



National Science Foundation Industry/University Cooperative Research Center (I/UCRC)



*Wind-Energy Science, Technology, and Research
Industry/University Cooperative Research Center*





1. What is an I/UCRC?



The Industry/University Cooperative Research Centers (I/UCRC) Program

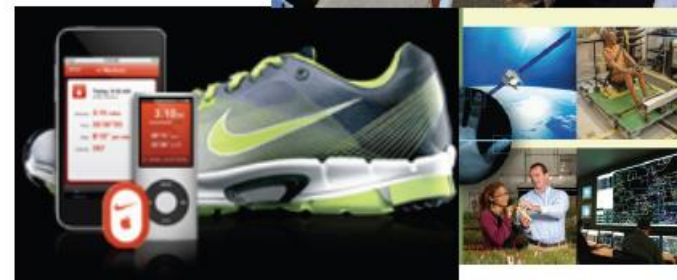
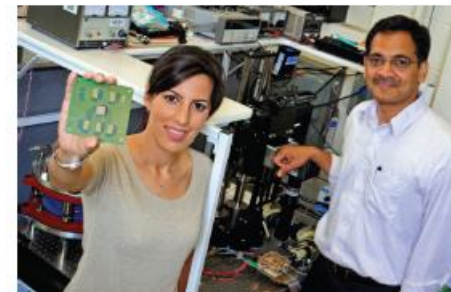
Mission:

- To contribute to the nation's research infrastructure base by **developing long-term partnerships among industry, academe and government**
- To leverage NSF funds with industry to **support graduate students performing industrially relevant research**

Vision:

- To **expand the innovation capacity of our nation's competitive workforce** through partnerships between industries and universities

Over 30 years of fostering and growing long-term trusted relationships between Industry and academe based on shared value





I/UCRC Fast Facts – FY13 Snapshot



**National
Scope of
I/UCRCs**

ENG – Engineering

CISE – Computer
and Info. Sci and Eng.

Program Funding

- \$14.5M in Program Funding (ENG, CISE)
- \$119.5M in Total Center Funding,
- 8:1 Leveraging of NSF funds.

Centers Nationally:

- 67 Centers with 191 Sites
- 1119 Memberships held by **over 700 Member organizations**

- 58% Large Business, 21% SB, 14% Federal Members

Students

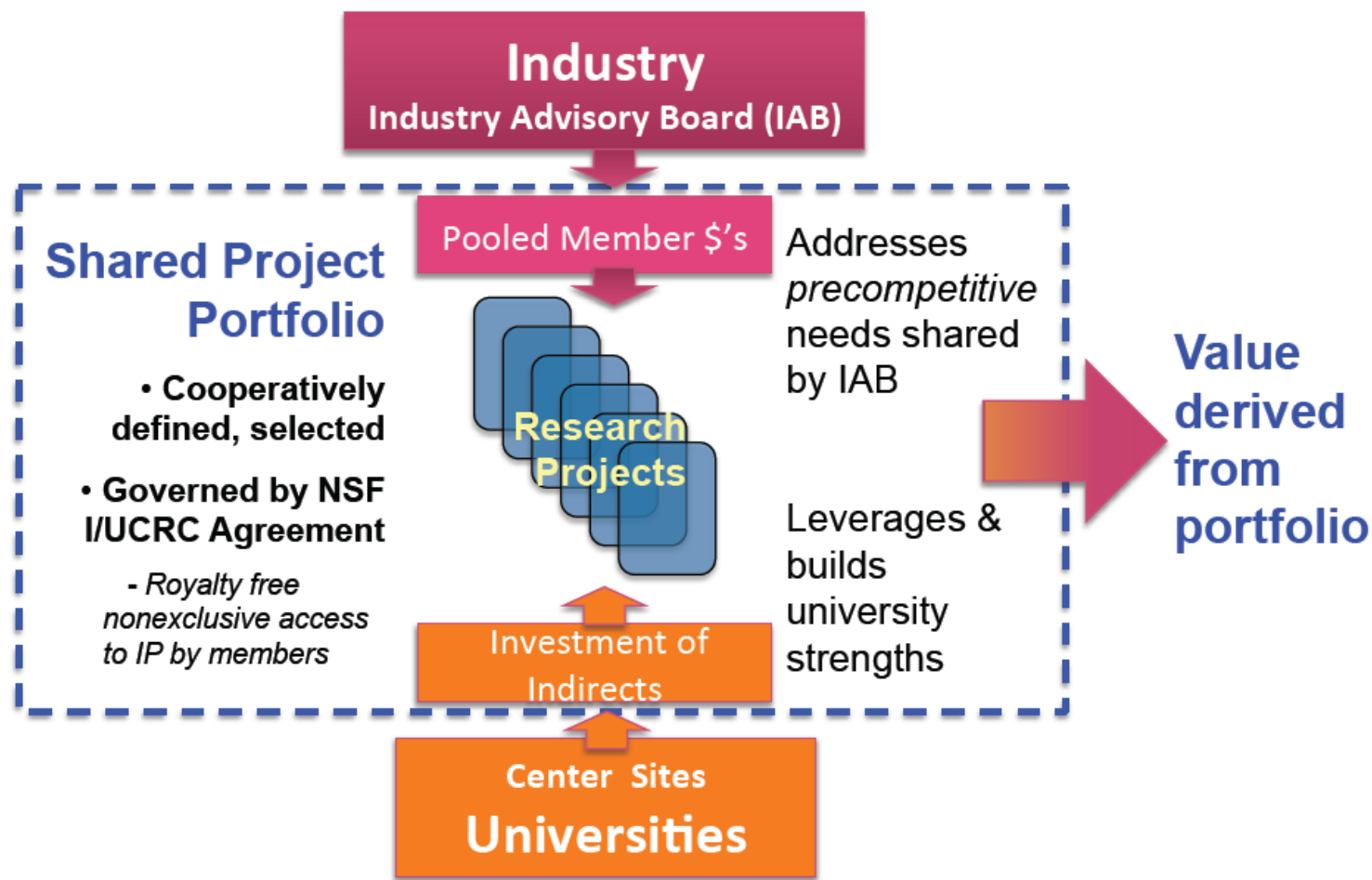
- 2077 students engaged
- 820 graduated in 2012, over 28% hired by members
- 285 PhDs, 322 MS & 213 UGs graduated in 2012, trained in Center research

Sustainability

- Over 40 Graduated I/UCRCs remain in operation true to model



WindSTAR's I/UCRC Nucleus: A Cooperatively Defined & Funded Shared Research Portfolio



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

Building WindSTAR to offer I/UCRC Value



Value to Industry Members

- High value research projects
- Leveraging relatively small investment to reap far greater return via consortium-style research center
- Sector networking, learning from industry peers and customers
- Access to intellectual property
- Pre-publication research access
- Access to students, faculty & facilities

Value to Center Institutions

- New research and education dimensions
- Student recruitment and placement
- POC leveraging for new funding
- Trusted relationships with industry
- Ready partners for translation
- Organize Industry sector relationships
- Means to achieve institutional mission.

**Outcomes from a
cooperatively defined
and managed, portfolio
of precompetitive
research.**





2. What is WindSTAR?



WindSTAR Vision Statement



Our vision is to become the premier research Center in the area of wind energy.

- Bring together **university and industry** researchers to conduct basic and applied research on wind energy,
- Combine **state-of-the-art capabilities and knowledge** to advance projects relevant and of mutual interest to industry partners,
- **Train students** in the advanced technologies that are important to industry partners and to have a pipeline of state-of-the-art talent flowing from academia to industry,
- Foster a **community for networking, interactions, and collaboration**
- Conduct research that **benefits our industry members**





I/UCRC Partners and Members



*Wind-Energy Science, Technology, and Research
Industry/University Cooperative Research Center*



keuka
ENERGY



The Maine Composite Alliance



MASSACHUSETTS
CLEAN ENERGY
CENTER



University of
Massachusetts
Lowell

IOWA STATE
UNIVERSITY





Thrust Areas



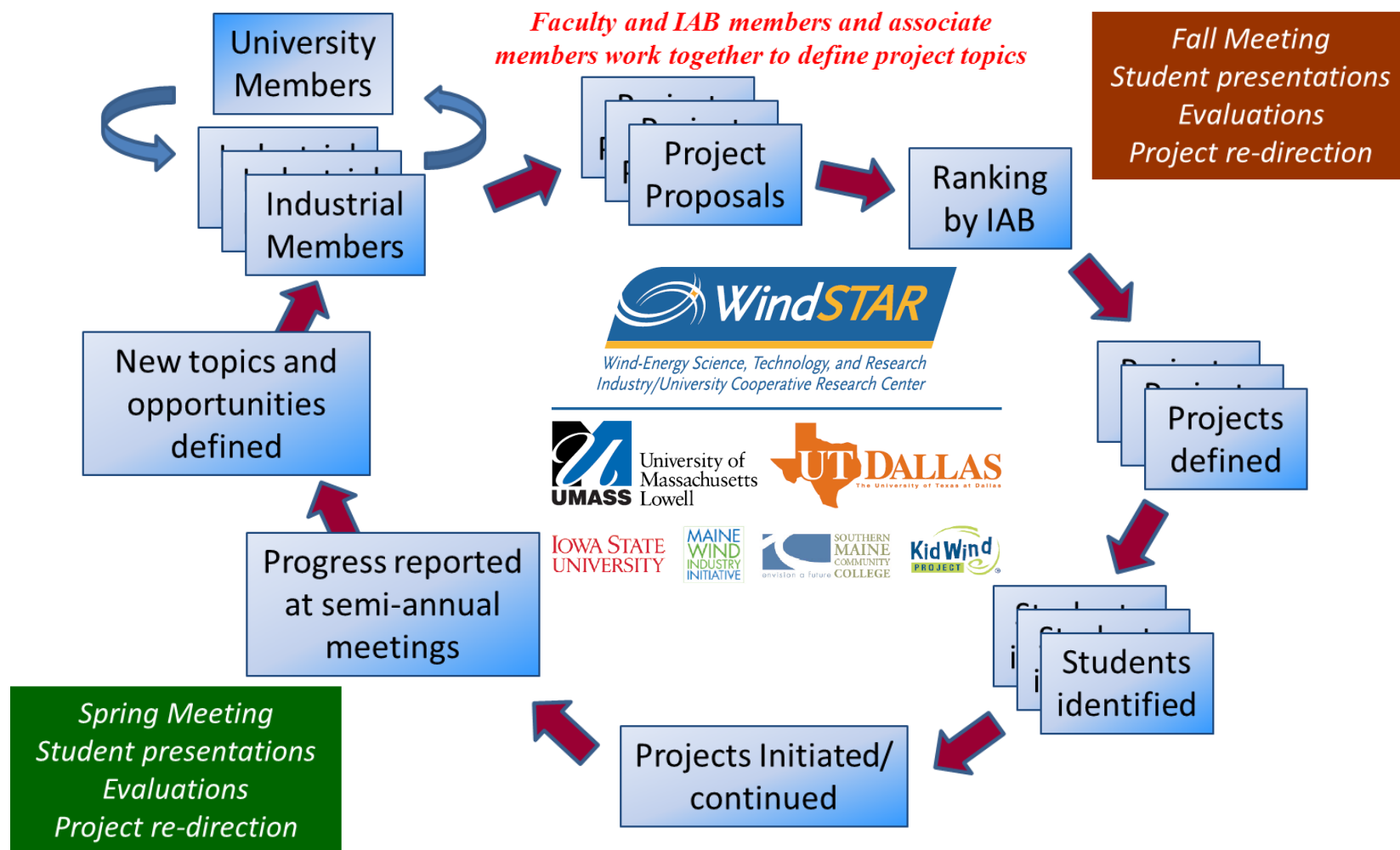
- **A. Composites in Wind Energy** – Advances in next generation materials and methods for turbine systems
- **B. Foundations, Towers and Infrastructure** – Developing cost-effective and deployable substructures above and below the ground or at sea
- **C. Manufacturing and Design** – Innovative approaches in the computational modeling and development of new turbines, subcomponents, and systems
- **D. Structural Health Monitoring, Non-Destructive Inspection, & Testing** – Advances in testing, monitoring, damage detection and prognosis, and maintenance throughout the lifecycle
- **E. Control Systems and Energy Storage** – Advances in control and power systems towards more reliable, efficient, dispatchable and grid-friendly wind energy systems than are currently available
- **F. Wind System Planning, Siting, Operations, and Maintenance** – Improved decision making for new systems, resource assessment, and managing uncertainty and future impact on system performance



3. How does it work?



WindSTAR I/UCRC - Annual Schedule



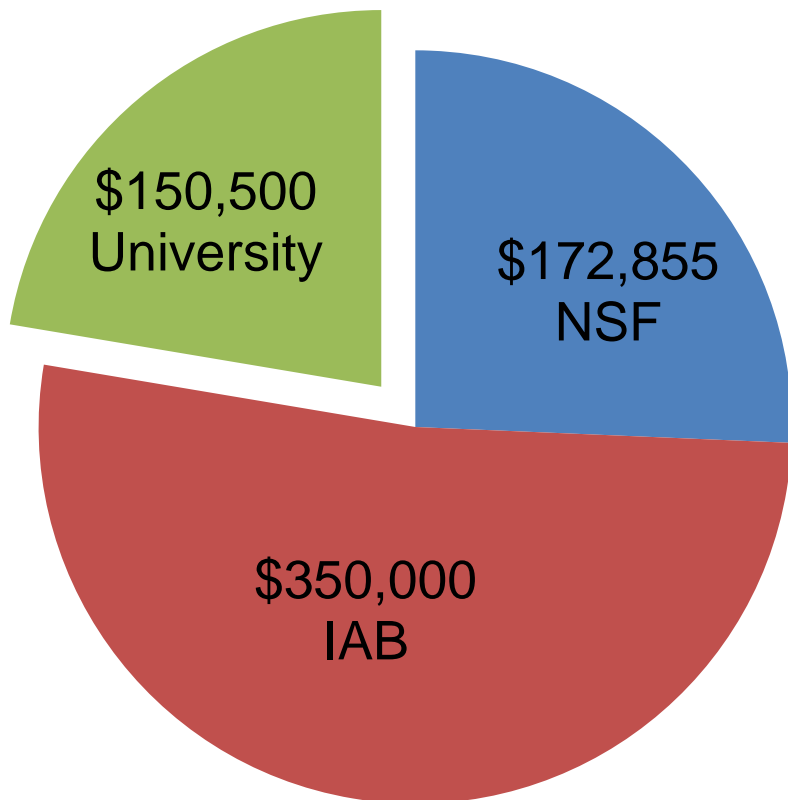


WindSTAR - Membership

- Company joins as *WindStar Member* - \$40,000/year membership fee, or a *Small Business Member* - \$15,000/year (NSF supplements may decrease SB fee to \$5,000)
 - **Financial Benefits:**
 1. Enjoy 10% overhead rates on project funds
 2. Pooling money improves return on investment in new technology with a 16:1 leveraging of membership fee (~\$670k invested in the first year)
 3. Enables IAB members to team on other research projects supported by NSF and DOE
 - **Members Benefits:**
 1. Invited to attend semi-annual center meeting, guide project execution, and provide input and guidance to faculty and students (Cast 8 votes as an Industrial Member, 3 votes as an SB member)
 2. Work with faculty to identify topics of interest and propose new research topics
 3. Receive copies of semi-annual project reports
 4. Receive non-exclusive rights to all IP generated across the center
 5. Can also provide additional funds for special projects with exclusive rights to IP that is generated
 6. Receive copies of manuscripts generated by faculty and students prior to publication
 7. Receive annual resume book of participating students
 8. Receive access to network with other members and affiliates



Funds for the Center for Year 1



- Total Fund: \$673,355 (\$502,855 real dollars)
- Leveraging of \$40k Membership = 16.8:1 (12.6:1 real dollars)
- For example: assuming a \$69k Project (with 53% overhead), the same project will cost \$51k (with 10% overhead). **Savings = \$18,000!**



Top Reasons to Join WindSTAR



1. Pooling money improves return on investment in new technology with a ~16:1 leveraging of membership fee and only 10% overhead rate (50-100% is typical)
2. Industry members direct the selection and execution of research topics across a broad range of researchers and facilities at multiple universities
3. Royalty-free licenses to technology generated through the Center and pre-publication access to research results
4. The Center allows us to pursue other sources of funding
5. Resume book and access to graduates who are well trained in the field of wind energy
6. Strategic networking and synergistic cooperation opportunities with complementary *and* competitor companies





www.uml.edu/WindSTAR

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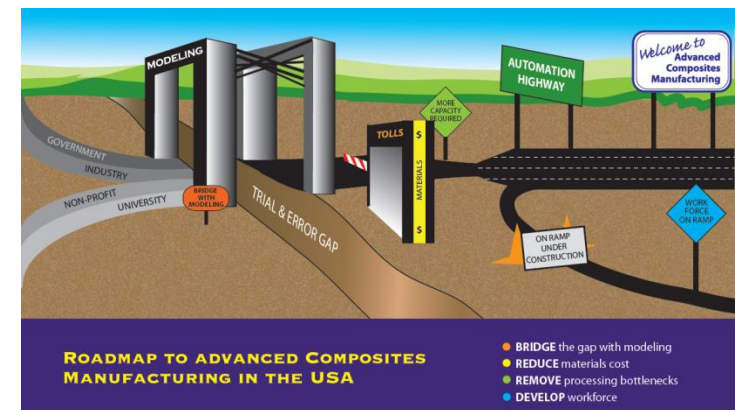
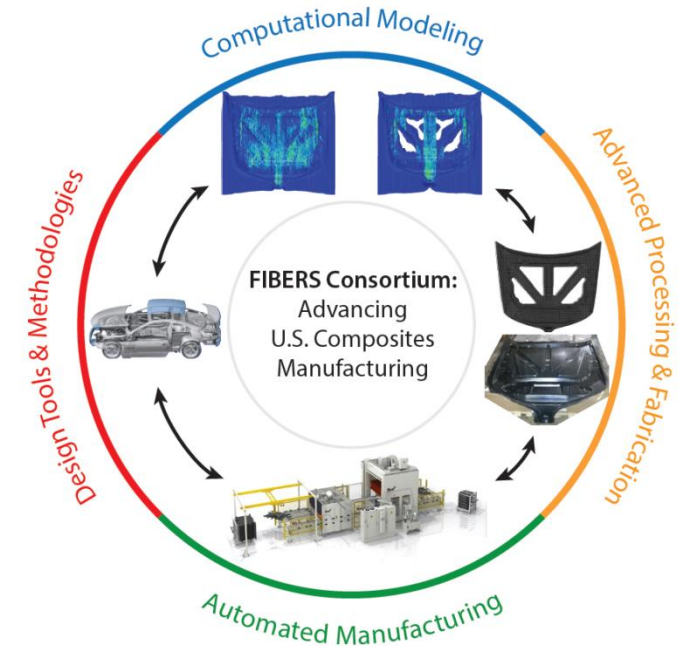
Facilitating Industry by Engineering, Roadmapping and Science for the Composites Industry





NIST awarded a 2-year grant (06/01/14 to 05/31/16) to the FIBERS Team to strengthen U.S. Composites manufacturing and innovation by:

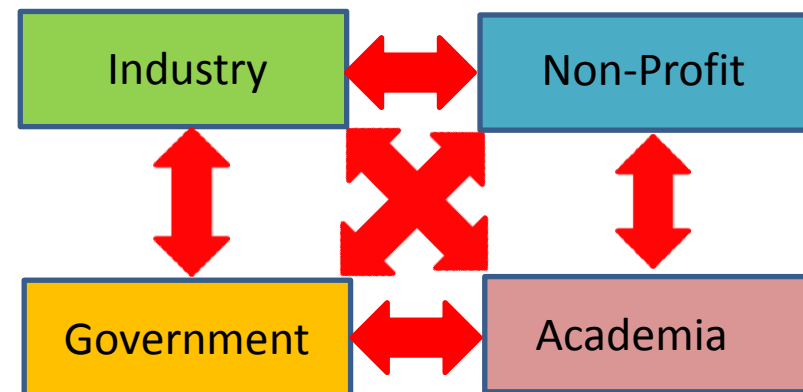
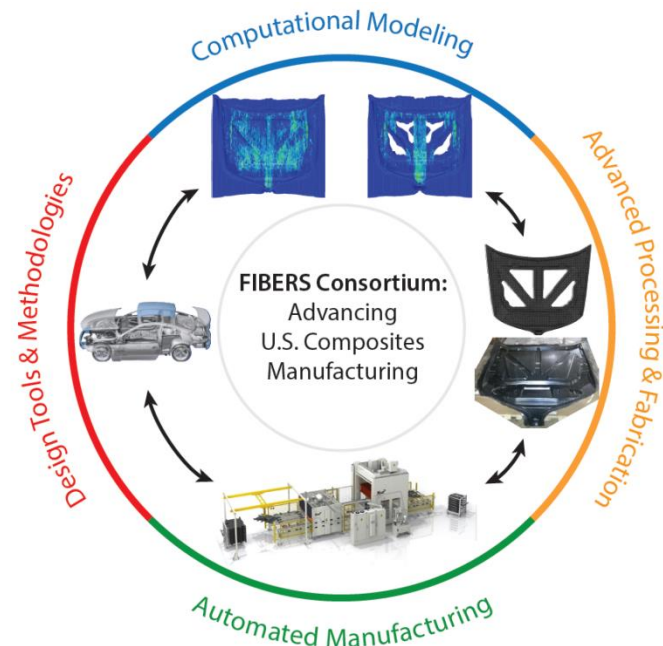
1. Forming a consortium of
 - Composites manufacturers and suppliers
 - Government labs
 - Academics
 - Non-profit organizations
2. Developing a roadmap
 - To Identify the challenges and gaps in the composites manufacturing industry,
 - To identify research and development priorities,
 - To create a network of stakeholders prepared to foster solutions





Goals

1. Identify and address challenges faced by the composites manufacturing industry,
 - Modeling
 - Automation
 - New fibers and resins
 - Repeatability of processes (high volume)
 - Disconnect among material suppliers
 - Workforce development of composite design and manufacturing engineers and technicians
2. Identify
 - Pre-competitive research and demonstration projects, and
 - Software and hardware tools to facilitate the advancement of composites manufacturing processes
3. Promote sustained interaction among industry, academia, and government laboratories in the area of composites.





Industry Participation

Companies Providing Letters of Interest for Proposal



University / Non-Profit / Government Participation



University of
New Hampshire

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY



Rensselaer





Consortium Leadership Team



John Dignam
FIBERS Co-Director



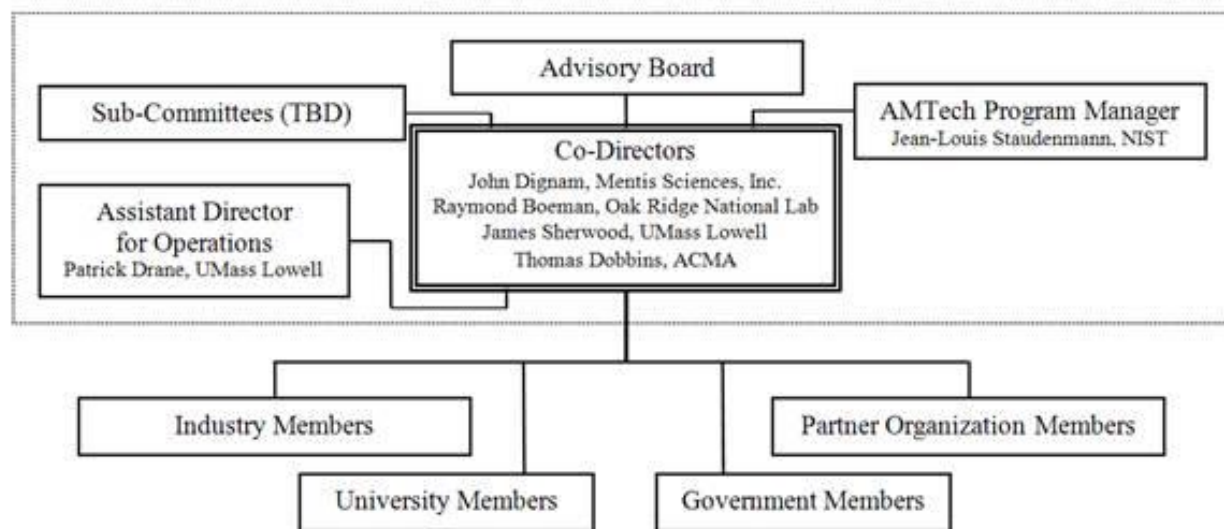
Raymond Boeman
FIBERS Co-Director



James Sherwood
FIBERS Co-Director



Tom Dobbins
FIBERS Co-Director



Patrick Drane
Asst. Director - Operations





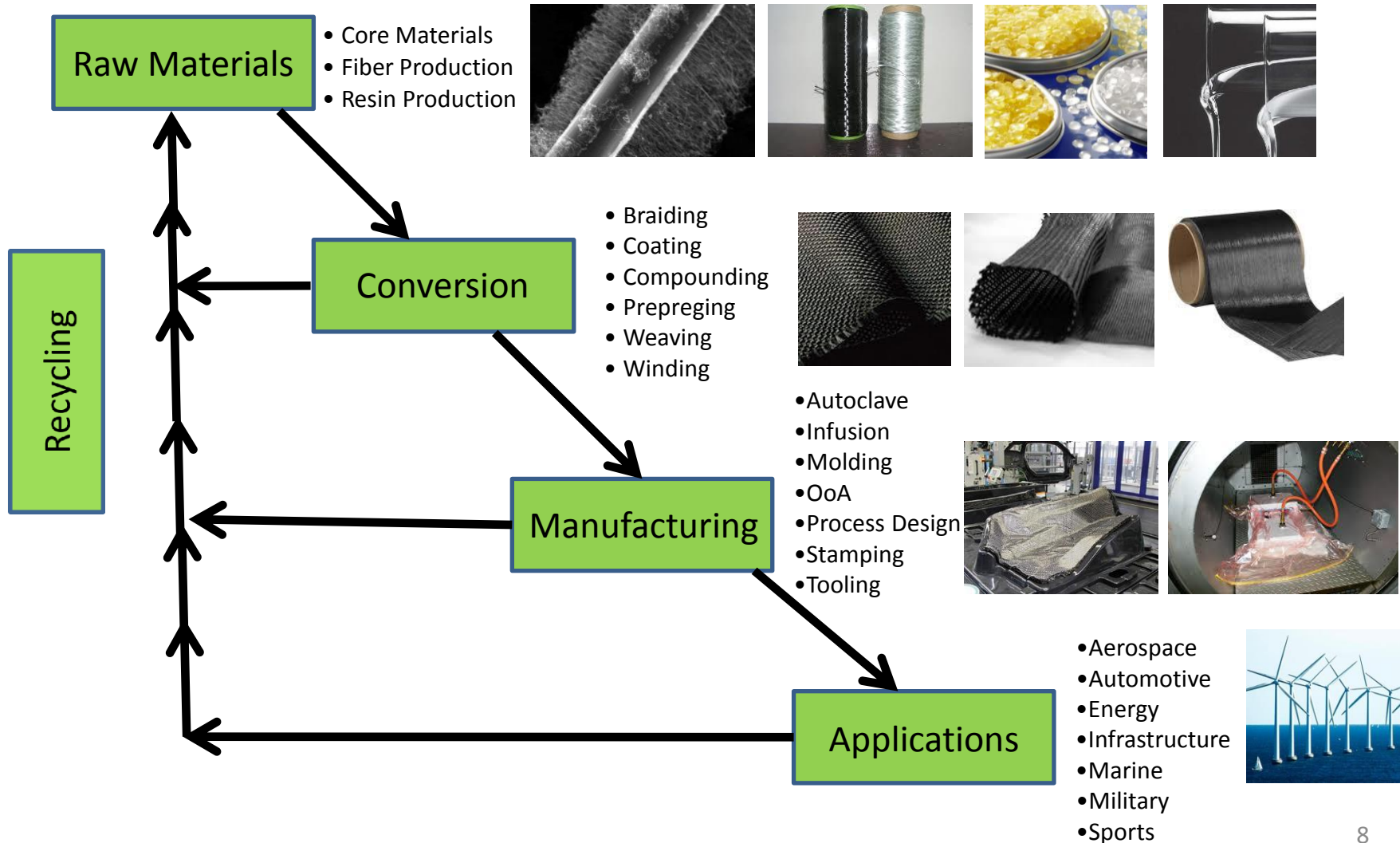
Composites Manufacturing

- Exceptional opportunity for growth in U.S. manufacturing due to the large number of applications across a variety of industrial sectors.
- Relatively low penetration to date, e.g., the market share of composites is below 10% for all structural products.
- With increased interest in energy efficiency through lightweighting, the projected growth in composites manufacturing over the coming years is considerable, e.g. (2014) 4M cars contain composites compared with (2017) 92M cars.
- For the U.S. to remain a major player in the growing field of composites manufacturing, it is imperative that initiatives be undertaken to strengthen U.S. composite manufacturers across the supply chain.





Supply Chain and Life Cycle



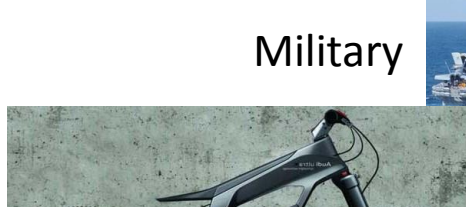


Industry Sectors



Aerospace

Automotive



Military



Sports / Recreation



Marine

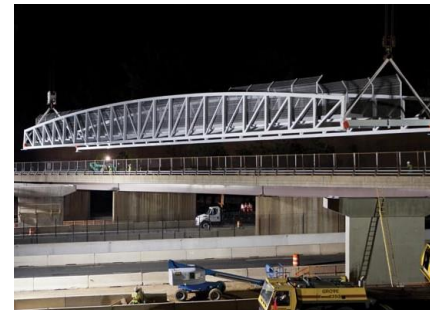
Architectural



Energy



Rail



Infrastructure

Other
Piping / Rebar /
Pressure Vessels





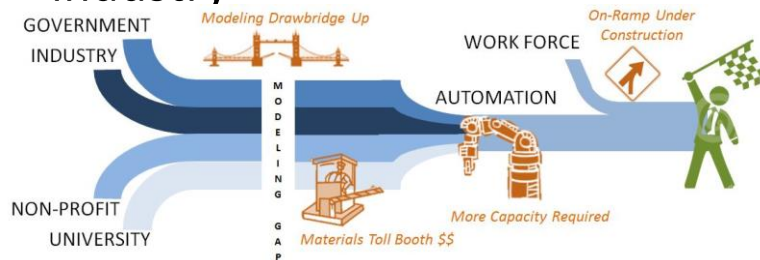
Consortium Activities

- Organize National and Regional Meetings
 - Meeting Goals:
 - Identify (Roadmap):
 - Industry/Sector challenges
 - Pre-competitive research and demonstration projects
 - Workforce development needs
 - Promote sustained interaction among industry, academia, non-profits and government laboratories and agencies
 - Aggressively and cooperatively address identified challenges
 - Foster Networking and Student Recruiting
- Conduct Targeted Roadmapping Workshops for Industry Sectors
- Speak at local professional meetings, e.g. SAMPE, SPE, ASME, SME, SAE.
- Conduct surveys
- Facilitate academic/industry personnel exchanges, e.g. embedded interns and visiting researchers
- Site visits with companies of 1-2 day duration
- Build a sustainable consortium



Outcomes of the Consortium

- A detailed roadmap for the composites manufacturing industry



- A deep understanding of the critical composite manufacturing challenges
- An effectively functioning and sustainable consortium to tackle these challenges
- Workforce planning
- Strengthen the supply chain





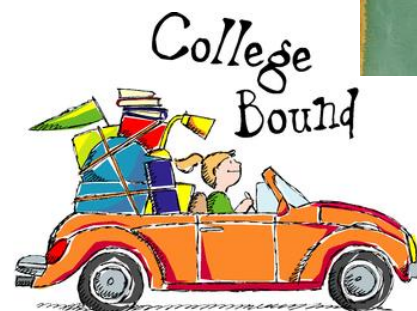
Professional Interactions

- Networking
 - All along the composite manufacturing supply chain



- Sharing of Ideas
 - Industry site visits by academics to Composite Manufacturing facilities to be on the floor meeting with process engineers, technicians and more.

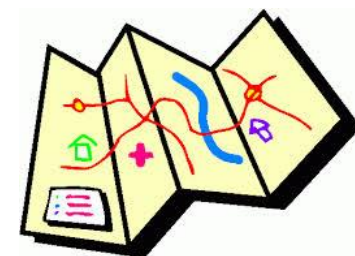
- Personnel Exchanges
 - Provide companies access to the pipeline of new talent
 - Senior graduate students and post-doctoral fellows embedded in industry through internships
 - Industrial researchers spending time at universities





Consortium Opportunities

- Complete a comprehensive roadmap across the supply chain of the challenges facing the U.S. Composites manufacturing industry through industry-centered **workshops and surveys**
 - First roadmap to address all aspects of U.S. Composites Manufacturing
 - Past roadmaps have been targeted at specific industries



- Position the members of the Consortium to be the thought leaders for the forthcoming NNMI Composites Manufacturing Institute.

- Provide direction to the government agencies as to what future research should be pursued and supported.



- Expand Workforce in composites manufacturing across the U.S.



Roadmap – Current Categories

Major Category	Challenge/Barrier	Possible Solutions
Modeling/ Simulation	Slow adoption by industry and limited accessibility for SMEs in supply chain	Benchmarking and demonstration projects, regional support centers, models tailored for use by design and manufacturing engineers
Materials	Cost, availability, reducing variability, improving properties and sustainability (recycling)	Framework for interactions between engineers across the concept-to-market cycle and faster new material qualification
Automation and New Processes	Design evolution, complexity, initial investment, loss of US equipment manufacturers	Integrated human-robot manufacturing; integrated QC (Quality Control) instrumentation, controls, and simulation; rebuilding equipment expertise
Education/ Workforce	Lack of skilled workforce	Partnership among industry, government, universities, community colleges and MEPs (Hollings Manufacturing Extension Partnerships)



Consortium Meetings / Workshops

Event	Location	Focus - Industry Sectors	Date
Northeast Workshop	Lowell, MA	Marine, Aerospace, Wind Energy	August 8, 2014
ASC Technical Conference - Info Session	San Diego, CA	Academic Information Session – All Sectors	September 8-10, 2014
CAMX Expo	Orlando, FL	All Sectors: Information Session, Workshop Session, Subcommittee Forums	October 15-17, 2014
SAE World Congress	Detroit, MI	Automotive, Rail, Forming, Materials, Supply Chain	April 21, 2015 (tentative)
Mid-Atlantic Workshop (SAMPE)	Baltimore, MD	Infrastructure, Oil, Gas & More	May 18-20, 2015 (tentative)
Southwest Workshop	Los Angeles, CA	Aerospace, Fibers, Prepregs, Sports	Fall 2015 (tentative)
National Roadmapping Workshop	Lowell, MA	All Sectors	Winter 2016



Discussion & Questions