MASSACHUSETTS TECHNOLOGY COLLABORATIVE

Innovation Policy Forum

Revisiting the Manufacturing USA Institutes

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Panel IV:

Knowledge Creation, Intellectual Property, and Technology Diffusion

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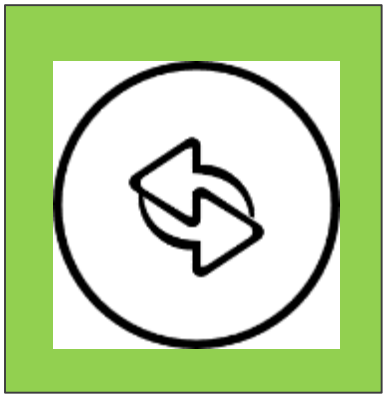
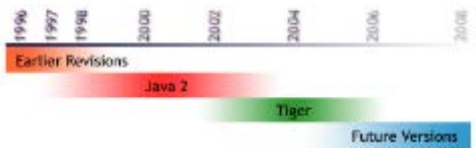
Manufacturing Challenge

1. **Innovation and Manufacturing are inextricably intertwined: Innovation propels manufacturing, but manufacturing propels innovation.**

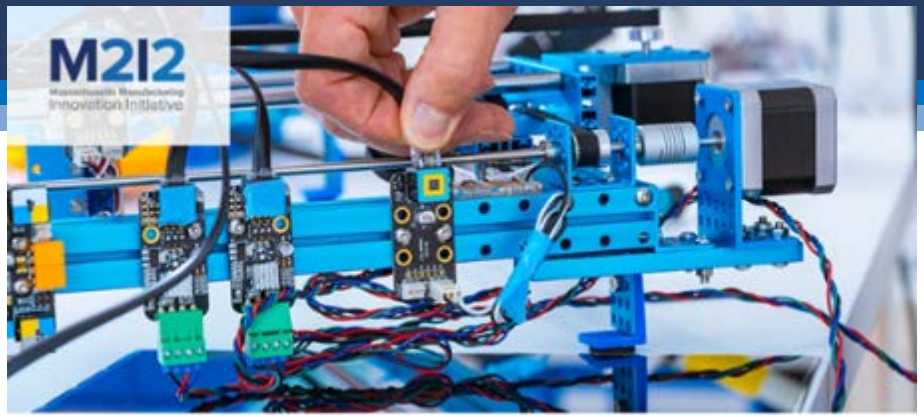


2. **It takes as much as 10 years to develop a disruptive manufacturable process from a standing start of pure research.**
   - As much as 5 years if you have all the tools



Do the Institutes accelerate this process? How can they do better?

Massachusetts Manufacturing Innovation Initiative (M2I2)



- Massachusetts Manufacturing Innovation Initiative (M2I2): **A substantial, nationally-leading commitment by Governor Baker and the State Legislature** to develop Manufacturing USA infrastructure within the state
- While there is probably activity in Massachusetts in all 14 Institutes, the state has committed $100M to capital grants for projects within:

Collaboration enabled by the Institutes does accelerate timelines, but regional organizations can enhance success

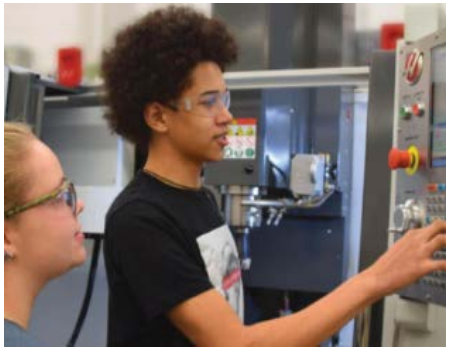
- Institutes do create a forcing function for technology, and a forum where members can identify and access each other for collaboration
- Coordinating such collaborations regionally (e.g., by states) can accelerate and amplify technology diffusion; and can be vehicles for including SMEs
- Examples:
  - AFFOA/NextFlex/ARM Discovery Center - M2I2 grant of $10M
    - Only facility in nation where three Institutes are collaborating
    - Engaged by Massachusetts academics, industry, national labs
  - NextFlex Massachusetts Node (New)
    - Will coordinate all current & potential NextFlex members in MA
    - Organize State-Wide Outreach, Networking, Training, Calls
  - Laboratories for Education and Application Prototypes – LEAPs (AIM)
  - MIT Lincoln Labs Integrated Photonics Facility (AIM)
    - $2M M2I2 grant to enable DoD trusted fab certification
    - Lincoln Labs, industry and local universities partnering

Small and Medium-Sized Enterprises (SMEs) are Accelerators

- There are 7000 manufacturing companies in MA; vast majority are SMEs
- M2I2 proactively targets SMEs and connects them with OEMs, other SMEs, universities, and national lab members of Manufacturing USA
- M2I2 & MassMEP spend significant time on enabling such partnerships. E.g.:
  - A $2M grant to 4 SMEs (Carpe Diem, Rothtec, Flexcon, Mack Technologies) and UMass Amherst for roll-to-roll NextFlex supply chain
  - 3D textile machine for Ministry of Supply and MIT to fabricate clothing that regulates body temperature for athletes and military
  - Pendar funded $845K to bring in-house their quantum cascade lasers, currently outsourced, to control quality and expand business
  - MRSI, Analog Photonics and UMass Lowell received $570K to perfect photonics packaging tool and achieve parity with European leader
  - $400K to SI2 and UMass Lowell to serve the multi-billion dollar market for high temperature hypersonic antennas
  - American Boronite, the first in the world to synthesize Boron Nitride Nanotubes in continuous form, received $240K to expand capacity

Manufacturing USA Workforce Development Efforts are Accelerators

- Must address K-12, Community College, University and Incumbent Workers
- Lack of Talent is a (the?) major inhibitor to success
- Examples of M2I2 Efforts:
  - $2.6M to AFFOA to enable collaboration with Lawrence Technical High School as well as host 22 new ventures
  - Thousands of incumbent factory workers will be trained to be roboticsts via $2M grant to Teachbot project (MIT, MassRobotics, ABB, GE, and MassMEP)
  - A Professional Education Academy for AIM was enabled by $2M grant, educating 50-70 engineers/year
  - FlexFactor: Being studied by NextFlex MA Node
  - The LEAPs: both Education and Prototyping Facilities; $4M collaboration between WPI and Quinsigamond CC



Conclusions from the Massachusetts Experience on Technology Diffusion from Manufacturing USA

- Creating and managing an intersection of national and regional activity is an accelerator for the most impactful technology diffusion
- Inclusion of start-ups and SMEs in projects is an accelerator, but requires bolder membership model for SMEs and regional support
- Workforce development is essential
  - K-12, vocational high school, community colleges important components
- We need a sustainable model for Manufacturing USA so that it is not perceived by members, staffs and states to be at risk
  - Currently a key differentiator compared to Fraunhofer, ITRI, etc.

Images by slide

- 2: Circular Flow: http://www.flaticon.com/free-icon/two-arrows-in-circular-outlined-interface-button_53009
- 2: Java Timelines https://commons.wikimedia.org/wiki/File:JavaDevelopmentMilestone.png
- 3: Institute Logos: https://www.manufacturingusa.com/institutes and each Institute's websites
- 4: UMass Lowell https://www.uml.edu/Research/fdc/; Lincoln Labs
- 5: Pendar http://www.pendar.com/index.html#about MRSI https://mrsisystems.com/mrsi-systems-products/
- 6: http://go.affoa.org/news-and-events/ AIM Photonics Academy