Innovation and the Role of Diversity: Keys to Successful Entrepreneurship

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“Research is an expression of faith in the possibility of progress. The drive that leads scholars to study a topic has to include the belief that new things can be discovered, that newer can be better, and that greater depth of understanding is achievable. Research, especially academic research, is a form of optimism about the human condition.”

Research Alone is Not Enough!

- Trends:
  - US global share of new doctorates in science & engineering
    - Slipped from 52% in 1986 to 17% in 2008
  - US share of scientific publications
    - Declined from 38% in 1988 to 21% in 2009
  - US leads the world in investments in R&D ($400 billion in 2009)
    - China leads the world in growth rate of R&D and surpassed Japan as #2

- Number of researchers (2008):
  - United States (1.4 million)
  - European Union (1.5 million)
  - China (1.6 million)

- How are our STUDENTS going to be competitive given:
  - Rising national debt, unbalanced budgets, credit crisis and increased competition in the global economy?
Employment!

Chemical Industry and Manufacturing?

In the US, over the last decade manufacturing jobs declined from just under 17 million to under 12 million.

Manufacturing in the chemical industry dropped from about one million to under 800,000.

What sector of our economy lost more jobs in 2010 than any other sector?
Intense Competition

- Common characteristics
  - Collaborative efforts
  - Transformative visions
  - Involves the “whole university”
  - Integrated with entrepreneurship
“Knowing is not enough; we must apply. Willing is not enough; we must do.”

Goethe
“It’s in Apple’s DNA that technology alone is not enough. It’s technology married with liberal arts; married with the humanities; that yields us the result that makes our heart sing”

Steve Jobs
Invention / Innovation is a contact sport!
A fundamental insight:

- In problem solving, diversity is powerful stuff.
- It doesn’t always trump ability, but it does so far more often than we’d expect.

Does this logic imply that we should abandon the meritocracy?

- No! Ability matters.
- But—here’s the catch—diversity matters too!
Key Ingredients
Going from Invention to Innovation

• The best design teams are the most diverse
• Mentorship and apprenticeships are essential
• Strategy is all about being different
• The most fertile ground for innovation lies between fields
• Partnerships with domain experts are critical
  → Learn the most from those we have the least in common with
• This is a contact sport…

Vignettes…
“Hedge Hog Concept” Applied to Research

What are you passionate about?

What can you be the best in the world at?

What are your economic drivers?

Advanced Lithium Ion Batteries
Adapt emerging techniques from the microelectronics industry to design and synthesize new vaccines and medicines.
Extremely Uniform, Shape-Specific Particles with a Wide Range of Spatio-Chemical Composition Control

Benefits of Academic Entrepreneurship

• Improve the health and well-being of society
• Economic development
• Entrepreneurship for a academic scientist provides:
  ➔ A compass that helps navigate where important problems are
  ➔ Peer review on steroids!
  ➔ Additional resources to make a true impact
  ➔ Improved “grantsmanship”
  • Value proposition
  ➔ An opportunity for scale-up
  ➔ Companies necessary to be effective in translational research
  • Key for universities to be competitive to garner grants
  ➔ Validates our science
  ➔ Apprenticeship for next generation entrepreneurs
“... a partner for innovative entrepreneurship...”
Comments on the Role of Research in Education and Economic Development

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