Executive Director, NCIIA (20 years)

National Collegiate Inventors and Innovators Alliance

Chair, Entrepreneurship Division of the American Society of Engineering Education

Phil Weilerstein leads the National Collegiate Inventors and Innovators Alliance (NCIIA www.nciia.org) a national program to stimulate and support innovation and entrepreneurship at universities and colleges.

He has designed and oversees programs which encourage curricular innovation and student venture creation, provide resources for faculty and student entrepreneurs, and develop conferences and workshops for faculty and students with a focus on encouraging socially beneficial application of technological innovations and the improvement of entrepreneurship and innovation education in higher education. As an entrepreneur in a not-for-profit organization, he has grown the NCIIA from a grassroots group of enthusiastic faculty to a nationally known and in-demand knowledge base and resource center.

Mr. Weilerstein received his BS from the University of Massachusetts Amherst. Phil Weilerstein began his career as a student entrepreneur at the University of Massachusetts. He and a team, including his advisor, launched a start-up biotech company that ultimately went public. This experience, coupled with a lifelong passion for entrepreneurship, led to his work with the National Collegiate Inventors and Innovators Alliance (NCIIA). Phil’s tenure at the NCIIA is marked by his skill for network-building and expert leverage of resources. He has a special talent for seeking out gifted educators and other important contributors and putting them to work for the betterment of invention, innovation, and entrepreneurship education in the US and worldwide.
Innovation and Entrepreneurship in Engineering Education
WHAT, WHY AND HOW

UCSD Engineering Deans Council
May 9, 2014

Phil Weilerstein
NCIIA

Innovation = Invention + (Adaptation to the Market) + Diffusion

Innovation as Culture

Weave the culture of innovation and entrepreneurship throughout the environment and the curriculum to create an ecosystem of support and enablement.
How to improve the innovation environment at universities

1. Catalyze the development of experiential courses and programs in innovation and commercialization
2. Stimulate multi-disciplinary collaboration among students and faculty to move creative research, product and technology ideas to commercialization
3. Integrate university activity with arts, industry and local business networks for mentoring, advising and investing
4. Set goals and measure the impact of commercialization as educational, product and venture development experiences.

How to institutionalize entrepreneurship in education

**Entrepreneurial thinking in the Frameworks**
- integrate throughout the curriculum,
- build into accreditation requirements more explicitly
- Expect it of every student

**Entrepreneurial Doing in the Programs**
- Remove barriers to experiential engagement at both ugrad and grad levels
- Legitimize commercial endeavor as part of educational experience
- Celebrate the pursuit of opportunity by those who choose the path
Create and support the pathway

- **Respect** the innovator at least as much as the innovation
- **Educate** for innovation and research. Innovation can be taught and learned.
- **Address** the challenges in venture formation head-on & provide support to address them
- **Provide** rewards and recognition for innovation that acknowledges an expanded view of the academic role

Elements for success

1) Support and Engagement of Leadership
2) Tie to Institutional strategy
3) Connect to Institutional History and Values
4) Celebrate Local success in Local context
5) Student Engagement
Key Program Components

- Academics - Key enabling knowledge
- Experience – Opportunity for Entrepreneurial Doing
- Networking & Community – Connections
- Teaming – Collaborative innovation
- Coaching and Mentoring – Support and Guidance
- Funding and Commercialization Pathways

Design and Strategy of the Curricula

1. Level of student: undergraduate or graduate or mix?
2. Discipline of students: engineering, business, and other?
3. Focus of the course: leadership skills, entrepreneurial management, venture formation?
4. Scope and breadth of the courses: seminars, courses, or a sequence of courses?
5. Purpose of the program: purely elective versus part of a certificate/minor/major?
EG: Mechanical Engineering ugrad:
5 “open elective” classes in four years

History student:
21 “open elective” classes

Entrepreneurial Doing

– Competitions

– Venture Development

– Student led initiatives
**Integrated Product Design Curriculum**

- Product Design and Entrepreneurship (PD&E) Technical Elective
- The final of the course is a business plan and technical overview presentation to a panel of outside experts,
- E-Team support for projects that warrant further funding.

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**mystartup XX**

*Empowering the Next Generation of Female Technology Entrepreneurs*

- Identify female students interested in launching technology companies and provide them with the knowledge, tools and support to help them succeed.
- Increase the number of female founders of technology-based startups by increasing awareness among the female student population about entrepreneurship as a career option.
- Provide female students with a chance to pursue entrepreneurial activities in the safe environment of a university while building their confidence in their abilities, competencies and skills.
- Build a strong collaborative network of female founders and their supporters.
- Build successful technology startups.
The Moxie Incubator provides:
- Lab Workspace, Tools and Equipment
- Education on how to build a startup company
- Mentoring from experienced entrepreneurs and business experts
- Advisors in corporate and IP law, marketing, manufacturing, etc.
- Networking
### Examples of Extracurricular Resources

<table>
<thead>
<tr>
<th>Description</th>
<th>Resource Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Stage funding</td>
<td>CAPITAL</td>
</tr>
<tr>
<td>Business Incubator</td>
<td>ASSISTANCE</td>
</tr>
<tr>
<td>Mentoring</td>
<td>ADVICE</td>
</tr>
<tr>
<td>Hands On Venture Formation</td>
<td>EXPERIENCE</td>
</tr>
<tr>
<td>Business Plan Competition</td>
<td>EXPERIENCE/CAPITAL</td>
</tr>
<tr>
<td>Start Up Bootcamp</td>
<td>ASSISTANCE</td>
</tr>
<tr>
<td>Student Venture Club</td>
<td>NETWORK</td>
</tr>
<tr>
<td>Alumni Network</td>
<td>NETWORK</td>
</tr>
<tr>
<td>Database/List of Product Ideas &amp; Business Opportunities</td>
<td>IDEAS</td>
</tr>
<tr>
<td>Field Experiences for Needs Identification</td>
<td>IDEAS</td>
</tr>
<tr>
<td>Interdisciplinary Collaborations Across Schools/Departments</td>
<td>ASSISTANCE</td>
</tr>
<tr>
<td>Tech Transfer</td>
<td>ASSISTANCE</td>
</tr>
<tr>
<td>External Partnerships to Facilitate Student Projects</td>
<td>IDEAS</td>
</tr>
</tbody>
</table>

**Innovation Corps**

- Trained ~300 teams to date
- Goal is to determine the commercial potential of university research
- NCIIA responsible for implementation, faculty training, evaluation
- Based on Lean Launchpad (Steve Blank)
- Required I-Corps training is 8-week course (two workshops and online)
- Each team awarded $50,000 to investigate commercialization
2012-13 E-TEAM PROGRAM
accelerating technology invention & innovation for scalable impact

STAGE 1
$5,000 funding
40 teams
Strategy mapping workshop
Evolve sustainable business model

STAGE 2
$20,000 funding
20 teams
Strategy refining & implementation workshop
Tactical coaching
NCIIA network access

STAGE 3
$50,000 investment opportunity
2-3 teams
Investor presentation program
Connect with potential investors

I-Corps Program Activity

I-Corps Nodes
NCIIA Coordinates National Network of Nodes

I-Corps Sites
NCIIA collaborates with sites to create pipeline of innovators

I-Corps Mentors
NCIIA role as coordinator

I-Corps Teams
NCIIA runs training programs
I-Corps Program Activity

I-Corps Nodes
NCIIA Coordinates National Network of Nodes

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NCIIA role as coordinator

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NCIIA runs training programs

Entrepreneurship Education Activities
Pennsylvania State University Overview

Curricular
- Center for Engineering Design & Entrepreneurship
- Engineering Leadership Development Minor
- Engineering Design Program
- Engineering Entrepreneurship Minor
- Civic and Community Engagement Minor
- Engineering & Community Engagement Certificate

Business Emphasis
- E-Ship Engineering Courses
- Engineering Leadership Concentration
- Engineering Entrepreneurship Minor
- Engineering Design Program
- Engineering & Community Engagement Certificate

Extra-Curricular
- Lion Launch Pad
- Industry Partners
- Student Groups
- E-Ship Venture Fund and Competition
- MBA Concentration in Innovation & Entrepreneurship
- Ferrell Center for Corporate Innovation and Entrepreneurship
- Penn State Idea Pitch Competition
- Advanced E-Teams

Penn State
INSPIRATION – Hinman CEOs Program
U of MD Living-Learning Entrepreneurship Program

• LIVE with aspiring and active entrepreneurs
  – On-demand mentoring and coaching
  – Residential experience
  – Incubator setting

• LEARN in a vibrant experiential environment
  – Courses and Seminars
  – Competitions and Workshops
  – Volunteering

• LAUNCH real companies
  – 25% of students manage new ventures
### COMPREHENSIVE Approach

Serving students throughout their academic careers & beyond

<table>
<thead>
<tr>
<th>Pre-Freshman</th>
<th>Freshman</th>
<th>Sophomore</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Young Scholars Program (140)</td>
<td>• Hinman Innovation Challenge</td>
<td>• 1st year Hinman CEO</td>
</tr>
<tr>
<td>• Summer discovery of entrepreneurship</td>
<td></td>
<td>• Introductory course to establish knowledge &amp; culture (460)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Junior</th>
<th>Senior</th>
<th>Alumni</th>
</tr>
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<tbody>
<tr>
<td>• 2nd year Hinman CEO</td>
<td>• 3rd year Hinman CEO</td>
<td>• Referrals for graduate school or new venturing</td>
</tr>
<tr>
<td>• Seminar series to develop confidence, inspire, and encourage (498)</td>
<td>• Entrepreneurship lab for applied learning (4898)</td>
<td>• Seminar speakers</td>
</tr>
<tr>
<td>• Internship preparation</td>
<td>• Advisor to fellow CEOs</td>
<td>• Events and competitions</td>
</tr>
<tr>
<td></td>
<td>• Employment preparation</td>
<td>• VentureAccelerator</td>
</tr>
</tbody>
</table>


**Menting, coaching, competitions, workshops, and networking for funding opportunities**

### EG: Mechanical Engineering ugrad

5 “open elective” classes in four years

### History student:

21 “open elective” classes
Pedagogical content

- 12 engineering concepts
- 10 entrepreneurial concepts
- Two ambiguous business decisions

<table>
<thead>
<tr>
<th>Engineering Concepts</th>
<th>Entrepreneurial Concepts</th>
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</thead>
<tbody>
<tr>
<td>Longboard - Trucks</td>
<td>Longboard - Deck</td>
</tr>
<tr>
<td>Normal force</td>
<td>Business model</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td>Vision statement</td>
</tr>
<tr>
<td>Normal stress</td>
<td>Value proposition</td>
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<tr>
<td>Deflection</td>
<td>Mission statement</td>
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<tr>
<td>Moments</td>
<td>Revenue model</td>
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<tr>
<td>Neutral Axis</td>
<td>SWOT analysis</td>
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<tr>
<td>Moment center</td>
<td>Cost model</td>
</tr>
<tr>
<td>Cantilever beam</td>
<td>Business risk</td>
</tr>
<tr>
<td>Planar systems</td>
<td>Profit model</td>
</tr>
<tr>
<td>Bending stress</td>
<td>Business uncertainty</td>
</tr>
<tr>
<td>Safety Factor</td>
<td></td>
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