# Manufacturing USA

## *Easing the On-Ramp to Manufacturing*


**Arthur Murphy**

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Deputy Director
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National Program Office



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**Stephen Catt**

Deputy Director,
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Development
ARM



**Kelvin Lee**

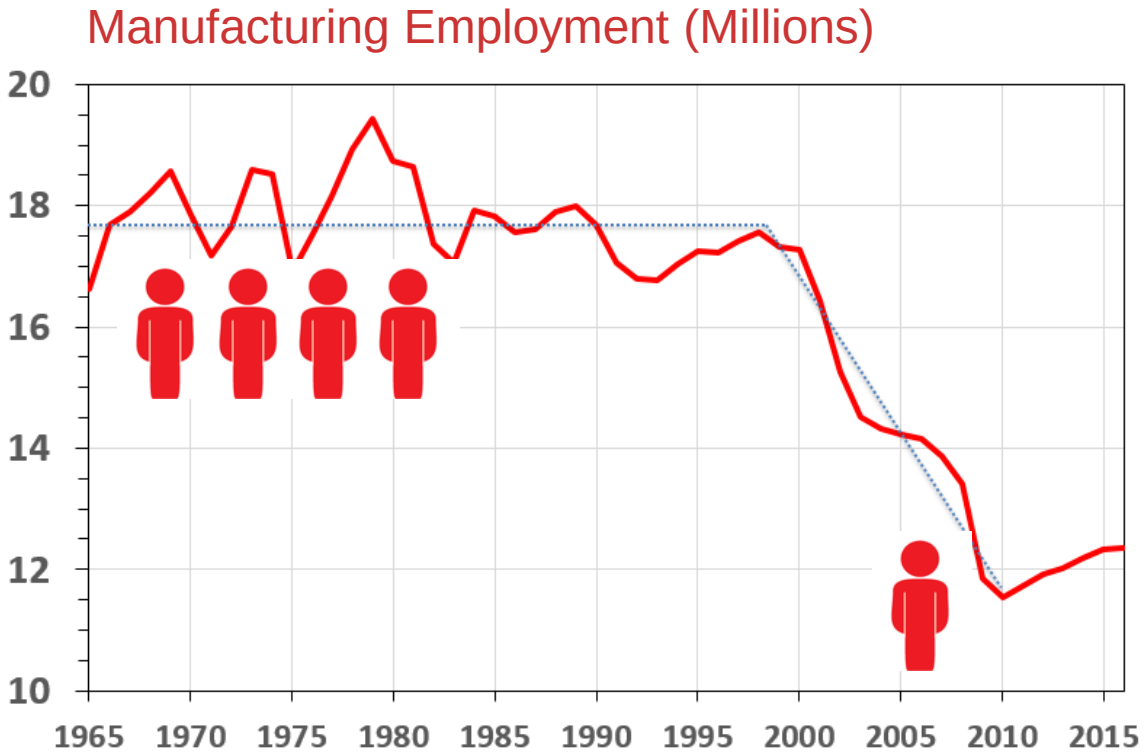
Institute Director,
NIIMBL



**Nick Justice**

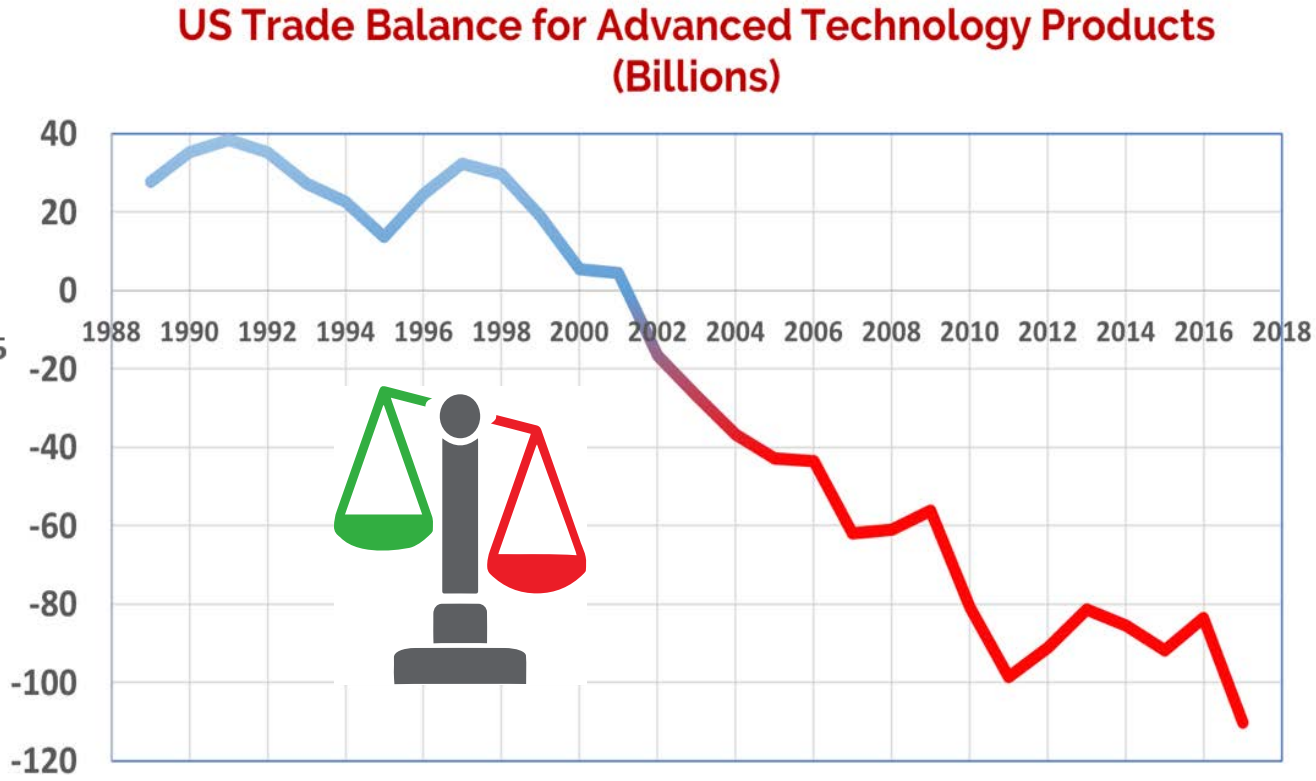
Executive Director,
PowerAmerica

# Why Manufacturing USA




Advanced Manufacturing plays a special role in the U.S. innovation ecosystem

- Highest value manufacturing, supporting high wages
- Highest economic multiplier (4x to 12x)
- Greatest source of next innovation

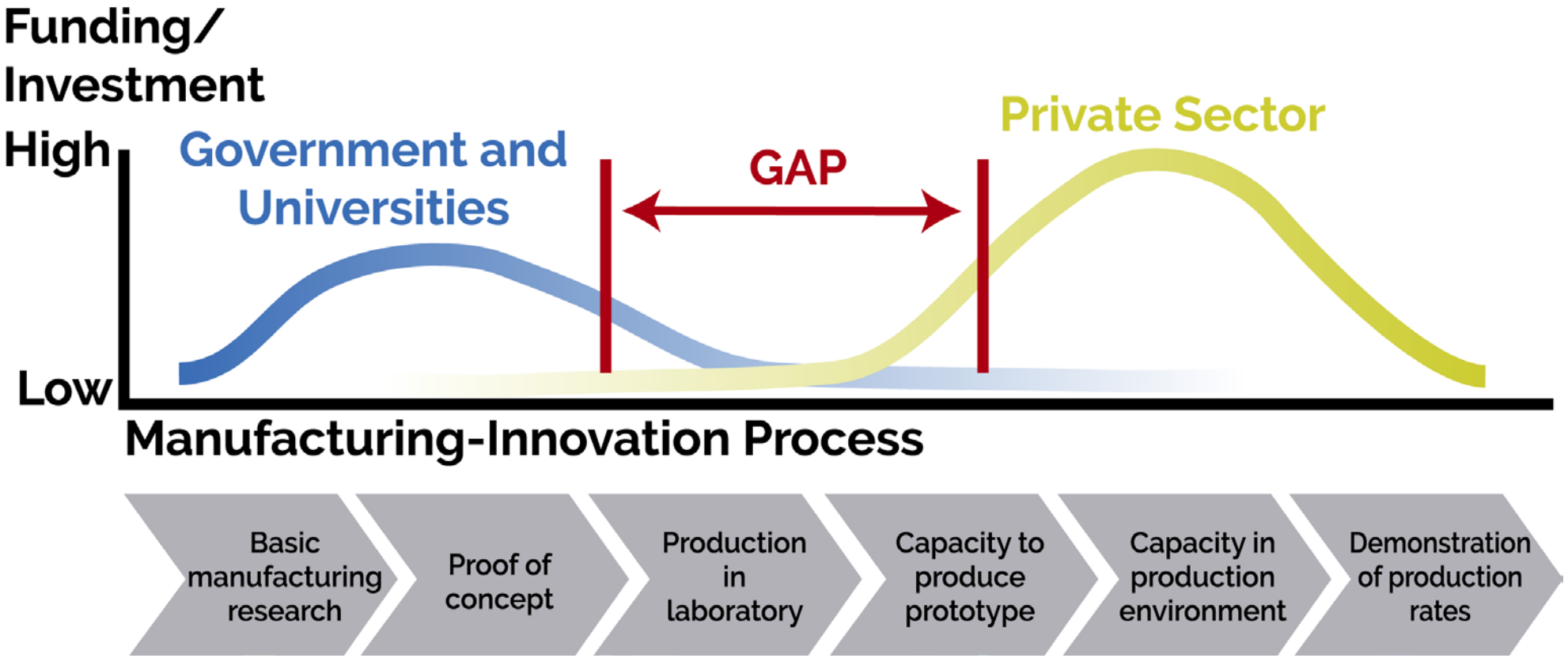



MFG USA

# Manufacturing USA Bridges Gaps

The federal role is to create a neutral convening space for U.S. Industry and Academia to collaborate.
Federal start-up investment of $70 million (over 5-7 years) must be at least 100% matched

**Market Failure in Pre-Competitive Applied Manufacturing R&D**




MFG USA

# Unique Institutes Span a Range of Technologies

## Electronics

**AIM Photonics**
Integrated Photonics
*Albany, NY*
*Rochester, NY*

**NextFlex**
Flexible Hybrid Electronics
*San Jose, CA*

**PowerAmerica**
Wide Bandgap Semiconductors
*Raleigh, NC*

## Materials

**affoa**
Advanced Fibers and Textiles
*Cambridge MA*

**iacmi** (The Composites Institute)
Advanced Composites
*Knoxville, TN*
*Detroit, MI*

**lift**
Lightweight Metals
*Detroit, MI*

## Bio-Manufacturing

**biofabusa**
Regenerative Manufacturing
*Manchester, NH*

**NIMBL**
Bio-pharmaceutical Manufacturing
*Newark, DE*

## Energy Usage / Environmental Impact

**RAPID** (Transforming Process Industries)
Modular Chemical Process Intensification
*New York, NY*

**REMADE Institute**
Sustainable Manufacturing
*Rochester, NY*

**Clean Energy Smart Manufacturing Innovation Institute**
Smart Sensors and Digital Process Control
*Los Angeles, CA*

## Digital Automation

**America Makes**
Additive Manufacturing
*Youngstown, OH*
*El Paso, TX*

**ARM** (Advanced Robotics for Manufacturing)
Advanced Robotics
*Pittsburgh, PA*

**DMDII** (a UI Labs Collaboration)
Digital Manufacturing & Design
*Chicago, IL*

MFG USA

# America Makes

*Vicki Thompson*

*First Institute – August 2012*

# E/WD Roadmap & Participation Opportunities

| | | | | | | |
|---|---|---|---|---|---|---|
| **Knowledge & Awareness** | Curriculum | Extracurricular STEAM programs | Learning Media | Seminars, Webinars, and Conferences | Case Studies | |
| **Competency and Skills** | Classroom-based Learning | E-Learning Courses | Maker Spaces and Fab Labs | Capstone Projects | Instructor-led Labs | |
| **Industry Experience** | Co-ops & Internships | Apprenticeship | Application-specific training | Industrial Experience Accelerators | | |
| **Individual Advancement** | Career Dev. Tools | Mentoring | Employer Needs | Scholarships & Fellowships | | |
| **Scaling and Diffusion** | Tech Transfer to SMBs | Training Clearinghouse | Value Analysis | Teach the Teacher | Grand Challenges | Talent Supply Chain Optimization |

# ARM

## ADVANCED ROBOTICS FOR MANUFACTURING

*Steve Catt*

*January 2017*

# YES, ROBOTS ARE TAKING OUR JOBS AND REPLACING THEM WITH CAREERS

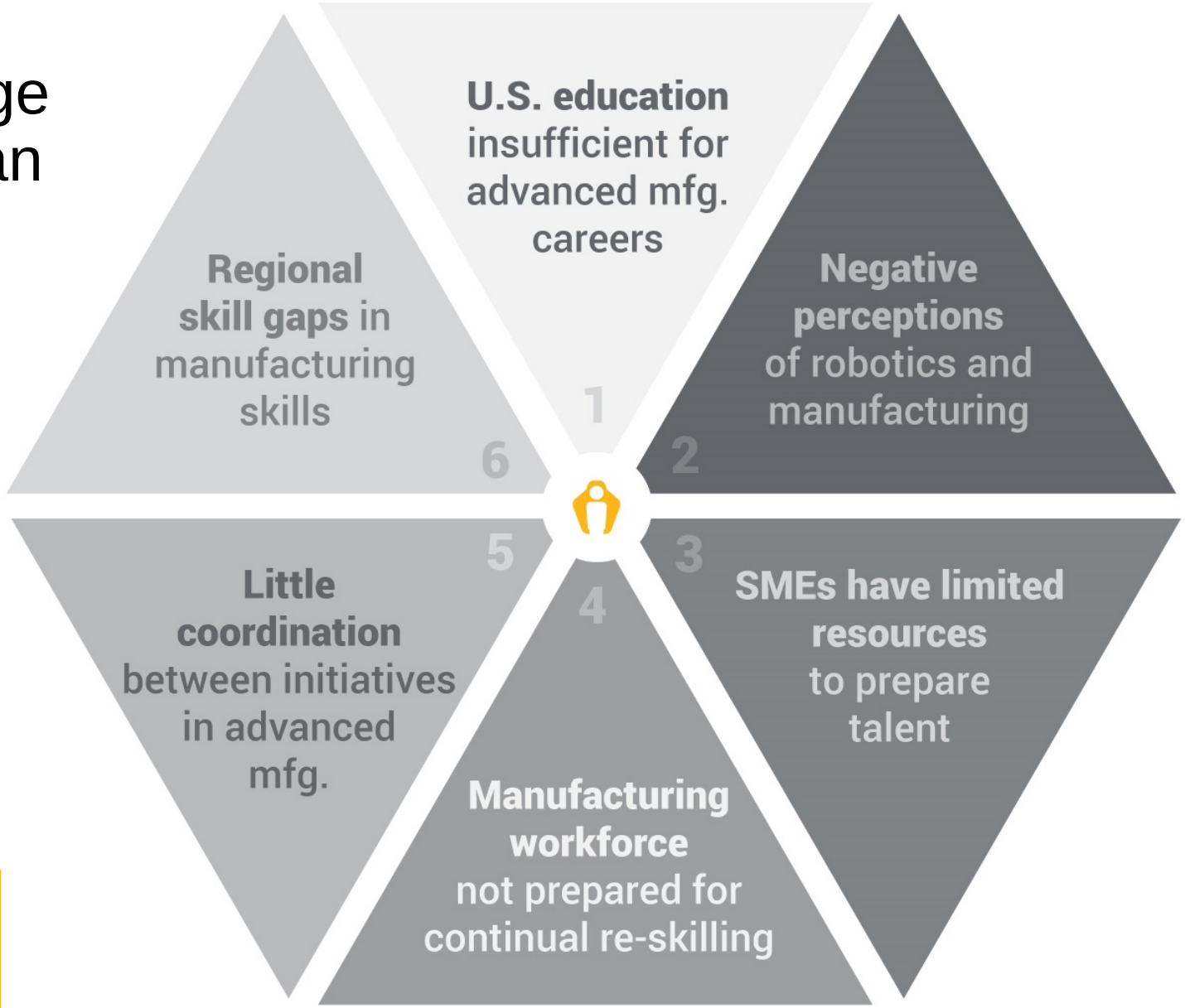
ARM

ARM

ADVANCED ROBOTICS FOR MANUFACTURING

# Supporting Careers in Manufacturing

6 top areas of challenge and need that ARM can engage solutions




ARM

# ACCELERATING THE MANUFACTURING RENAISSANCE WITH PEOPLE & ROBOTS. TOGETHER.

- Working to instill an enthusiasm for active, lifelong learning.
- Showing that robots are collaborative and can help human workers and attain more rewarding, in-demand, safer manufacturing careers.
- Creating a robust workforce pipeline that keeps students engaged in STEM and promotes careers in manufacturing.

BIZTECH CHALLENGE

## ABOUT

The Bayou Classic BizTech Challenge is a tech-based business program which challenges HBCU students to work in multi-disciplinary teams to originate a technology-based business concept, a relevant business model for that concept, a 2-page business summary, and a 5-minute video pitch presentation. NexusLA has partnered with the Bayou Classic to host the final pitch presentation in front of a live panel of judges, with a grand prize of $10,000 awarded to the winner.

## PROGRAM COMPONENTS

TECHNOLOGY DEVELOPMENT

MENTORSHIP

EDUCATION

## PROGRAM IMPACT

**82.6%**

Said they had a greater knowledge of how to build or expand their professional network

**95.7%**

Said they were more likely to consider starting a new business in the future

**91.3%**

Said they were interested in continuing to work on the project they developed with their team

*Based on a survey of participating students from the 2017 competition*

# NIMBL

*Kelvin Lee*

*March 2017*

## NEEDS

- Global competitiveness
- Reduced offshoring and outsourcing
- Workforce training and education
- Domestic biomanufacturing
- Reduced medical costs
- Precision medicines
- Standardization
- Secure supply of medicines/pandemic readiness

## NIIMBL

### MEMBERS

- Industry
- Academia
- States
- NIST
- FDA
- MEPs
- MIIs
- NGOs
- NIH
- DOD
- BARDA
- Trade organizations

### FOCUS AREAS

**Existing products**

mAbs, proteins, vaccines

ADCs, bispecifics, virus-like particles

**Emerging products**

gene and cell therapies

### MANUFACTURING PROCESS THEMES

Drug Substance → Drug Product → Process Control

## OUTCOMES

- Skilled workforce
- Novel real-time analytical technologies
- Integrated continuous processing
- Automation
- Reference standards and protocols
- Advanced process modeling and control
- Process integration and intensification
- Energy/water savings

## IMPACT

### NATIONAL

- Growth of globally-competitive domestic industry
- Regional economic development
- Secure, integrated supply chain
- Access to new and improved medicines

### INDUSTRY

- Flexible, adaptive manufacturing
- De-risked manufacturing innovation
- Lower costs
- Accelerated development and approval

PowerAmerica

*Nick Justice*

*January 2015*

# PowerAmerica

Overview
August 2018

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PowerAmerica | Next Generation Power Electronics Manufacturing Innovation Institute

PowerAmerica

## VISION

Dramatically accelerate commercialization of wide bandgap power electronics to power America.

PowerAmerica started operations in 2015. It's objective: promote advanced manufacturing processes that can enable cost-competitive, large-scale production of wide bandgap (SiC and GaN) semiconductor-based power electronics, which allow electronic systems to be smaller, faster and more efficient than power electronics made from silicon. *There are more than 100 projects funded to date to achieve these objectives*.

# PowerAmerica Membership

**Full Sustaining**

**Full**

**Affiliate**

**Start-up**

**Academic**

**Gov. Labs**

**Associate Members**



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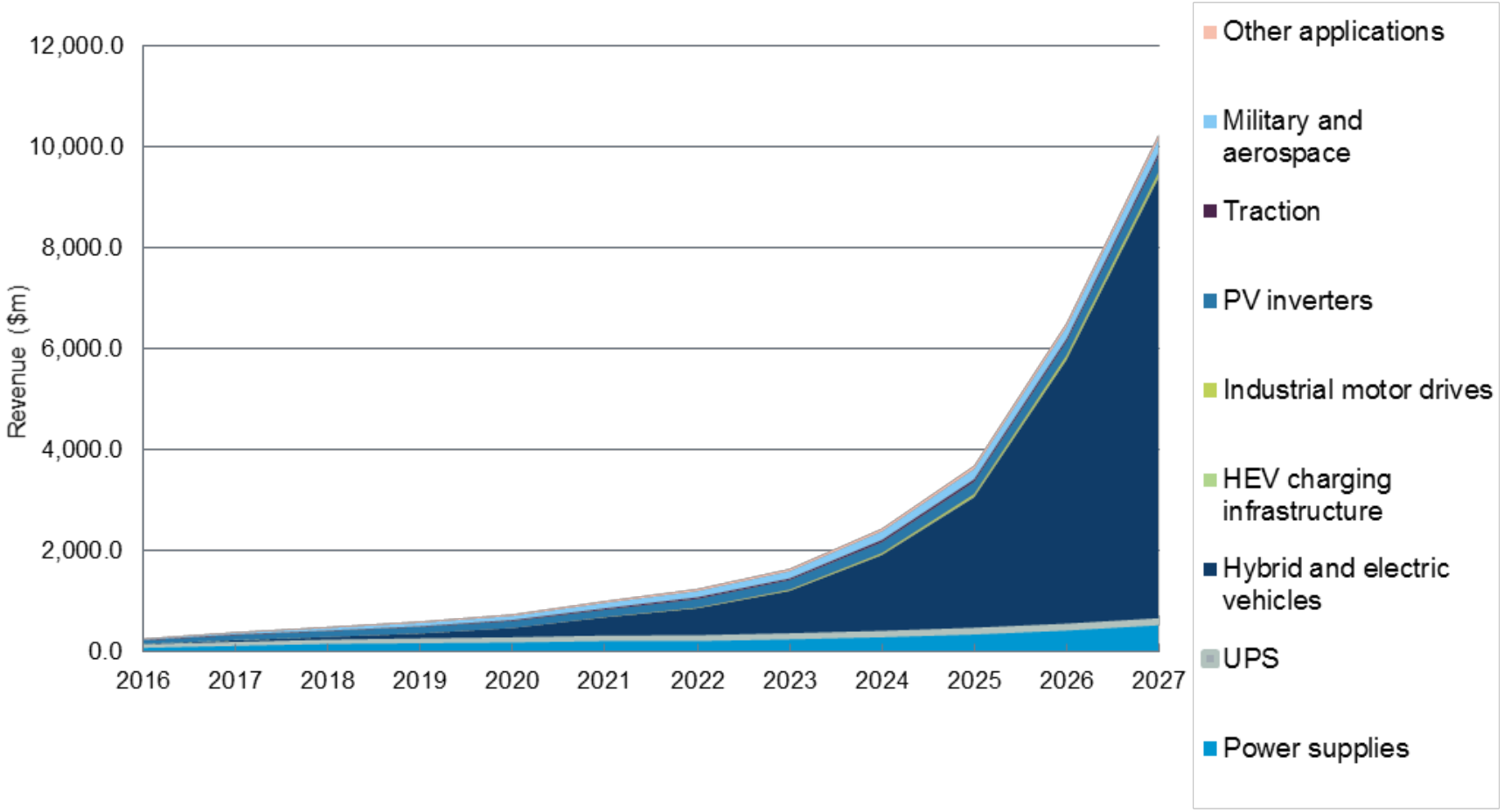
# Wide Bandgap Technology Changes Everything

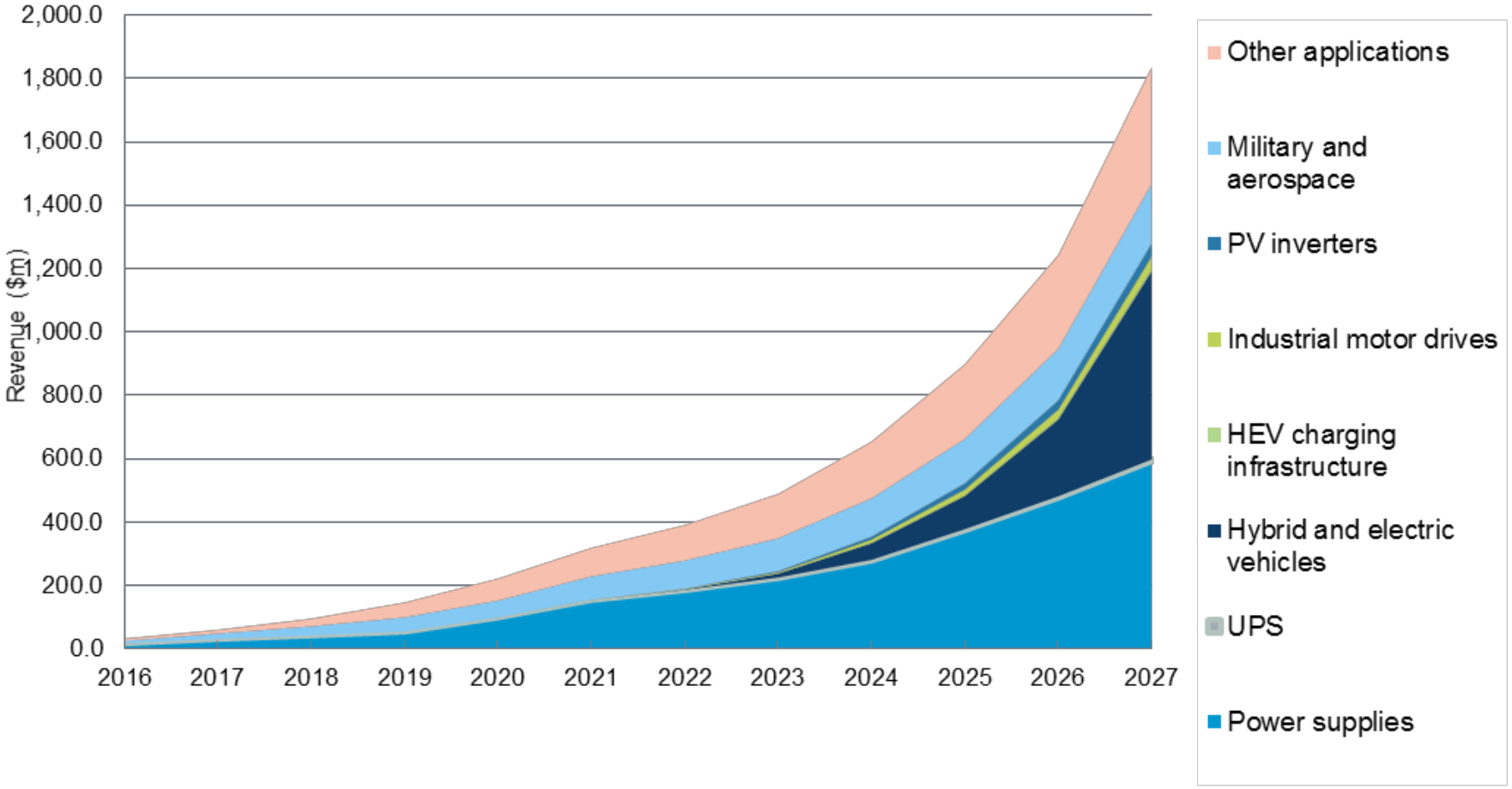
2

# The SiC power semiconductor market




Data: The World Market for Silicon Carbide & Gallium Nitride Power Semiconductors – 2018

# The GaN power semiconductor market




Data: The World Market for Silicon Carbide & Gallium Nitride Power Semiconductors – 2018

# Value Proposition and Priorities

PowerAmerica

(* indicates a PA uniqueness)

- **Fund the MIP program**: Create and manage Member-Initiated Projects, funded with member dues, with significant membership input an oversight; four such projects have been initiated to date; **a key differentiator is the participation of 17 university members***
- **Solicit new government funding** for MIPs and other PA programs;
- **Facilitate student-industry interaction** with the PA Linked-In portal that enables industry to contact students with WBG education; nine universities participating presently*
- **Conduct two member meetings annually that address the business side of WBG technology** in addition to reporting of specific technical projects and developments*
- **Facilitate industry-led updating of the SiC and GaN technology roadmaps** at each member meeting in coordination with international IEEE and JEDEC initiatives as appropriate. Focus: cost reduction, reliability improvement, performance improvement, strengthening the WBG ecosystem*
- **Conduct periodic webinars for industry** led by faculty on WBG developments at multiple universities*

# Value Proposition and Priorities cont'd

(* indicates a PA uniqueness)

- **Provide device bank services** to support needs for WBG devices and modules for non-commercial purposes among members*
- **Conduct WBG applications workshops for applications engineers** in industry at least annually, or more frequently according to market demand, including on site at companies.
- **Selectively sponsor and participate in power electronics trade shows and professional meetings** (e.g. APEC, ECCE, etc.) including offering WBG tutorials at such events.*
- **Communicate regularly with members and the trade media** on members' and PA's activities and accomplishments, including through newsletters and the PA website.
- **Solicit "voice of the customer" input** from members and prospects.

# Moving Forward

- Members agree on PA priorities post-DoE funding (DoE funding expected to conclude in 2020); IP rights/rule under review
- Presently ~ $1.2 million in annual dues revenue, primarily from 24 corporate members; there are 17 academic members
- Dues levels under review by members to determine how revenue and membership can be maximized. Current annual dues structure:
  - $250K + $250K in-kind
  - $100K
  - $50K
  - $10K for small business and universities

  …primary distinction is voting rights and IP rights
- $10K is not affordable for some small businesses and many universities;
- Many larger business prospects can afford something between $10K and $50K, but not $50K


PowerAmerica

APEC

# Questions??

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