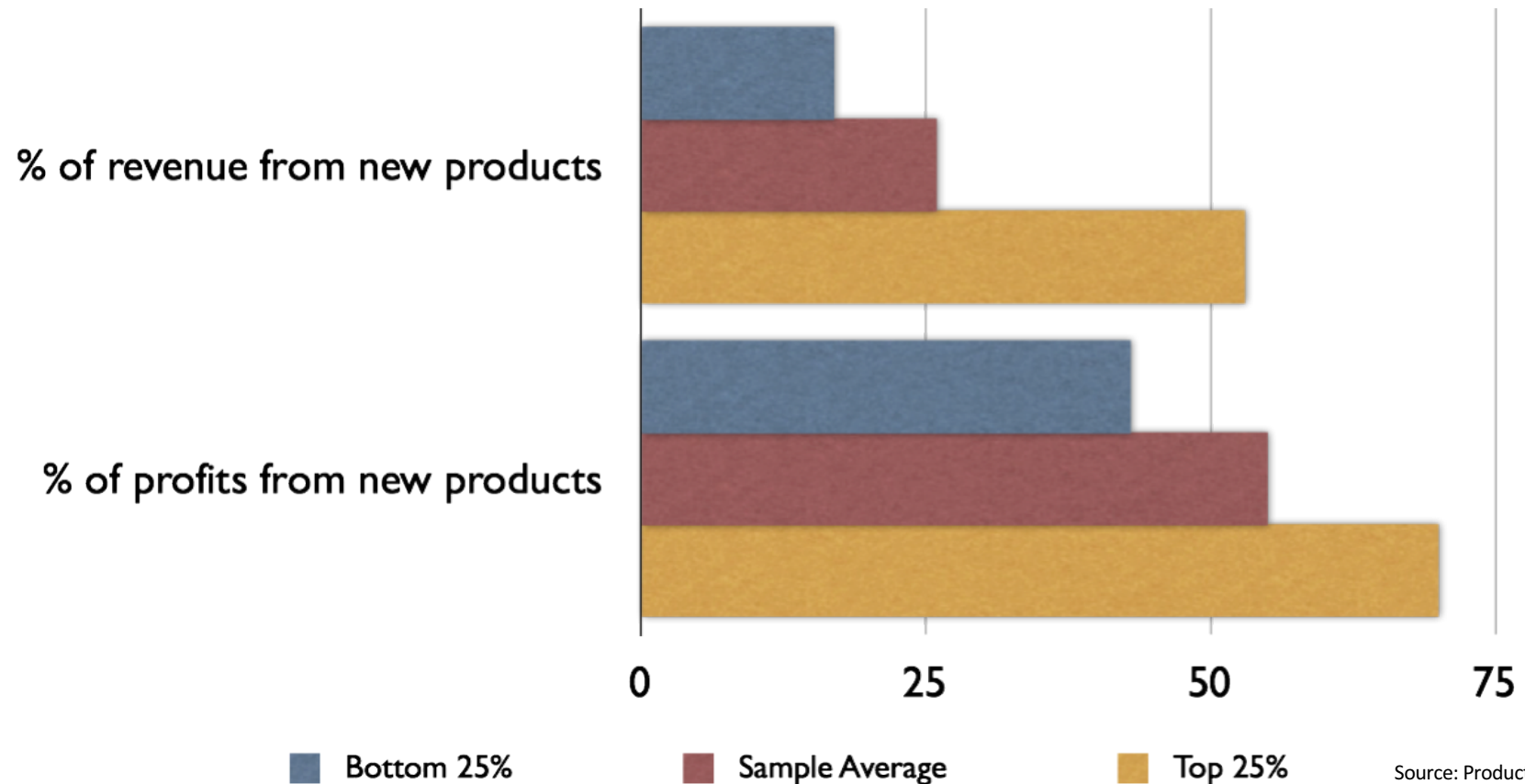
Dr. Catherine Newman

# Valuing Design

- Usage
- Performance Ratings (J.D. Power, Consumer Reports)
- Expert Evaluation (IDEA/ Business Week, Consumer Electronics awards)
- Creativity (novelty, variety)
- Financial (stock performance, revenues, sales)
- Process (multidisciplinary team work, human-centered design)
- Societal Impact (environmental, emerging regions)



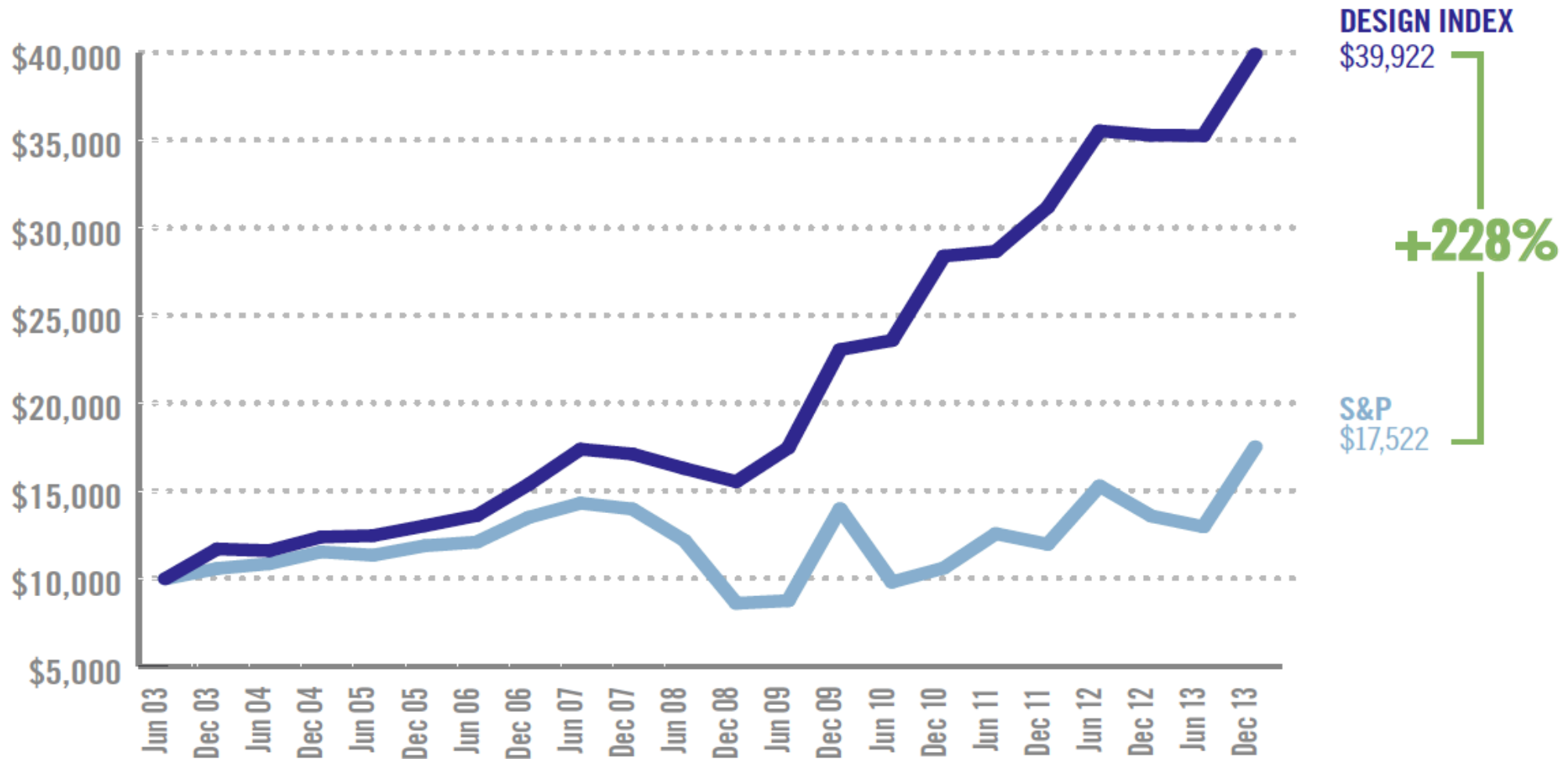
# Benefits of a Well-Managed Product Development Process



Source: Product Development Institute, Inc.



# Design Value Index



[What is the Real Value of Design](#), Jeneanne Rae, *Motiv Strategies & Design Management Institute*, 2014

# Design Value Index Selection Criteria

1. Publicly trades in the U.S. for 10+ years
2. Scale of integrated design organization & deployment as catalyst for change
3. Growth in design-related investments
4. Design is embedded within the organization
5. Design leadership at all levels
6. Senior-level commitment to design as an innovative resource for positive change



# Portfolio of Design-Centric Organizations: Design Value Index

- Apple
- Coca-Cola
- Ford
- Herman-Miller
- IBM
- Intuit
- Newell-Rubbermaid
- Nike
- Procter & Gamble
- Starbucks
- Starwood
- Steelcase
- Target
- Walt Disney
- Whirlpool

# Design Increases Revenues, Profit & Exports in the U.K.





# SOCIETAL & ENVIRONMENTAL IMPACT

Oehlberg, Lora A., A.M. Agogino and S. Beckman (2009). "Framing Sustainability in Human-Centered Product Design," *Proceedings of the ASME 2009 International Design Engineering Technical Conference*.

Cobb, C., A.M. Agogino, S. Beckman and L. Speer, "Enabling and Characterizing Twenty-First Century Skills in New Product Development Teams," *Proceedings of Mudd 2007*. Archival in the *International Journal of Engineering Education*, Vol. 24 (2), February, 2008, pp. 420-433.

## Engineering Ethics: What Does Your Professor Say?

"What we design? For whom do we design? How we manufacture? What resources we use? What will be the impact on society and the environment? These are all ethical and social justice questions that are important in product design. "

Alice Agogino, Professor  
Mechanical Engineering  
Minner Fellow

UC BERKELEY  
**ENGINEERING  
ETHICS WEEK**  
PROFESSIONAL AND SOCIAL RESPONSIBILITY  
Monday, April 7 - Friday, April 11



Berkeley  
Engineering

[coe.berkeley.edu/ethicsweek](http://coe.berkeley.edu/ethicsweek)

# COMMUNITY CO-DESIGN PROJECTS



[Darfur Stove](#)



[JustMilk](#)



[Zimba](#)



[Seguro](#): Pesticide Protection



[CARES: Community Assessment of Renewable Energy & Sustainability](#)

L. Oehberg, R. Shelby and A. M. Agogino (2009). "Sustainable Product Design: Designing for Diversity in Engineering Education," *Int. J. of Engineering Education*, No. 2 of Vol. 26, 2010, pp. 489-498.



College of Engineering  
University of California, Berkeley  
Fall 2015  
Volume 8

**CellScope in Cameroon**  
Safe treatment for river blindness

**Fortifying breast milk**  
Global delivery device

# BerkeleyENGINEER



**SOPHIE'S  
SUPER HAND**

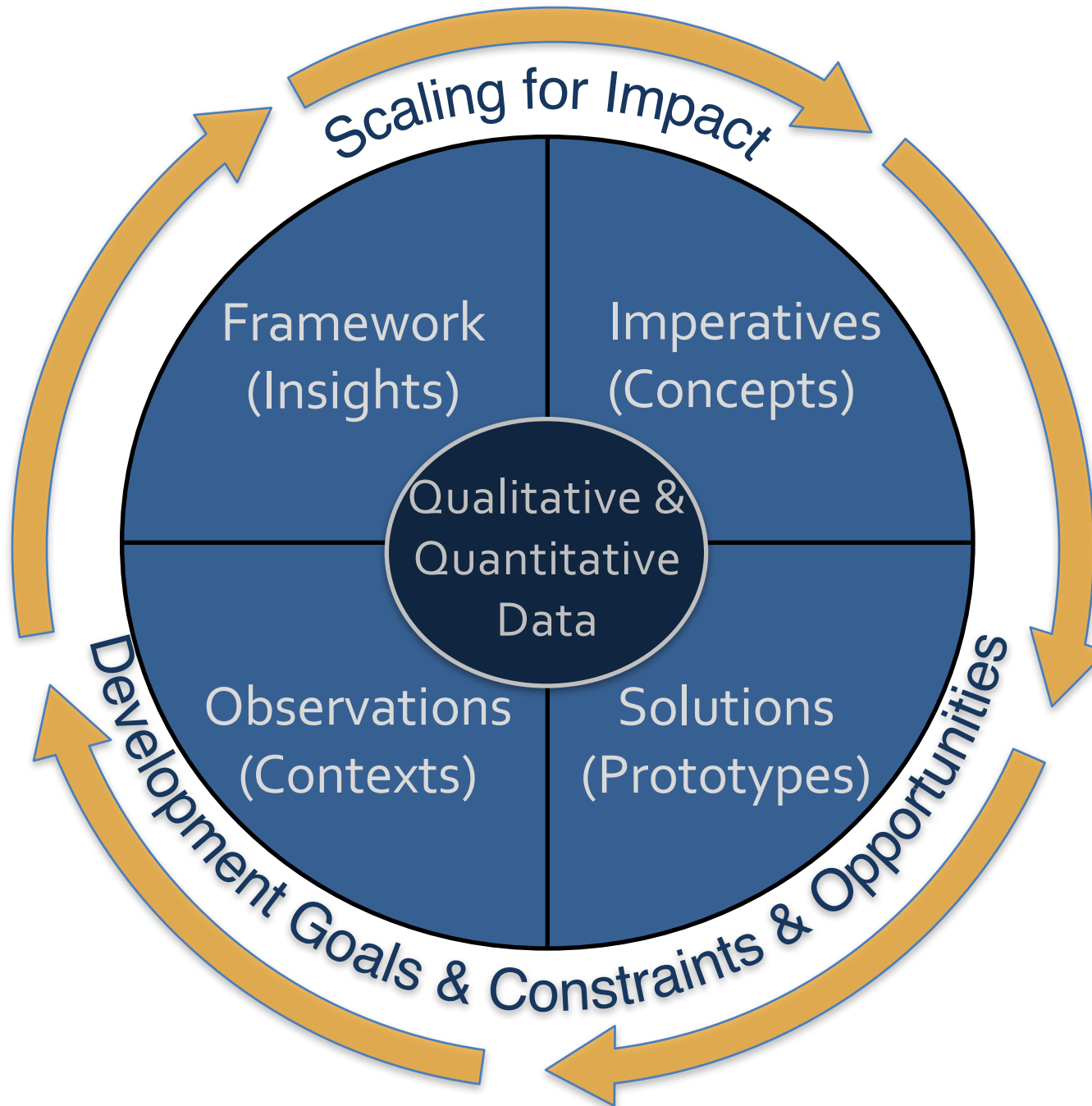
Fabricating custom prosthetics

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





# Design for Social Impact

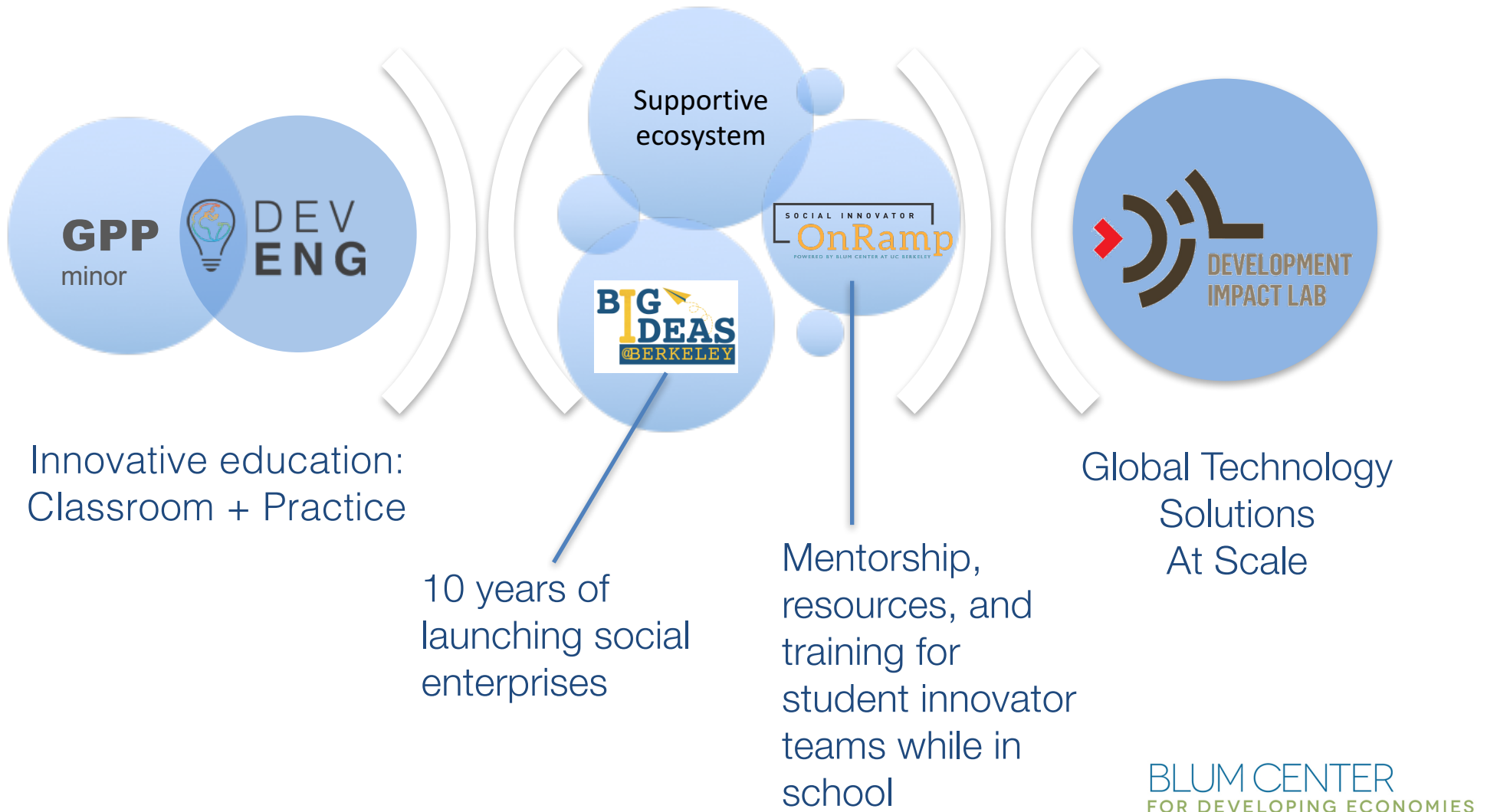


# BLUM CENTER METHODOLOGY

Train  
a new generation  
of global innovators

Transform ideas  
into inventions and action

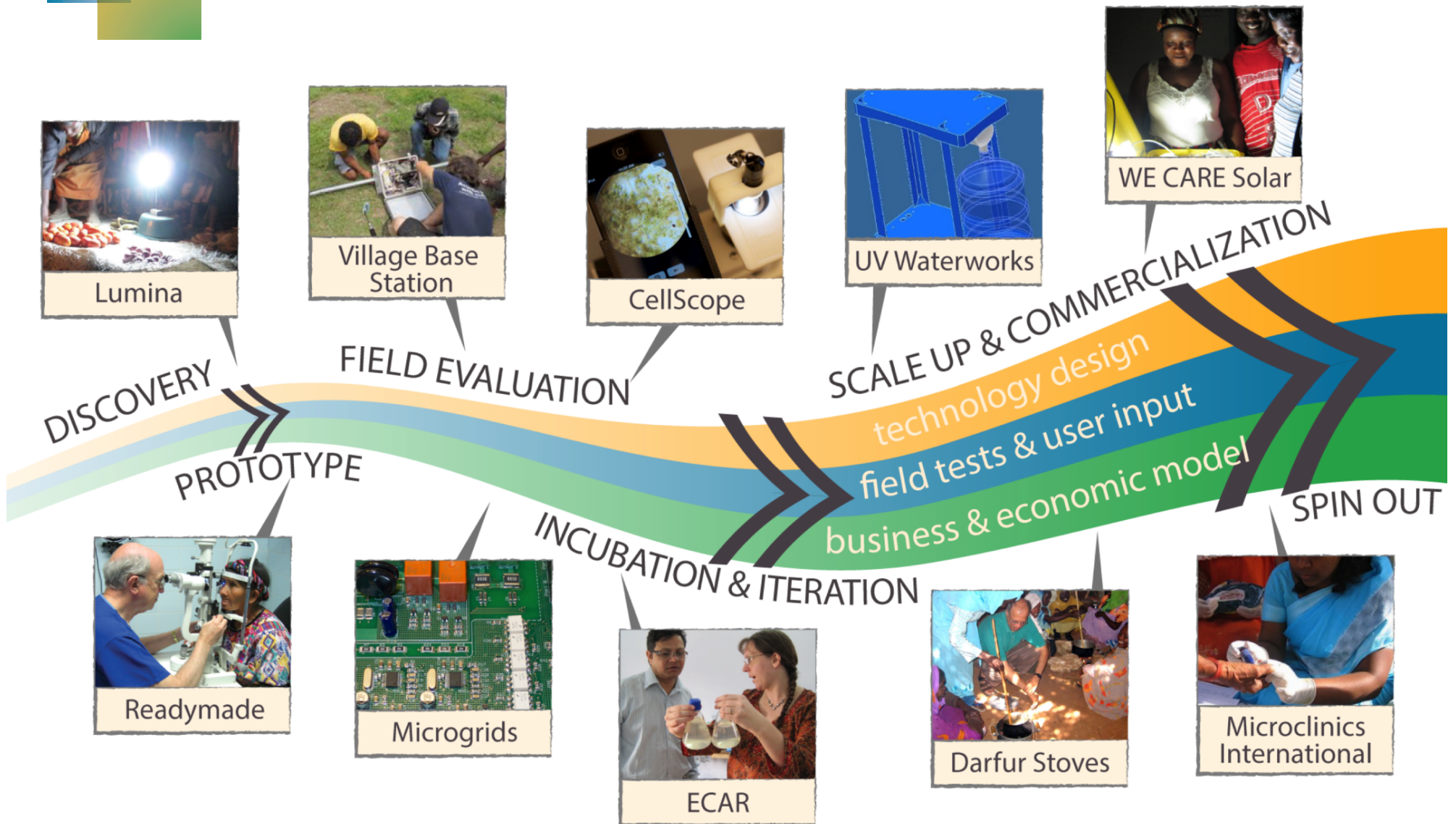
Drive  
discovery & innovation





# APPROACH

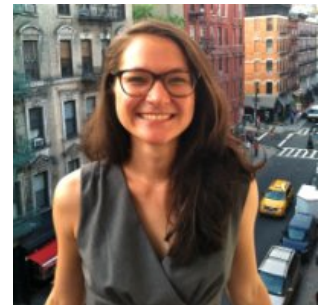
## THE INNOVATION PIPELINE





# Gender Diversity Improves Product Design

- improves use rate
- satisfies people's needs and wants and increases the quality of their lives
- doesn't stand alone but is part of an infrastructure
- meshes with the culture
- is sustainable over the product life cycle



Femme Den is here  
to save good  
women from bad  
products

# Gender Diversity Improves Products and Business

- **Improves innovation and problem-solving:** Draws on broader diversity of experiences.
- **Connects companies with customers:** Women in the U.S. purchase 50% of computers, 50% of cars and 80% of consumer goods.
- **Increases the Bottom Line:** Fortune 500 companies women in leadership have a return on sales increases by at least 42%.





Ford Windstar, 1999

Today woman make up 50% of automotive buying decisions, compared to 20% in 1990.

# TECHNICAL WOMEN IN SMALL AND MEDIUM BUSINESSES

EMILY BLAKEMORE, ANGIE IM, CHANNING MARTIN, ALBERY MELO, SARA RAJU, AND LIZ SCHUELKE.

THE H. JOHN HEINZ III COLLEGE, CARNEGIE MELLON UNIVERSITY

Women control 80 percent of consumer decisions but design only 10 percent of IT products and services.



Source: Harris, K., and M. Raskino. 2007. *Women and Men in IT: Breaking Sexual Stereotypes*. Stamford, CT: Gartner.



# Early Air Bags Tested on Male Crash Dummies Exclusively

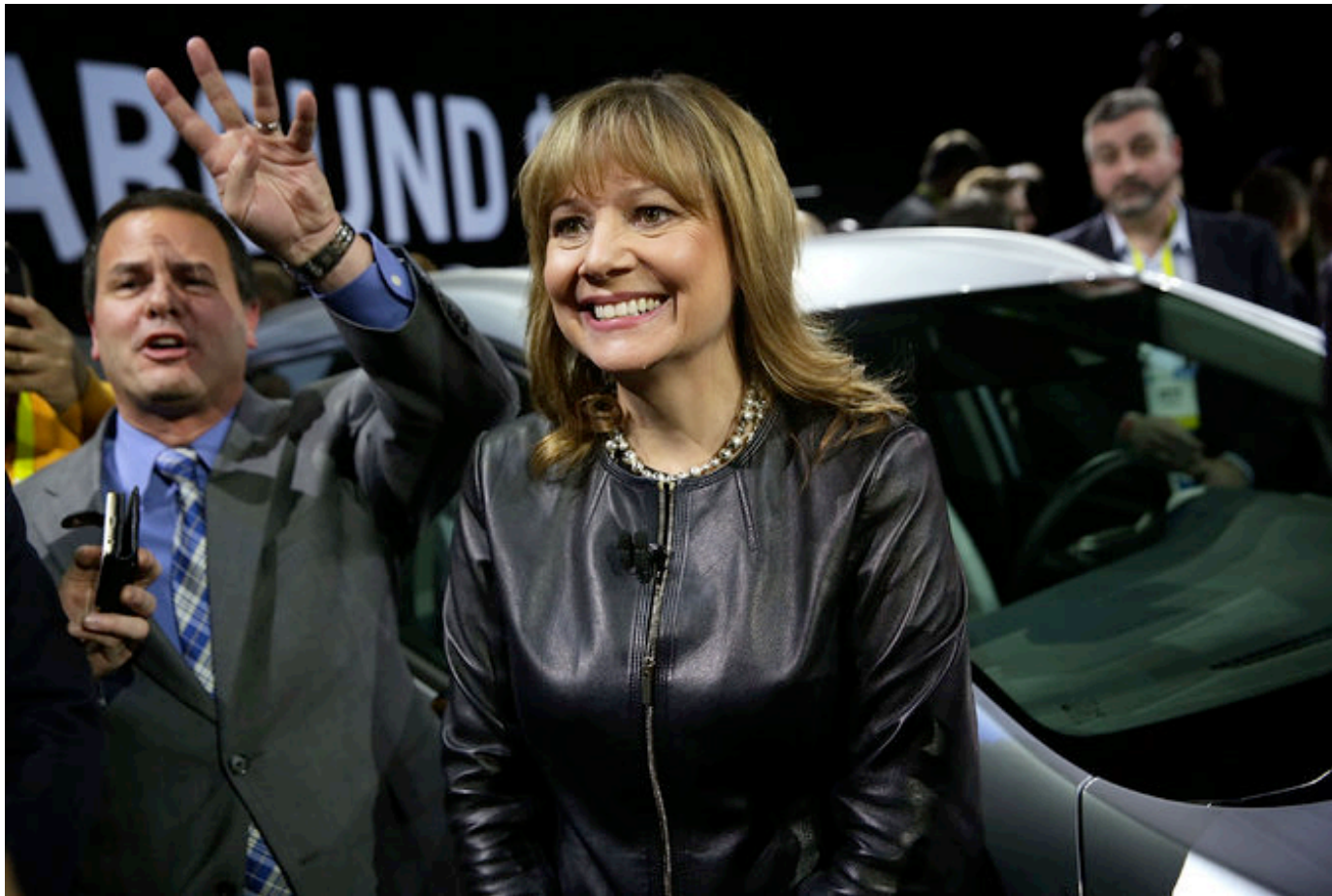


# Winning Mustang Design: High Gear Designed and Voted by Woman



40 women designers and engineers

# Women in Company Leadership Tied to Stronger Profits



Study of 22,000 publically traded companies in 91 countries, Peterson Institute of International Economics: [http://www.nytimes.com/2016/02/10/business/women-in-company-leadership-tied-to-stronger-profits.html?\\_r=0](http://www.nytimes.com/2016/02/10/business/women-in-company-leadership-tied-to-stronger-profits.html?_r=0)



# Impacts and Engagement: The Intersection of Science, Technology & Society on Saturday, April 22, 2017



CAL DAY STAND UP  
FOR SCIENCE  
1-1:45 PM  
BANATAO  
AUDITORIUM,  
SUTARDJA DAI HALL





Cal Day Tensegrity Tour  
230 Hesse Hall  
10 am – 3 pm

