Research to Innovation to Venture: An Education and Venture Development Process..

GOAL: Sustainable Materials Commercialization and Innovator Preparation

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VALLEY OF DEATH:
University science and engineering innovators are challenged in converting research into commercial innovations, the so-called “Valley of Death”
TIME OF BRILLIANCE
Figure 2:
Stage Dependent Value of Research to Commercial Enterprise – years versus arbitrary $
Transforming the Valley of Death to a Time of Brilliance and REAP the benefits!

- **Respect** the innovator at least as much as the innovation
- **Educate** for research *and* fast innovation and iteration. R2I2V is an interdisciplinary process – which can be taught and learned.
- **Address** the challenges in venture formation head-on
- **Provide** rewards and recognition for innovation in an expanded view of the academic role
• ASEE
• Defines pedagogic background
• Discusses original research and lit references

Transforming the Practices and Rationale for Educational Programs to Aid Academic Researchers in Translating Research into Innovations and Ventures

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1. The innovation challenge

Overview

One of our hopes is that, ... there will be full employment, and that the production of goods and services will cease to ruin some standard of living. ... Surely we will not get there by standing still. ... We will not get ahead in international trade unless we offer new and more effective and cheaper products. ... There must be a stream of new scientific knowledge to turn the wheels of private and public enterprise. -- T. S. Eliot (1943)

The translation of basic scientific research to practical and deployable innovations that benefit people and the planet is as old as human history itself. From the discovery of fire to the transformative basic research that is the basis for space exploration, humans have translated scientific research and technological innovations that have advanced society.

To address the complex challenges faced by our planet and its inhabitants, many studies over the last fifteen years have pointed to the need for those formally trained in the science, technology, engineering and math (STEM) disciplines to be more broadly and flexibly educated to meet the demands of the 21st century. It has been suggested that this broader education must not only of greater depth to a given STEM discipline but also include additional interdisciplinary scientific skills, the ability to participate in the translation of research into innovations that become products and processes that address societal problems, and the desire and skill to work collaboratively in developing and implementing these innovations.

Engineering education has traditionally been focused on preparing students to effectively apply scientific principles in order to design and develop useful things. While this remains the essence of engineering training, there is an urgent need to equip engineers with better translational skills and the ability to see opportunity in and translate scientific research into practical applications.

This is even more important in an increasingly interdisciplinary environment of science and engineering. The once clear demarcation between scientist and engineer has become less sharp, and interdisciplinary engineering knowledge, but engineers often remain key mediators of discovery to useful and commercially viable applications.
RESPECTing innovator and innovation

• Providing a systematic, focused, cost-effective, scalable approach to venture development and innovator support.
• BOTH build value!

Innovation

Idea → Research → Innovation → Scalable Venture → Commercial Enterprise

Acknowledge → Aware → Accept → Act → Accomplish

Innovators
Only 1 percent of more than 200 U.S. entrepreneurs surveyed cited higher education as a significant motivator toward starting their own venture, while 61 percent cited their "innate drive."

Northeastern University Survey

Entrepreneurs are born, but can they be taught? By Jim Hopkins, USA TODAY

Are Entrepreneurs Born or Made? Two-thirds of entrepreneurs claim they were inspired by innate desire, not education or training, according to a new survey.

By Leslie Taylor |Inc. |Oct 24, 2006
ADDRESS - CHALLENGE #1: dealflow

Innumerable undifferentiated “top of funnel” opportunities
CHALLENGE #2: PROCESS, ADVICE, SUPPORT and PRACTICE

An ecosystem that efficiently validates and structures seed stage deals exists only in Web 2.0, not for STEM ventures.
CHALLENGE #3: Lost in translation

• Low success of STEM translation to commercialization

• Need to “fail fast and iterate”..not easy in STEM
Academic Research Mission

- Gain knowledge and an understanding of the “world”
- Disseminate and share results
- Train future STEM practitioners
PROVIDing reward and recognition

Embracing and extended view

Figure 1: Fully Extended Academic Research to Broad Impact (Market) Value Chain
SOLUTIONS TO REAP REWARDS

• Respect the R2I2V PERSONAL CHANGE process
  • NO person builds a company alone
• Lens of the MARKET as important as Lens of RESEARCH
  • STEM ventures are not the same as Web 2.0 BUT build for “failing fast” based on business insights
• It is not a single event...NO one learned P Chem the first time round!

Ongoing Education and Training

Business Advising

Funding

Acknowledge  Aware  Accept  Act  Accomplish
Centers for Chemical Innovation

• The Centers for Chemical Innovation (CCI) Program supports research centers focused on major, long-term fundamental chemical research challenges. CCIs that address these challenges will produce transformative research, lead to innovation, and attract broad scientific and public interest...... CCIs integrate research, innovation, education, and public outreach and include a plan to broaden participation of underrepresented groups.
National Science Foundation

• The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..."
Center for Sustainable Materials Chemistry

The Research to Innovation to Venture (R2I2V) “value development” process

Idea generation → Research (market and science) → Translating research to Innovation (or Invention) → Translating Innovations to a Venture or a licensed technology → Commercialization

- Workshop 1: Lens of the Market
- Workshop 2: InnovationLab
- Workshop 3: Advising Intensive

Ongoing Webinars and Discussion with Innovation Teams
Investors and Innovators Council
Industrial Advisory Board

the Research to Innovation to Venture “personal change” process

- Acknowledge personal interest in R2I2V
- Gain Awareness of the skills required
- Accept the personal role as innovator or potential entrepreneur
- Take personal Action on developing R2I2V
- Accomplish building a venture & commercializing technology

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Transforming the Valley of Death to a Time of Brilliance

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ecosVC Portfolio Examples

• Natural Composites Inc.: university spin-out using natural materials as a petroleum polymer filler and replacement
• Qteros: a university spin-out in cellulosic ethanol.
• Ecovative Design: university spin-out creating a biodegradable alternative to expanded polystyrene
• A privately held oil processing equipment company developing a process for algae oil extraction
• A privately held natural composites company creating structural materials in a wide range of sectors
• Numerous Fortune 500 companies expanding their portfolios through Open Innovation