Building an Entrepreneurial Culture of Risk Taking and Venture Creation
What is corporate culture?
Culture is

• Not one of those soft matters to be dealt with after the real business is done.
• A complement to the formal, established rules of doing business.
To Create a Culture of Innovation

Strategies and tactics must be in alignment with goal to create an innovative culture.
Strategic

• Hiring
• Inspiring
• Leading
Hiring

• Attract the brightest stars
  ✓ Decide how much creativity you can tolerate
  ✓ Let the job description set the tone
  ✓ Look outside your usual pipeline
Hiring

• Test to select the best
  ✓ Behavior questions
  ✓ Samples of previous work
  ✓ Abstract reasoning tests
Inspiring

• Let them work their way, within bounds.
• Allow them to fail without fear.
• Compensate competitively
• Create happiness
Common Definitions

• History
• Values & Beliefs
• Stories
• Ceremonies
Leading

• Stress the importance of creativity
Leading

• Train staff in innovation techniques.
Leading

• Act on ideas
Leading

• Create diverse teams
You Set the Pace

As the leader of your organization, people are watching you.
Creating a SWOT Analysis

Joy Fisher
University of Tennessee
joy.fisher@utk.edu
What is a SWOT Analysis?

- Structured planning method
- Evaluates these elements of a project:
  - **Strengths**
  - **Weaknesses**
  - **Opportunities**
  - **Threats**
- Objective: increase translation of research-based innovation from your region into products and services that benefit society
Objective: Increase translation of research-based innovation from your region into products and services that benefit society
**Objective**: Increase translation of research-based innovation into products and services that benefit society

<table>
<thead>
<tr>
<th>Internal to the organization(s)</th>
<th>Helpful to achieving the objective</th>
<th>Harmful to achieving the objective</th>
</tr>
</thead>
<tbody>
<tr>
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**Objective:** Introduce a high performance odor eliminator for used and rental cars

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### Example

**Objective:** Introduce a high performance odor eliminator for used and rental cars

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<td><strong>External</strong></td>
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</table>
**Example**

**Objective:** Introduce a high performance odor eliminator for used and rental cars

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| External | **Opportunities:** | 1. Nothing works well  
2. Impact on car prices  
3. Low regulatory barriers |
**Objective:** Introduce a high performance odor eliminator for used and rental cars

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## Preview of Workshop 2 Next Steps

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<tr>
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QUESTION AND ANSWER PERIOD
WORKSHOP 2
### Objective: Increase translation of research-based innovation into products and services that benefit society

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Highlight a State Example?
Next Step: Formulating Strategies

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<td>1. Nothing works well</td>
<td>1. Structured devel. plan</td>
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<td>2. Impact on car prices</td>
<td>2. Provide free samples</td>
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<td>3. Low regulatory barriers</td>
<td>3. Demo at trade shows</td>
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<td>1. Market “noise”</td>
<td>1. Hire industry salesperson</td>
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<td>2. Lots of distributors</td>
<td>2. Customer testimonials</td>
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<tr>
<td>3. Jaded market</td>
<td>3. Speak at conferences</td>
</tr>
<tr>
<td>4. Chemical perception</td>
<td>4. Track/publish metrics</td>
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<td>1. Customer testimonials</td>
<td>1. Industry advisory board</td>
</tr>
<tr>
<td>2. Prioritize customer targets</td>
<td>2. Speak at conferences</td>
</tr>
<tr>
<td>3. Chemical facts on website</td>
<td>3. Customer testimonials</td>
</tr>
<tr>
<td>4. OEM with large player</td>
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</tbody>
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QUESTION AND ANSWER PERIOD
Developing Effective Partnerships Between Universities and Industry

Rathindra (Babu) DasGupta
Lead Program Director, IIP Academic Cluster
Division of Industrial Innovation and Partnerships
National Science Foundation

NSF EPSCoR Workshop Series
October 5-6, 2015
Importance of Partnership?

• Universities:
  • Less dependence on funding from government agencies
  • Exposure to “real world” problems
  • Sharing risks and rewards associated with the research
  • Vehicle for contributing to the training of the next generation of scientists and engineers

• Industry:
  • Lower risks, accelerate competitive R&D or internal cost avoidance...
  • Vehicle for accessing the next generation of scientists and engineers
  • Contribution to economic development
Factors affecting Partnership?

• Robust relationship ("happy marriage")
  • Communication & transparency
• Shared vision
• Time commitment
• Intellectual property, NDA...
• Return on investment (ROI)
• Availability of funds
• Others...
Opportunities at NSF

- Grant Opportunities for Academic Liaison with Industry (GOALI)
- Industry/University Cooperative Research Center (I/UCRC)
- Accelerating Innovation Research: Technology Translation (AIR-TT)
- Partnership for Innovation: Building Innovation Capacity (PFI:BIC)
- Engineering Research Center (ERC)
- Innovation Corps (I-Corps)
- Small Business Innovation Research (SBIR)
Research to Commercialization: Filling the Gap
Grant Opportunities for Academic Liaison with Industry (GOALI)

• Aims to synergize university-industry partnerships and fund transformative research that industry would not normally fund

• Three Mechanisms:
  • Faculty and Students in industry
  • Industry Scientists and Engineers in Academe
  • Industry-University Collaborative Research Projects

• Criteria:
  • Impact/relevance of successful research
  • Resources considered (time, facilities, materials, IP)
  • Strong Industrial co-PI
Industry/University Cooperative Research Center (I/UCRC) Nucleus: A Cooperatively Defined, Funded & Shared Research Portfolio

Industry Advisory Board (IAB)

Shared Project Portfolio
- Cooperatively defined, selected
- Governed by NSF I/UCRC Agreement
  - Royalty free nonexclusive access to IP by members

Value derived from portfolio

Research Projects

Center Sites Universities

Pooled Member $’s

Investment of Indirects

Addresses precompetitive needs shared by IAB

Leverages & builds university strengths

Requires trust be built in the model, and between all partners in the center.
Innovation through Partnerships

77 Centers Across the Nation in FY14

5 Formal International Sites

- CEHMS, Germany
- CR³, Belgium
- NSF CAKE, Russia
- Pass, Pakistan
- VDI, Finland
I/UCRC Impact vs. Investment: Examples

CPaSS: Center for Particulates & Surfactants (1998)
BSAC: Berkeley Sensors and Actuators Center (1986)

<table>
<thead>
<tr>
<th>IUCRC investments &amp; Impacts</th>
<th>TOTAL</th>
<th>IMS</th>
<th>BSAC</th>
<th>CPaSS</th>
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</thead>
<tbody>
<tr>
<td>Estimated impacts (present value)</td>
<td>$1267.1M</td>
<td>$846,738,946</td>
<td>$410,727,849</td>
<td>$9,638,633</td>
</tr>
<tr>
<td>Total investments (present value)</td>
<td>$19.6M</td>
<td>$3,133,857</td>
<td>$13,250,712</td>
<td>$3,203,057</td>
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<tr>
<td>Benefit:Cost Ratio</td>
<td>64.7:1</td>
<td>270.2:1</td>
<td>31.2:1</td>
<td>3.0:1</td>
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<tr>
<td>Net Present Value</td>
<td>$1247.5M</td>
<td>$843,605,090</td>
<td>$397,477,137</td>
<td>$6,435,577</td>
</tr>
</tbody>
</table>

- Realized impacts with a net present value of $1.25B.
- Each dollar invested by NSF-I/UCRC generated an estimated 64.7 dollars in impacts.
PFI: AIR-TT Project Goals

1. Technical
   Basic Research
   AIR domain
   Proof-of-Concept
   Early Stage Prototype
   Technology/knowledge gaps
   NSF-Funded Research Result

2. Commercial
   Preliminary understanding of market need, potential competitive advantage, IP landscape, regulatory hurdles. Strategy toward commercialization.
   Enhanced commercial understanding, refined strategy toward commercialization

3. Educational
   Student innovation/entrepreneurial experiences
   Successful Commercialization
PFI:BIC – Smart Service Systems

Research Activities to Integrate Platform Technology in Service Systems

- Innovations in the service concept
- Innovations in the customer interface
- Innovations in the manner of delivery of the service
- Innovation in processing systems that feed service systems on the back end.

Smart cities, smart healthcare, smart infrastructure, self-service and customized service solutions to improve government services, social and humanitarian services, etc.
ERC Key Features

- Engineered Systems Vision
- Interdisciplinary Research
- Innovation Ecosystem
- Education
- Infrastructure
USC – Biomimetic Microelectronic Systems ERC

• An external camera sends images to a microelectronic implant in the eye
• The implant stimulates the retina of a blind person to provide a sense of vision
• The retinal implant is commercially available in Europe and the US (FDA approved for clinical use)
• Current implants – navigation and letter reading
• Future implants – face recognition

Intraocular Retinal Prosthesis
Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR)

➢ Program Goals
  ▪ To foster technological innovations
  ▪ To catalyze technology commercialization
  ▪ To encourage broader participation

➢ Seeking
  ▪ High-risk, high payback innovations with high commercialization potential
BLUEFIN LABS, Inc.

- Social web and TV analytics to index video
- Based on the founder’s Ph.D. thesis research performed at MIT’s Media Labs
- Fundamental research: supported by NSF

- 2008: founded (Cambridge, MA)
- 2008-2012: NSF SBIR Phase I & II
- 2013: Acquired by Twitter for about $100 million
Thank You
Who we are

- A global specialty chemical company headquartered in Kingsport, Tennessee
- Approximately 15,000 employees and over 50 manufacturing sites around the globe
- Serving customers in approximately 100 countries
- A company dedicated to environmental stewardship, social responsibility and economic growth
- 2015 ENERGY STAR® Partner of the Year Sustained Excellence
- 2014 Ethisphere’s World’s Most Ethical ® Companies
- 2015 Glassdoor Employees’ Choice Best Places to Work (# 30)
- 2014 revenue of $9.5 billion
- Our products include cellulose esters, copolyesters, functional films, plasticizers, solvents, paint additives, tire additives, aviation fluids, and heat transfer fluids
Eastman External Innovation Vision

Eastman Chemical Centers of Excellence:
- NC State

Innovation Network Schools
- University of North Carolina
- University of Tennessee
- Others TBD  *(One in active negotiation)*

Sponsored Research Projects: As needed

Focus Schools & Community:
- Recruiting
- PhD Fellowships
- On Campus Student Organization Support
Eastman Partnership Strategy – An equation for success

- Multi-year, multi-million dollar collaborations with both NCSU and UNC
- Eastman employees located on campus
- Collaborations across at least thirteen departments and colleges and two universities
- Over 35 projects active across both campuses
Center of Excellence at NC State

Why?
- Access to additional ‘Mind-Share’ as well as diversity – of thought, skill and experience
- Use others’ (existing) resources rather than build it

Vision
- Company center of expertise in rapid analysis of market needs and prototyping of possible solutions
- Additional leverage and value gained via government funding, and attraction of talent
- One element in part of broader external engagement strategy that involves fewer, deeper, relationships
- Our partnership becomes a model for how to partner

Key elements of the COE agreement include
- $10 M / 6 year commitment for sponsored research at NCSU
- Single points of contact and joint steering team
- $1.5 M / 6 year for UNC
- Non-disclosure and publication review provisions
- Pre-defined terms for IP resulting from work
Eastman Innovation Center

- **Stewart Witzeman**
  - Director, Eastman Innovation Center
  - Joined Eastman in 1985
  - B.S. Chemistry
  - Ph.D. Chemistry
  - Post Doctorate Organic Chemistry

- **Barclay Satterfield**
  - Senior Chemical Engineer
  - Joined Eastman in 2013
  - B.S. Chemical Engineering
  - Ph.D. Chemical Engineering

- **Gary Luce**
  - Technology Liaison, Eastman Innovation Center
  - Joined Eastman in 1980
  - B.S. Chemistry
  - Ph.D. Chemistry

- **Steve Perri**
  - Senior Research Associate
  - Joined Eastman in 1991
  - B.S. Chemistry
  - Ph.D. Organic Chemistry
  - Post Doctorate Chemistry

- **Jennifer Peavey**
  - Innovation Manager
  - Joined Eastman in 2010
  - B.S. Chemical Engineering
  - M.S. Chemical Engineering

- **Damon Billodeaux**
  - Principal Research Chemist
  - Joined Eastman in 2006
  - B.S. Chemistry
  - Ph.D. Chemistry

- **Jeanette Lucas**
  - Administrative Assistant
  - Joined Eastman in 2013
  - B.A. English
  - M.A. English
Lessons Learned

- Physical presence matters
  - Enables quick response time
  - Meeting space with infrastructure
  - Student/faculty interactions
  - ‘Secondary’ interactions

- Collaboration matters
  - There’s no substitute for face to face discussions
  - Best proposals developed jointly
  - Connecting groups across campus
Institutionalization of University Relations
Creating a Center of Excellence

Selection
200 -> 10 -> 4
Top schools in Chemistry, Eng, Matl’s

Negotiation
IP
Business relationship
Other

Implementation

Center Of Excellence

Eastman Satellite Technology Center
## A busy few years...

<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
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</table>
| 2012 | - Agreement  
- 1st RFP round & projects funded |
| 2013 | - Staff moved to Raleigh  
- Expanded relationship to UNC  
- Opened permanent office  
- 2nd & 3rd RFP rounds  
- 5 workshops  
- 80+ proposals received  
- ~25 projects at NCSU  
- ~5 projects at UNC  
- Over 50 faculty & 50 students engaged on projects |
| 2014 | - Additional staff moved to Raleigh  
- 4th & 5th RFP rounds  
- 65 proposals received for 2 RFP rounds  
- 3 Q&A workshops  
- 8 projects funded in 4th round (~40 total funded projects)  
- Refinement of RFP to central themes  
- Topical training by faculty to Eastman Researchers  
- 6 patents filed  
- 10+ additional disclosures  
- Major public events: Dyes Library Donation, anniversary events |
| 2015 | - 6th RFP round  
- 3 new projects selected (37 active projects)  
- Experiment with ‘Open Call’ RFP  
- Relationship expansion to University of Tennessee  
- 5 additional patent applications (11 total); 1 patent issued. Initial projects finishing  
- Now active with 9 NCSU departments and 2 UNC departments |
Importance of Entrepreneurship

John Rabolt
Karl W. & Renate Boer Professor of Materials Science, UD
Co-PI DE EPSCoR Research Infrastructure Improvement Grants
Entrepreneurship
n. 1. the activity of organizing, managing, and assuming the risks of a business enterprise.

Innovation
n. 1. The act of innovating; introduction of something new, in customs, rites, commercial products, etc.
   2. A change effected by innovating; a change in customs; something new, and contrary to established customs, manners, or rites.
How does one create an economic ecosystem in the state that encourages entrepreneurship?
Together Create an Economic Development Ecosystem that works for Delaware

DE EPSCoR + UD OEIP + Legislative Leaders
Economic Development: OEIP

**Approach**

- Develop value from university knowledge-based assets
- Participate in the establishment of an economic development ecosystem that
  1) invigorates and supports innovation and entrepreneurship
  2) establishes partnerships with public, private and academic sectors resulting in economic and social benefit
- Manage the economic development track for the Delaware EPSCoR grant
Responsibility to provide educational and entrepreneurial opportunities for Delaware citizens to start small businesses and support these activities through state and federal aid/grants
ENTR 860/460, ELEG 660/460, MSEG 625/425
High Technology Entrepreneurship
1999 - ????

Instructors:

Keith Goossen, Associate Professor
Electrical and Computer Engineering

Scott Jones, Professor of Accounting, and MIS

John Rabolt, Karl W. and Renate Böer Professor
Materials Science and Engineering

Objective:

The goal is to provide the business or engineering student with an interdisciplinary experience that improves their preparation to serve as entrepreneurial team members in an emerging high technology business. This will be accomplished through presentations by distinguished guest speakers and experiential learning projects completed by students.
Requirements:

A signed and legally executed non-disclosure agreement is REQUIRED for this course.

Class Attendance: Our guest lecturers have taken time from extraordinarily busy schedules to come to class to talk about entrepreneurship. Attendance is required, unless excused in advance with a really good reason. (20 points)

Assignments: Business plan tutorial, Invention Assessment assignment, others as needed (10 points)

Developing a venture: The business opportunities are comprised of ideas that have been developed by inventors or entrepreneurs at UD. The opportunities have been screened and determined to be potentially credible business opportunities. The number of points you earn is heavily influenced by peer ratings.

Metrics:

Mid-term progress presentation: You will present a preliminary 8 minute assessment of your technology to the class for the mid-term review. (15 points)

Final 8-minute Venture “pitch”: You will present an 8 minute “pitch” to a panel of venture capital experts for the final exam. (15 points).

Written venture plan: You will prepare an appropriate business and strategic research/engineering plan serving as backup to the venture “pitch” you gave in the 8 minute talk. (40 points).

Website: www.udel.edu/sakai

Required SaS: The Idea Startup software
Student Successes
PAIR Technologies LLC

The next generation of infrared analysis tools

- John Rabolt (MSEG), Bruce Chase (DuPont – Retired), Scott Jones (Lerner Business School), Dan Frost (MBA – UD), Jim Malone (Bomem-Retired)

- Founded in 2005 over Dunkin’ Donuts on Main Street, Newark, DE
- Since 2006 has raised over $1.2M in NSF and NIH SBIR I and II funds (including approximately $100K from founders)
- Moved to Delaware Technology Park in 2010 and commercialized instrument
- Current PAIR 100 instrument used by students and faculty in ISE Advanced Materials Characterization Lab
Delaware's EPSCoR Program helped support and develop a new course (High Tech Entrepreneurship) jointly co-taught by professors in the College of Engineering and the College of Business. 1,000 undergraduate and graduate students have been taught to simulate a small company environment and write a business plan.

**Fingerworks** – started by PhD student Wayne Westerman and Professor John Elias (ECE at UD)

Sold to Apple in 2005 for $25M
Need to encourage technological innovation and enable startup companies to translate ideas into commercializable products

*Parkinson’s Disease*

Delaware EPSCoR has provided "traction" funds for PD Shoe, a “student-created” company, that is trying to commercialize a device that has shown effectiveness in mitigating *Parkinson's* symptoms

*Neurological thief*
College of Engineering Enables Entrepreneurship
COE’s Spin Up™ Program

Student team from Entrepreneurship class works with COE and Business School faculty supervision to develop business plan

COE faculty provide/identify source of “traction” funds and facilities for student team to begin operation, develop prototypes, etc.

Example from 2013 Class: Parkinson’s Disease Shoe (PD Shoe)

COE works with Business School to provide guidance to student team to bring company “up to speed” and ready to commercialize product

COE provides mentors to help student team develop milestones and seek SBIR Phase I and II funding from NSF, NIH, DOD, etc.
Results and Progress

- Since 1999 UD’s IP has been used to form 100 student-created companies complete with business plans and a venture “pitch”

- Of those 100 virtual companies, about 8-10% have stayed together and gone on to license IP from the university, incorporate and commercialize products.

- More than 1000 students from engineering, the sciences and the business school have been irreversibly influenced by this course and will integrate the entrepreneurial experience into their career plans.
Delaware’s leading edge research and initiatives fuel technological innovation, create next generation entrepreneurs, stimulate economic development, and defend the natural resources that make the state a healthy, attractive environment for businesses and citizens.

BUT THAT WOULD NOT HAPPEN WITHOUT

• Continued and increased public and private financial support of EPSCoR research and entrepreneurial initiatives
• Tax incentives for “home-grown” startup companies to remain in the State
• Expansion of the entrepreneurial mentoring network to include all stakeholders in the State
An economic ecosystem in the state that encourages entrepreneurship requires:
THANK YOU!!!
This is what you need from your State government:

- **Continued and increased public and private financial support of EPSCoR research and entrepreneurial initiatives**
- **Tax incentives for “home-grown” startup companies to remain in your State**
- **Expansion of the entrepreneurial mentoring network to include all stakeholders in your State**

Thank You!!
Delaware's economic vitality has suffered over the last 25 years from changes in big business priorities, consolidation and globalization

$$\text{$$$}$$
1990: Delaware's economy built on the 4Cs
This has lead to a loss of manufacturing jobs since 1990 that sapped $1,000,000,000 from the Delaware economy.
Spin In™ Program

Company submits idea to OEIP, which assembles interdisciplinary student team.

Student team works with faculty supervision and company personnel to complete product research & development.

Team “spins out” finished product to company and receives academic credit.

Company develops product or idea with commercial potential.
Entrepreneurship Course

• EPSCoR funded the launch of this entrepreneurship course at UD, team taught by business and engineering faculty.

• Over 1,000 students have taken the course, developing hundreds of virtual business plans.

• One student developed a plan for his fledgling company, Fingerworks.

• Later sold to Apple, who incorporated his multi-touch technology into its iPhone and iPad products.
Macroscale environmental sensor network research led by Dan Leathers

Approach:

• Integrating diverse environmental data streams to solve complex environmental problems.

• Providing data products and visualization tools to environmental regulators and emergency responders.
Theme 3: Developing and Deploying Multiple Spatial and Temporal Scale Environmental Sensors

Team Leaders: Rabolt, Leathers, Ni, Xiao
Theme 3: Motivation

- Adverse environmental events may be preempted or curtailed when the type and source of contamination are detected early at very low levels.

- Innovation in environmental sensors has lagged in recent years.

- Environmental decision makers need access to usable data that ranges from micro- to macro-scale.
Data Integration from Nano to Macro

Nanoscale sensors

Macro-sensing array

Traditional handheld sensor
THREDDS Server

- Data warehouse for multi-scale environmental data (in situ sensors to remotely sensed data).
- Allows data integration and visualization in one package.
- Will allow integration of nano sensors with large-scale data.
Environmental Cyberinfrastructure

- Employing two FTEs, graduate and undergraduate students.
- Currently involved in several data integration projects.
- Developing Delaware Climate Change Assessment Web Portal.
Climate Change Assessment Portal

- Archive Delaware climate change projections.
- Create a web portal for visualization and dissemination of projections.
- Integrate projections with historical data.
- Make data easily available to researchers, decision makers, and the general public.
New Opportunities Under Development

- Linne Industries – solar-powered pond aeration system
- Voltaic Coatings – transparent, conductive films for electronic displays
- Knotts Creek – low-cost “green” process for chlorine recovery
- Genomatica – biofuels
Intrapreneurship and Entrepreneurship: A View From the Trenches

John F. Rabolt
Karl W. and Renate Boer Professor and Founding Chair
Materials Science and Engineering
Professor
Biomedical Engineering
The Ultimate Entrepreneurial Experience in Academia: Start a New Department

- Rabolt recruited from IBM (in 1996) to establish a Department of Materials Science and Engineering (MSEG) at Delaware, the first new department in the College of Engineering in over 90 years!!!
- a 12 year *entrepreneurial* adventure: hired 12 faculty, assisted in the design and construction of E. S. DuPont Hall (home of MSEG), programmatic development of Departmental Strategic Plans, Graduate Curriculum, Workload Policy and Promotion and Tenure Documents
- Chance meeting with Professor Scott Jones in 1998 leads to co-teaching a class on entrepreneurship in the A. E. Lerner Business School
Voltaic (Fall-2010 Class-company formed 2011)

- **Business** – conducting plastic films
- **Hattiesburg, MS** - 7th annual “Invent Your Future!” competition, 4/26/11. Voltaic one of seven invitees!!
- Philadelphia, 5/1/11, Angel Ventures Fair
- CEO - Keith Modzelewski (MBA); CFO - Rick Walsh
  CTO - Chelsea Haughn (MSEG)
  CSO - Nandita Bhagwat (MSEG)
- K. Modzelewski – First UD Kauffman Global Scholar (2012) oversees polymer synthesis in Chile
- 2013 – COE/UD provides $15K “traction” money, facilities and mentors to begin processing and testing of polymers
- 2014 – team works with UD mentors to write NSF SBIR grant, which is successful and provides $150K for 6 mo.
- Milestones to be evaluated 1/2015
Freedom to move, Freedom to learn, Freedom to live

MOBiLETECH ORTHOPEDiCS

iBrace

Owners
Steven Stanhope, PhD
Alexander Karahalis, MBA
Ryan Bennett, MS
Maxime Dempah, MS-MSEG

Alexander R. Razzook, M.S.E.
arazzook@udel.edu
202.330.9593

2012 UD Hen-Hatch Business Plan Competition Winner
Economic Development Ecosystem

Innovation/Entrepreneurship
- Experiential Learning
- Workforce Development
- Spin In

Partnerships
- Established Enterprises
- New/Early Stage

Technology Transfer
- Inventions
- Patents
- Licenses & Revenues
- Research Partnerships

State Committee
- State S&T Plan
- EPSCoR Business Community
Tag & Target Delivery Technology

$T^3D$: Oncology (Fall, 2011)

Rice University Business Plan Competition, 2012
Houston, TX
UD Hen-Hatch Business Plan Competition Finalist

Owners
Vinu Krishnan (MSEG)
Sean Gilligan (MBA)
Sameer Sathaye (MSEG)

www.t3dnanotech.com
196 S. College Avenue, Newark DE 19716
302-293-8365
Launch Tennessee

Making Tennessee the No. 1 Place in the Southeast to Start and Grow a Company
Governor Haslam’s Jobs4TN Plan

**Strategy # 1:**
Prioritizing Key Clusters & Existing Businesses

**Strategy # 2:**
Establishing Regional “Jobs Base Camps”

**Strategy # 3:**
Reducing Business Regulation

**Strategy # 4:**
Investing in Innovation

**Ultimate Goal:**
Tennessee Becomes No. 1 in the Southeast for High Quality Jobs
Launch Tennessee Focus Areas

LaunchTN supports statewide efforts by boosting entrepreneurship, promoting the commercialization of technologies, increasing the flow of capital into Tennessee-based companies and raising the profile of the state.

- Entrepreneurship
- Capital Formation
- Innovation & Commercialization
- Outreach
Economic Impact

Create

1,000+ jobs created by accelerated companies
480 companies accelerated

Invest

$99 million invested via INCITE Co-Investment Fund
$868 million venture investment in Tennessee

Grow

3,200+ companies screened
$80+ million raised by accelerator-assisted companies

January 2012 – June 2015
Innovation Strategy

Innovation is a multi-phase, multi-faceted process. Innovation should be market-driven. Innovation takes a village.

Researchers

Industry

Investors

Entrepreneurs
A Sampling of Tennessee’s Key Industry Clusters

- Advanced Manufacturing
- Agriculture
- Automotive
- Energy Technology
- Healthcare & Medical Devices
- Transportation & Logistics
LaunchTN-Supported
Industry-Specific Accelerator Cohorts
Leveraging Public/Private Partnerships

- Department of ECD
- Life Science TN Mentor Network
- Innovation Connection
- Tech Office Hours
- Accelerator Network // The TENN
- COSTARTERS For Researchers
Importance of New Venture Development and Support

Mahendra Jain
mjain@kstc.com

www.kstc.com
http://ksef.kstc.com

NSF Workshop Series on Innovation, Entrepreneurship, and Translational Research

October 5, 2015
Nashville, TN
Stages of Innovation and Investment

- **Basic Research**
- **Applied Research**
- **Start Up**
- **Product Rollout**
- **Successful Venture**

**Entrepreneurs**

**POST COMPANY FORMATION**
- **Seed**
- **Start Up**

**PRE-COMPANY FORMATION**
- **EPSCoR**
- **Education**

**Time**
Kentucky Ranking 1999-2000*

Kentucky – EPSCoR and IDeA State

- 29th in Venture Capital Investments
- 42nd in Business Incubators
- 50th in Federal Research and Development
- 47th in Scientists and Engineers – Work Force
- 43rd in Patents Issued
- 42nd in the Creation of New Firms

*Data from PricewaterhouseCoopers and National Business Incubation Association
Kentucky Programs for Entrepreneurs

Kentucky Offers a Variety of Programs to develop entrepreneurial ecosystem for:

- New Venture Formation – Innovation Driven
- Capitalization
- Business Assistance and Expansion
- Job Creation
- Talent Development
Programs Designed for ...

Student Entrepreneurs
- High School and College / University

Entrepreneurial Innovators
- Researchers and Faculty at an University

Entrepreneurs
- Business
Entrepreneurial Innovators
(Funded through the Council on Post Secondary Education, CPE)

• Kentucky Science and Engineering Foundation (KSEF)
  ➢ R&D Excellence Program
• Kentucky Commercialization Fund

Status Update (FY 2003 – FY 2015):
• Technological innovations: increased IP activity
  ➢ Nearly 160 Invention Disclosures; ~90 Provisional Patents
  ➢ Nearly 70 Non-provisional Patent Applications
• > 40 new businesses
Federal SBIR / STTR Program

• America’s Early Seed Fund
  ➢ ~$2.5 billion / year

• SBIR: Small Business Innovation Research

• STTR: Small Business Technology Transfer
  ➢ Facilitates Cooperative R&D between Small Business Concerns and U.S. Research Institutions

  ➢ Phase I: Feasibility, 6-12 months, $150K
  ➢ Phase II: Prototype Development, 2 years, $1M
  ➢ Phase III: Commercialization, Non-SBIR/STTR $$$
SBIR / STTR Purpose and Eligibility

**Purpose**
- Commercialize Innovative, Scalable, High-risk Technologies
- De-risk Technologies
- Promote Private Sector Investment

**Eligibility**
- For-Profit Company
- Small Businesses (<500 employees, including affiliates)
- US Owned (≥50% US citizens or permanent resident aliens)
- Special Rules Apply if Majority-owned by VC Firms, Hedge Funds, Private Equity Firms, Trusts, etc.
Participating Federal Agencies

Largest Agencies:
- DoD - Department of Defense
- DOE - Department of Energy
- DHHS – Department of Health Human Services
  - National Institutes of Health (NIH)
- NASA - National Aeronautics and Space Administration
- NSF - National Science Foundation
Kentucky SBIR/STTR Program

Pre-application Assistance

- **Mentoring**: One-on-one Consultation; Matching with Federal Agencies
- **Training**: SBIR/STTR Seminars; Workshops and Conferences
- **Grants**: Phase Zero and Phase Double Zero (up to $4,000)
- **Networking**: SBIR Connect Meetings Two Times per Month

Post-award Assistance

- Kentucky SBIR/STTR Matching Grants
- Review of Comments

Entrepreneurial Leave

- University of Louisville and University of Kentucky
Mentoring: One-on-One Assistance

1. Assist in Identifying a Problem and a Solution (Approach to the Problem)
2. Refer Appropriate Federal Agencies (Solicitation); Advise the PI/Company to Discuss Technology with PM
3. Assure that the Agency is Interested in the Company’s Technology/Idea
4. Advise the Company re: Documentation of the State-of-the-art Literature and Issued Patents, and Talking to Other Researchers
5. Advise the Company to Develop a Technical Plan for Feasibility Study and Prototype Development for Commercialization; Identify the Technical Objectives for Demonstrating Proof of Concept in Phase I
6. Assure that the Company Identifies Competing Products and the Market
7. Help the Company to Name the PI and the Project Team
8. Discuss with the Company How They will Assure that Their Idea will Work
9. Discuss the Importance of Support and Commitment Letters from Partners
10. Advise the Company to Retain a Proposal Writer, Editor, and/or Reviewer – and to Prepare a Schedule to Get the Proposal Conforming to Agency Format before the Deadline
11. Assure the Company has Completed all Registrations
Faculty Participation in the SBIR/STTR Programs

- Partners with a Small Business (subcontractor)
- Forms a Company, while Staying as a Faculty Member at University
- Forms a Company and takes Leave of Absence from University
- Allows a Small Business to use Equipment for a Fee
- Avails the University Entrepreneurial Leave Program

*In all cases, the faculty member can initiate the process, find the topic, and write the proposal.*

Source: Robert Berger Consulting
Kentucky SBIR/STTR Matching Funds Program
(Created and funded by KY Cabinet for Economic Development)

- Program Initiated and Funded by CED-OOE Since 2006
- Provides Matching Funds for Both SBIR and STTR Grant Awards: Doubles the Money
- Quarterly Application with Complimentary Tasks and Independent Review Process

- Phase I
  - Matches Up to 100% – but Not to Exceed $150,000 – for Exploration of Technical Merit or Feasibility of an Idea or Technology

- Phase II
  - Matches Up to 100% – but Not to Exceed $500,000 Per Year for Two Years – to Support Full-scale R&D and Business-related Tasks
Program Statistics (FY 07 – FY 15)

- 220 Awards to Date to 108 Companies
- $53.2M Awarded to Date
- All 5 CED Focus Areas Represented
  - Concentration in Health & Bioscience
Kentucky Innovation Network
(Created and funded by KY Cabinet for Economic Development)

Provides Business Assistance through 13 Locations

- Business Development Consultation
- Business Model Consultation
- Validation and Market Assessment
- Assistance with Growth Strategy
- Access to Service Providers
- Access to Professional Networks
- Connections to Potential Suppliers / Business Partners
- Access to Funding Resources and Capital Networks
- Coaching throughout Fundraising Efforts
KY Programs Encouraging Entrepreneurs

**Commercialization**

- Kentucky Innovation Network (KyIN)
  - 13 KyIN Centers
- Kentucky Enterprise Fund / Commonwealth Seed Capital
- Kentucky SBIR/STTR Matching Fund Grants
- Start Up
- Federal SBIR/STTR Grants
- Seed Funds
- Product Rollout
- WC Infusion
- Successful Venture

**Time**

**Basic Research**

- Commercialization Fund
- Kentucky Science and Engineering Foundation
- EPSCoR / IDeA

**Education – GSE & Idea State U**
Kentucky’s Entrepreneurial Activity Ranking

- Per 2011 Kauffman Entrepreneurial Index
  Kentucky’s Entrepreneurial Activity has Grown
  - 5th Fastest Rate from 2001 to 2010
  - 3rd Fastest Rate between 2008 – 2010
  - 8th Highest Rate among All States in 2011

- Per University of Nebraska-Lincoln Report
  Kentucky Ranked 4th in 2013 State Entrepreneurship Index
  - Based on Data from the Bureau of Labor Statistics, the IRS Statistics of Income Bulletin, the U.S. Census Bureau, and the U.S. Statistical Abstract
  - ND (2.72), CA (1.91), NY (1.79), KY (1.78), NH (1.71), CT...
Questions?
Success Story: ParaTechs Corporation

- University of Kentucky Spin-Off (2004)
- Founder received RDE grant
- Company received Phase Zero and Phase Double Zero awards
- Develops and brings to market novel products in the area of protein expression and mouse transgenic technologies.
- SBIR Funding: Over $7.5M (federal+ Kentucky Match)
- Product Sales: has brought to market two products derived from SBIR/STTR funding with customers in 27 different countries
SBIR /STTR Awards Made by NIH

# of SBIR/STTR Awards

- **US**
- **IDeA States**

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### SBIR Grants (R43 & R44) awarded to IDeA States for FY 2012 and FY 2013

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The chart shows the number of SBIR grants awarded to IDeA States for FY 2012 and FY 2013. The states are listed in the columns, with 2012 grants on the left and 2013 grants on the right. The states with the highest number of grants in 2012 are Kentucky (19) and New Mexico (18), while in 2013, Kentucky (18) and New Mexico (14) also lead the list, with Vermont (10) and Wisconsin (10) showing a significant increase from 2012 to 2013.
STTR Grants (R41 & R42) Awarded to IDeA States for FY 2012 and FY 2013

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No. of Grants
## Success Rate for Competing SBIR Applications FY 2013

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<td>Non-IDeA States</td>
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Technology Commercialization

Alan Bentley
Vanderbilt University

NSF EPSCOR Workshop 1
October 5, 2015
Agenda:
Tech Transfer Background
Innovation Culture
Impact of Tech Transfer
Licensing v Start Up
Keys to Success
Agenda:

Tech Transfer Background
Innovation Culture
Impact of Tech Transfer
Licensing v Start Up
Keys to Success
How do they get the vitamin D in the milk?
What is the Bayh-Dole Act?

Birch Bayh

Bob Dole
Serve the university by assisting inventors in *bringing their innovations to practical application for the benefit of the public*
License inventions to industry

- Serves as a conduit for the transfer of promising Vanderbilt technologies to industry
- Contributes to regional economic development by licensing locally and supporting new venture creation
- Encouraging greater collaboration between academia and industry

Help launch new Start Up Companies

Business Development / Industry Funding
• Revenue Generation
• Revenue Generation
• Faculty Service
(Competing ?) Objectives

- Revenue Generation
- Faculty Service
- Regional economic development / job creation
(Competing ?) Objectives

• Revenue Generation
• Faculty Service
• Regional economic development / job creation
• Societal benefit
(Competing ?) Objectives

• Revenue Generation
• Faculty Service
• Regional economic development / job creation
• Societal benefit
• Partnership development / cultural enrichment
(Competing ?) Objectives

• Revenue Generation

• **Faculty Service**

• Regional economic development / job creation

• Societal benefit

• Partnership development / cultural enrichment
Agenda:

Tech Transfer Background

Innovation Culture

Impact of Tech Transfer

Licensing v Start Up

Keys to Success
Research Cycle

- Hypothesis
- Grant application
Research Cycle

- Hypothesis
- Grant application
- Funding ($)
- Research
Innovation Cycle

Research

Idea

Innovation
Innovation Cycle

Research → Innovation → Patents / Licenses → Products, Services, Jobs

idea → CTTC
Innovation Cycle

- Research
- Innovation
- Patents / Licenses
- Products, Services, Jobs
- Royalties ($)

CTTC
Impact Cycles

- Funding ($)
  - Grant application
  - Publication
  - Discovery

- Royalties ($)
  - Products, Services, Jobs
  - Patents / Licenses
  - Innovation
  - Research
Impact Cycles

Funding ($)

Grant application
Publication
Discovery

Royalties ($)

Research

Innovation

Products, Services, Jobs
Patents / Licenses

Impact Cycle
Research Cycle
Innovation Cycle

Impact
Anyone can cook
Agenda:

Tech Transfer Background
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**Impact of Tech Transfer**
Licensing v Start Up
Keys to Success
Economic Impact of TT - FY2014

- 5,435 licenses executed
- 6,363 U.S. patents issued
- 914 new startups
- 914 startups were formed
  ▲ 12%
- 702 of them had their primary place of business in the licensing institution's home state
  ▲ 14.8%
- 4,688 startups were in operation at the end of FY2014
  ▲ 11.4%
- $28 billion of net product sales were generated last year
  ▲ 27.2%
- 965 new commercial products
- 965 new commercial products were created by companies licensing university technology
  ▲ 34.2%
Economic Impact of TT - FY2014

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Societal Benefit from Tech Transfer

- Hepatitis B vaccine
- Saccharin
- Pap smear
- Taxol
- LCDs
- Insulin
- Vitamin D milk
- Emtriva
- PET/CT scanner
- Fluoride toothpaste
- MRI scanner
- Electron microscope
- Allegra
- Streptomycin
- Pacemakers
- Gatorade
- Cysplatin
- Penicillin
- Magnetic memory
- Polio vaccine
- MRI scanner
- Rocket fuel
- Neupogen
- Cysplatin
- Remicade
- Neupogen
- Plexiglas
- Coumadin
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Vanderbilt’s Impact
Agenda:
- Tech Transfer Background
- Innovation Culture
- Impact of Tech Transfer
- Licensing v Start Up
- Keys to Success
License v start up

It shouldn’t be a competition.
Start ups are a major pain in the buttocks to manage.
Why are they a pain?

They take a lot of time to develop
• Some are not worried about speed to market
Why are they a pain?

They take an inordinate amount of work
Why are they a pain?

They experience a very high failure rate
Why are they a pain?

Some are executing questionable business plans.
Why are they a pain?

Most do not have resources to pay – the others refuse to do so.
Why are they a pain?

There are often complex Conflicts of Issue to manage.
Why are they a pain?

Must be handled with extra care
Why are they a pain?

They can be a bit needy
Then why support new ventures?

- Politics require it
- Part of providing valuable service
- Increases deal flow
- Supports entrepreneurship
Then why support new ventures?

- Regional job creation
- Retention / recruitment of faculty
- Financial upside
- Opportunity too good or too bad to pass up
Agenda:

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Keys to Success
Keys to success

• Clear objectives for the office + accountability
• Ample personnel
• Dedicated NV personnel
• Profile within and support of institution
Keys to success

- Engagement with community
- Strong network
  - Investors, advisors, services, entrepreneurs
Keys to success

• Value-creation mentality
  – Investment in proof of concept
  – Novel deals with regional firms
Thank you

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