



MEP • MANUFACTURING
EXTENSION PARTNERSHIP

NIST MEP Advisory Board

September 2014

Today's Agenda

8:30 am	Meeting Logistics	Kari Reidy, NIST MEP
8:40 am	Welcome Introductions and Opening Remarks	Denny Dotson, Chair
8:50 am	Audience Introductions	
9:00 am	MEP Director Update on Activities	Phil Singerman, Acting Director NIST MEP
9:30 am	MEP Strategic Plan – Implementation	Gary Yakimov and Jeff Lucas, NIST MEP
10:45 am	Break	
11:00 am	Technology Acceleration <ul style="list-style-type: none"> • “Building the Nation of Makers” – Miller Center Report • MEP’s Approach to Technology Acceleration 	<ul style="list-style-type: none"> • Jennifer Clark, Georgia Institute of Technology • Clara Asmail, David Cranmer, David Stieren and Mark Troppe, NIST MEP
12:30 pm	Lunch	
1:30 pm	Center Competition Process	<ul style="list-style-type: none"> • Diane Henderson and Bill Kinser, NIST MEP • Robin Bunch and Jannet Cancino, GMD • Jedd Vertman, FALD
2:15 pm	MEP Export Initiatives	<ul style="list-style-type: none"> • Mike Simpson, NIST MEP • Antwaun Griffin, International Trade Admin • Michael Stone, Stone & Associates • Buckley Brinkman, Wisconsin MEP
3:45 pm	Break	
4:00 pm	Board Discussion, Feedback, and Public Comments	
5:00 pm	Adjournment	

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MEP Advisory Board meeting
Heritage Room

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Cafeteria
Courtyard

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MEP DIRECTOR'S UPDATE ON ACTIVITIES

NIST MEP Appropriations History (Dollars in Millions)

FY 2010	\$124.7
FY 2011	\$128.4
FY 2012	\$128.4
FY 2013	\$120.0
FY 2014	\$128.0
FY 2015 (requested)	\$141.0

NIST MEP Spend Plan (Dollars in Millions)

	FY 2014 (Budgeted)	FY 2104 (Projected TYE)	FY 2015 (Projected)
Existing MEP Center Renewals	\$91.0	\$95.5 ^A	\$90.7
Additional MEP Center Funding	6.6	6.4	-
Re-baselining/Minimum Cooperative Agreement Threshold	0.6	0.6	-
Supplemental One-Time Minimum	6.0	5.8	. ^B
MEP Center Competitions	4.5	-	15.0
MEP Center Strategic Competitions (e.g., Jobs Accelerator, M-TAC, Make It In America, B2B)	6.5	7.7	5.0
Centralized MEP System Support 5.0 (Programmatic and Non-programmatic Contracts/Cooperative Agreements)		5.4	4.9
NIST MEP (Staff Labor, Benefits, Supplies, Travel, etc.)	9.5	8.6	9.8 ^C
NIST Overhead	4.6	4.9	5.0
<u>Total Appropriation</u>	<u>128.0</u>	<u>128.0</u>	<u>130.8^D</u>
Transfer from TIP		2.8	

A. Includes partial year funding for CMTC and MassMEP

B. Supplemental funding to be determined

C. Assumes Full MEP Staffing

D. Assumes same appropriations level as FY2014, includes TIP transfer

Legislative Updates

H.R. 5035 - NIST Reauthorization Act of 2014 “To reauthorize the National Institute of Standards and Technology, and for other purposes”

Passed the House on July 22, 2014

- Cost share adjusted to 1:1
- Panel reviews of performance at years 3, 6, 8
- Recompensation after 10 consecutive years of funding
- Protection of Center client confidential information
- Center Advisory Boards – conflict of interest policy (approved by NIST Director), representation of SME’s on Board from the Center’s region; Board members may not serve as a vendor or provide services, or serve on more than one Board simultaneously
- MEP Advisory Board increased to minimum of 10 members

Reports:

- Plan for reapplication competition process, performance reviews and assessment within 180 days of enactment
- Independent assessment of implementation of reapplication competition three years after the plan
- Comparison of Centers operating from new competitions as compared to longstanding centers two years after date of enactment

Legislative Updates

S. 2757 – “America COMPETES Reauthorization Act of 2014”

Introduced in the Senate on July 31, 2014

- Cost share adjusted to 1:1
- Panel reviews of performance at years 3, 5, 8
- Recompensation after 10 consecutive years of funding
- Protection of Center client confidential information
- Center Advisory Boards – conflict of interest policy (submitted to the NIST Director), oversight board representative of regional stakeholders with majority of SMEs on board; Board members may not serve as vendor or provide services or serve on more than one Board simultaneously
- MEP Advisory Board increased to minimum of 10 members

Center Competition

MEP Center Location and Assigned Geographical Service Area (by State)	Annual Federal Funding for Each Year of the Award
Colorado	\$1,668,359
Connecticut	\$1,476,247
Indiana	\$2,758,688
Michigan	\$4,229,175
New Hampshire	\$628,176
North Carolina	\$3,036,183
Oregon	\$1,792,029
Tennessee	\$1,976,348
Texas	\$6,700,881
Virginia	\$1,722,571

Center Competition Timeline

- **August 1** – Federal Funding Opportunity Released
- **October 15** – Proposals Due
- **October 15 – December 15** – Technical Review
- **December 15 – December 31** – Review by Selecting Official
- **January 1 – January 31** – Review by Grants

MEP Director Selection

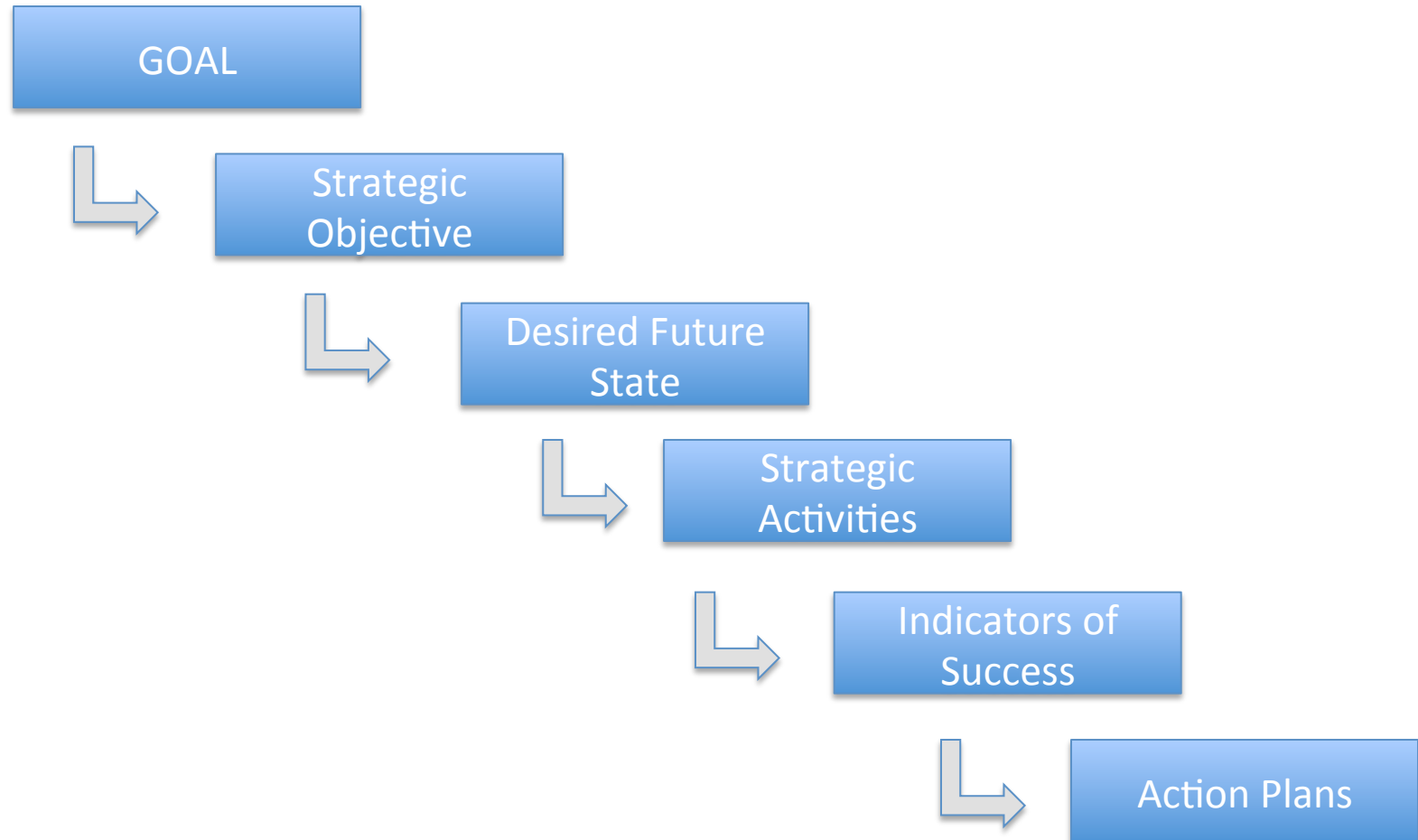
- **October 1** – Issuance of Pre-Vacancy Announcement
- **October 15** – Vacancy Announcement
- **November 15** – Applications Due
- **November 15 – 30** – Technical Review of Applications
- **December 1** – Panel Interviews
- **January 1** – Recommendation to Human Resources

STRATEGIC PLAN – IMPLEMENTATION

MANUFACTURING EXTENSION PARTNERSHIP



Implementation Plan - Structure



MANUFACTURING EXTENSION PARTNERSHIP

OUTCOME AREAS	DESIRED FUTURE STATE
<p>ENHANCE COMPETITVENESS</p> <p>Technology Acceleration</p>	<p>NIST MEP is recognized as a national leader in identifying usable technologies from multiple sources (labs, universities, institutes, etc.) and assisting with deployment to SMEs</p>
<p>CHAMPION MANUFACTURING</p> <p>Data as a Service</p>	<p>All MEP centers have access to the information and data necessary to make day-to-day and strategic decisions anytime/anywhere</p> <p>National, state, and other partners (associations, etc.) will have access to meet their needs and expectations</p>
<p>CHAMPION MANUFACTURING</p> <p>Increased Role of National and Center Boards</p>	<p>MEP System has established collaborative methods for leveraging the collective knowledge and practices of the MEP Center Boards (i.e in sharing, understanding and implementing best practices) for the purpose of ensuring that MEP Center Boards are knowledgeable, engaged, and responsible for MEP program governance and have adopted best practices as a high performance organization.</p>

MANUFACTURING EXTENSION PARTNERSHIP

OUTCOME AREAS	DESIRED FUTURE STATE
<p>SUPPORT PARTNERSHIPS:</p> <p>Manufacturing Eco-system</p>	<p>NIST MEP and MEP centers are recognized as central players by federal, state and local partners to advance manufacturing eco-systems including building collaboration, expertise, and capacity of manufacturing advocates and service providers</p> <p>MEP Center partnerships are well-designed, provide mutual benefit, and strengthen regional eco-systems.</p>
<p>DEVELOP CAPABILITIES</p> <p>Learning Organization</p>	<p>National network will be a system characterized by:</p> <ol style="list-style-type: none"> 1. All system members have a process for continuously identifying and acting on opportunities for improvement 2. Rapid identification, sharing, and implementation of best practices occurs across the system <p>A performance measurement system that supports the strategic plan and meets all stakeholders needs and expectations has been implemented</p>
<p>System Refresh</p>	<p>Performance and long-term sustainability of the system will be enhanced by a carefully planned, systematic, multi-year re-competition of the Centers.</p>

Discussion: Board Review of Plan Progress

- What data do you want to review?
- On what schedule?
- How should this inform annual review of the plan?

TECHNOLOGY ACCELERATION

Presentation by Dr. Jennifer Clark

*Director, Center for Urban Innovation, Georgia Tech
Member, Milstein Commission on New Manufacturing*

NIST MEP Advisory Board Meeting  September 18, 2014

The Milstein Symposium: Commission on New Manufacturing

The University of Virginia's Miller Center launched *The Milstein Symposium: Ideas for a New American Century* in September 2013.

This multi-year initiative convenes distinguished stakeholders and eminent scholars to define and advance innovative, nonpartisan, action-oriented ideas, grounded in history, to help rebuild the American Dream.



The Milstein Symposium: Commission on New Manufacturing

The theme of the Milstein Symposium's first year is middle-class job creation.

The inaugural commission, co-chaired by Haley Barbour and Evan Bayh, focused on how to facilitate the growth of small- and medium-sized manufacturing enterprises – a key engine of middle-class jobs.



The Milstein Symposium: Commission on New Manufacturing

Commission Members

Haley Barbour (*co-chair*), former Governor of Mississippi

Evan Bayh (*co-chair*), former Governor and U.S. Senator, Indiana

Rebecca O. Bagley, President and CEO, NorTech

Aaron Bagshaw, President, WH Bagshaw Co.

Matthew Burnett, Founder, Maker's Row

W. Bernard Carlson, Chair, Department of Engineering and Society, University of Virginia

Jennifer Clark, Associate Professor, School of Public Policy, and Director, Center for Urban Innovation, Georgia Tech

John Engler, President, Business Roundtable

James Fallows, National Correspondent, *The Atlantic*

James Manyika, Director, McKinsey Global Institute; Senior Partner, McKinsey & Company

Kate Sofis, Founding Executive Director, SFMade

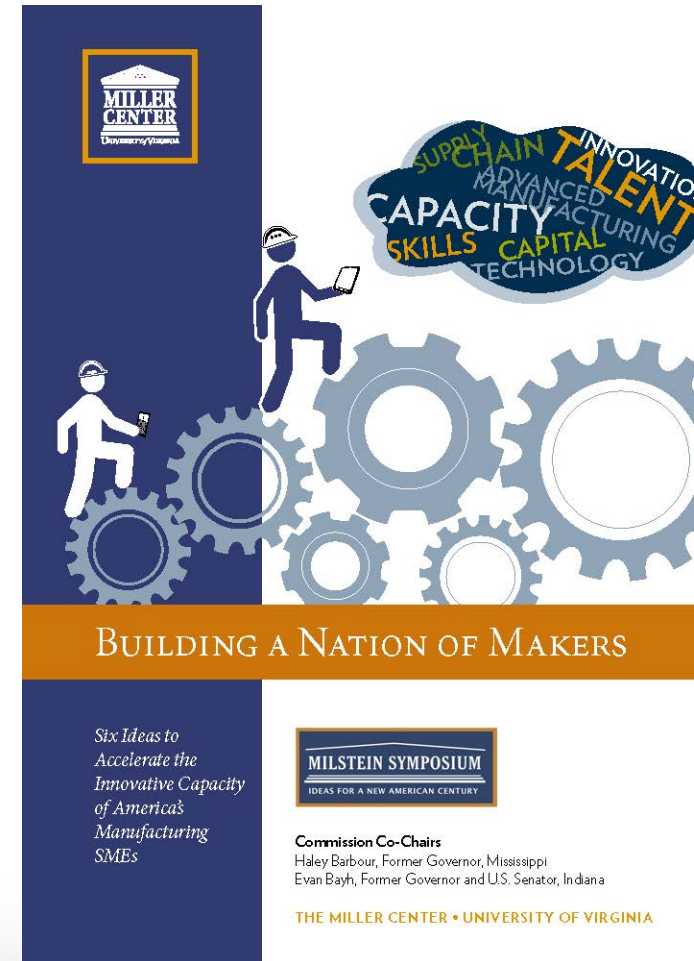
Howard Wial, Director, Center for Urban Economic Development, Univ. of Illinois-Chicago



The Milstein Symposium: Commission on New Manufacturing

The Commission released its final report in June 2014, entitled *Building a Nation of Makers: Six Ideas to Accelerate the Innovative Capacity of America's Manufacturing SMEs*. It includes the following recommendations:

1. **Talent Investment Loans** to Expand Human Capital
2. **Upside-Down Degrees** to Connect Classroom Learning with On-the-Job Learning
3. **A Skills Census** to Build a More Efficient Skilled Labor Force



The Milstein Symposium: Commission on New Manufacturing

4. A National Supply Chain Initiative to Fully Map America's Manufacturing Enterprises
5. Up-Skilling High School Students with Expanded Technology and Engineering Certification Programs
6. A "Big Trend-Small Firms" Initiative to Diffuse the Latest Technologies to Manufacturing SMEs



The book cover features a dark blue background with a white silhouette of a worker on the left and a larger white silhouette of a worker on the right, both holding tablets. The background is filled with various sized white gears. A cloud-like shape in the upper right contains the words "SUPPLY CHAIN", "ADVANCED MANUFACTURING", "CAPACITY", "SKILLS", "TALENT", "INNOVATION", "CAPITAL", and "TECHNOLOGY". At the top left is the Miller Center logo. At the bottom is an orange banner with the text "BUILDING A NATION OF MAKERS".

Six Ideas to Accelerate the Innovative Capacity of America's Manufacturing SMEs

MILSTEIN SYMPOSIUM
IDEAS FOR A NEW AMERICAN CENTURY

Commission Co-Chairs
Haley Barbour, Former Governor, Mississippi
Evan Bayh, Former Governor and U.S. Senator, Indiana

THE MILLER CENTER • UNIVERSITY OF VIRGINIA

The Milstein Symposium: Commission on New Manufacturing

Challenge

- Ø SMEs are especially vulnerable to technology-driven disruptions. How can SMEs be empowered with resources to capitalize on emerging trends and leverage them to their advantage?
- Ø Two elements are essential:
 - Ø Standing national effort to track the latest trends and analyze their impact
 - Ø Vehicle to connect SMEs to these trends so they can employ them to their benefit



IDEA #6:

“Big Trends–Small Firms”
Initiative



The Milstein Symposium: Commission on New Manufacturing

Idea

- Ø Since state MEPs have provided SMEs with performance-enhancing services historically, what if their scope was broadened to track these trends and deliver them back to SMEs manufacturing base?
- Ø MEP's existing private-public model is well-positioned to implement a “Big Trends–Small Firms” project. Plus, the market for dispersing big ideas back to manufacturing base is strong, with existing non-profits already doing some of this work currently.



IDEA #6:

“Big Trends–Small Firms”
Initiative



The Milstein Symposium: Commission on New Manufacturing

Impact

- Ø Firm Growth
- Ø Participation in the Digital Economy
- Ø Flexible IT
- Ø Efficient Workforce
- Ø Operational Improvement

Catalysts

- Ø Government
- Ø MEP Centers and Nonprofits
- Ø SMEs



IDEA #6:

“Big Trends–Small Firms”
Initiative



The Milstein Symposium: Commission on New Manufacturing

Milstein Commission members and Miller Center staff continue to work with stakeholder groups and other interested constituencies to advance the ideas proposed in this report.

For more information on the Milstein Symposium or the Commission on New Manufacturing, please visit www.millercenter.org/milstein.



MEP's Approach to Technology Acceleration

Agenda

- **Context Setting**
- Current Activities
- Emerging Opportunities
- Questions for the Board

Context Setting

- Legislative authority
- Administration Priorities (AMP 2.0)
- MEP Priorities (New Strategic Plan)
- Stakeholder Priorities (Miller Center/
Milstein Commission report)

The objective of the Centers is **to enhance productivity and technological performance** in United States manufacturing through-- (USC 278k(b))

- (1) the transfer of manufacturing technology and techniques** developed at the Institute to Centers and, through them, to manufacturing companies throughout the United States;
- (2) the participation of individuals from industry, universities, State governments, other Federal agencies, and, when appropriate, the Institute in cooperative technology transfer activities;**
- (3) efforts to make new manufacturing technology and processes usable** by United States-based small- and medium-sized companies;
- (4) the active dissemination of scientific, engineering, technical, and management information about manufacturing to industrial firms, including small- and medium-sized manufacturing companies;**
- (5) the utilization, when appropriate, of the expertise and capability that exists in Federal laboratories other than the Institute; and**
- (6) providing to community colleges information about the job skills needed in small- and medium-sized manufacturing businesses in the regions they serve.**

AMP 2.0 Recommendations

- AMP Report envisions a major role for MEP, and provides:
 - Support for Manufacturing Day (MFG DAY)
 - Support for MEP as an intermediary to help SMEs leverage manufacturing technologies
 - Support to ensure that the MEP becomes a major “tool in the NNMI toolbox”
 - Support for MEP role to assist SMMs with market entry support and scale-up

MEP Strategic Plan

OUTCOME AREAS	DESIRED FUTURE STATE	STRATEGIC ACTIVITIES NIST MEP will . . .
<p>ENHANCE COMPETITIVENESS</p> <p>Technology Acceleration</p>	<p>NIST MEP is recognized as a national leader in identifying usable technologies from multiple sources (labs, universities, institutes, etc.) and assisting with deployment to SMEs</p>	<p>Conduct inventory of centers' activities and expertise</p> <p>Examine best practices of states and other organizations</p> <p>Conduct a pilot program with NIST labs and other NIST resources (NNMI, etc.)</p> <p>Develop a framework for technology acceleration</p> <p>Use framework to identify and promote technologies from other federal laboratories and universities</p> <p>Conduct analysis and assessment of progress and adapt plans based on lessons learned</p>

Miller Center/Milstein Commission Report

- “Building a Nation of Makers” – July 2014
- Chaired by Haley Barbour and Evan Bayh
- Idea #6: Big Trends-Small Firms Initiative to Diffuse the Latest Technologies to SMEs
 - Emerging technologies promise to produce major disruption to established business models
 - SMEs often do not possess the tools to leverage these technologies
 - Connect SMEs with the latest trends; implement through MEP.

Agenda

- Context Setting
- **Current Activities**
- Emerging Opportunities
- Questions for the Board

MEP Approach to Technology Acceleration



- Accelerate technology development and commercialization by **connecting** U.S. manufacturers' capabilities, needs with technology sources
- Enhance business opportunities for U.S. manufacturers by **connecting** their capabilities and capacities with supply needs of govt. agencies, OEMs
- Provide commercialization **assistance** to manufacturers: manufacturing strategy, scale-up, product development, IP mgt, financing
- Provide tools, manufacturer assistance mechanisms, opportunities

MEP Tools, Services, Approaches - CONNECT

MEP Tool/Service/ Approach	Definition
Technology Scouting	Rigorous approach to find technology-based solutions to manufacturer needs – for product and process applications
Supplier Scouting	MEP links manufacturers possessing specific technical capabilities and capacities with government (DOD, DOE, DOT, NIST) and OEM supply opportunities.
B2B Network Pilots	MEP uses web repositories and a suite of related tools and approaches to link innovations (available for commercialization and being sought) from technology and buying sources (including manufacturer clients) with interested manufacturers
Regional Innovation Clusters and Technology Collaboratives	MEP participates in local RICs and TCs to connect local manufacturers and technologies from local laboratory sources using RIC consortium and TDMI approach to forming collaboratives as mechanism

MEP Tools, Services, Approaches - ASSIST

MEP Tool/Service/Approach	Definition
IP Awareness, Assessment and Management	Helps manufacturers understand how to handle intellectual property issues <ul style="list-style-type: none"> • Partnership with USPTO
Lean Product Development	Teaches manufacturers best practices in efficient product development and project management
Technology-Driven Market Intelligence	Identifies market impacts and technical requirements for technology-based new products and processes
SBIR Assistance	Assists manufacturers from proposal through R&D then commercialization to develop innovative technologies
Access to Capital	Increase manufacturer awareness, access to range of financing options for pursuing innovation and growth strategies



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Technology Scouting

Identifies enabling technologies for specific target applications

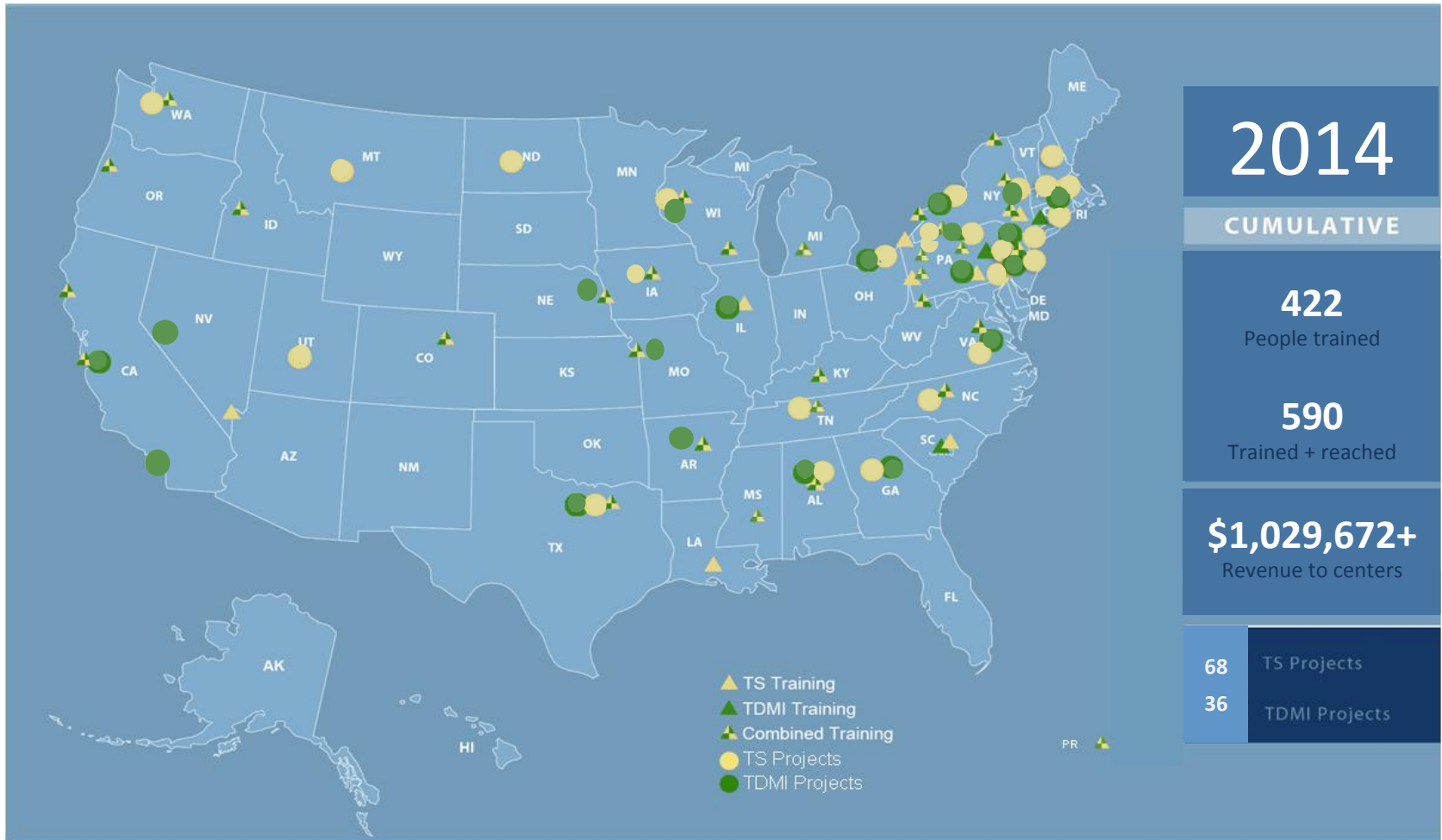


Technology-Driven Market Intelligence

Analyzes technology-specific perspective of industry/ adoption and market requirements

Technology Scouting and Technology Driven Market Intelligence are two services that MEPs provide to small and medium manufacturers

MEPs across the country are trained in TS and TDMI



INTRODUCTION

Technology Collaboratives

- Using the TDMI process to inform the creation and activities of the collaborative
- Process guide created
- Three projects:
 - California Network for Manufacturing Innovation (CNMI)
 - Nevada Industry Excellence Unmanned Autonomous Systems (NVIE UAS)
 - North Central Massachusetts Collaborative Communities Manufacturing Growth Initiative

MEP's Role through SBIR Phases

Preparing for Phase I (proof of concept, 6 months)	Preparing for Phase II (R&D, 2yrs)	During or after Phase II (commercialization)
<ul style="list-style-type: none"> proposal preparation help identify R&D partners obtain endorsements for future supply chain integration to include in proposals (ph1 and ph2) initial commercialization plans TDMI to frame market opportunities technology translation to capture value proposition and messaging (key for abstract) 	<ul style="list-style-type: none"> strategy support for commercialization plan required as part of Phase II proposal TDMI to target partners and technical functional requirements for market acceptability identify R&D and industrial partners for T&E engineering support prototyping services technology scouting Lean services (VSM, LPD ...) 	<ul style="list-style-type: none"> TDMI to focus on priority market opportunity Product development Design for manufacture and assembly Scout contract manufacturer Develop in-house manufacture capability Quality control and management Certifications · Connect back with early interests (endorsers, or LM or Boeing etc) Scope possible future SBIR/ STTR Phase I proposals based on persistent technical challenges

SBIR ROI

SBIR and MEP by the Numbers



Agenda

- Context Setting
- Current Activities
- **Emerging Opportunities**
- Questions for the Board

Technology Acceleration – going forward

- Continue partnerships with federal labs, universities and intermediaries to foster awareness of MEP as commercialization partner
- Continue to work with Centers to expand services to become comprehensive in scope
- Pursue unique high-potential impact opportunities
 - MTAC pilots
 - NNMI coordination
 - Additive Manufacturing, Digital, and other emerging technologies
 - Maker community

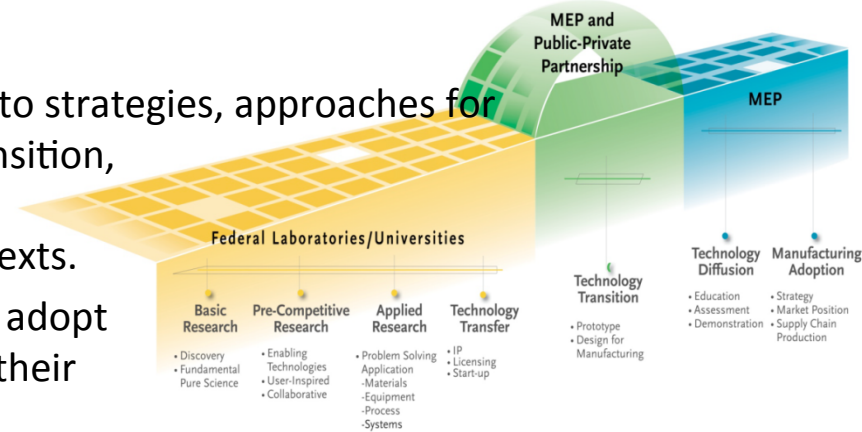
Manufacturing Technology Acceleration Center (M-TAC) Pilot Projects

- M-TACs intended to amplify MEP service offerings related to tech transition, commercialization
 - M-TAC Pilots consist of teams of experts in *specific technology/supply chain areas*, partnered together to offer services, deep expertise to support small & mid-sized manufacturer needs



- **M-TACs -- coordination point w/in key supply chains**
- M-TACs are:

- ü Informing future NIST investment leading to strategies, approaches for MEP system-wide deployment of tech transition, commercialization assistance for small manufacturers – within supply chain contexts.
- ü fostering small manufacturer readiness to adopt and/or adapt advanced technologies into their manufacturing processes, products.
- ü addressing small manufacturer tech, business challenges as they attempt to integrate, adopt, transition, commercialize both existing and emerging product and process technologies into their operations to help them grow and compete within manufacturing supply chains



MEP and the National Network for Manufacturing Innovation (NNMI)

- MEP involved in suggesting language for FFOs and serving on proposal review panels.
- MEP developing relationships with the NNMI Institutes for Manufacturing Innovation (IMI).
 - ü Partnering at both Federal sponsor level – NIST MEP – and individual IMI level – MEP Centers
- Initial Focus on DOD-led IMIs:
 - ü America Makes
 - ü Digital Manufacturing and Design Innovation (DMDI)
 - ü Lightweight & Modern Metals Manufacturing Innovation (LM3I)

MEP and the National Network for Manufacturing Innovation (NNMI)

- Purpose of relationships
 - ü Leverage MEP nationwide assets, resources to assist NNMI IMIs as they strive to engage and impact on SMEs
 - ü Expand NIST MEP ability to impact competitiveness and growth of SMEs by developing expertise in IMI focus areas
- MEP Role
 - ü Increase small manufacturer awareness of IMI focus areas
 - ü Facilitate small manufacturer informing IMI research
 - ü Facilitate small manufacturer participation in IMI research
 - ü Help deploy results of IMI research to small manufacturers

NIST MEP Additive Manufacturing Goals

- **Market Assessment**
 - Explore the field
 - Obtain information about the needs and directions of industry
 - Hear the voice of MEP Centers regarding how much they currently, and would like to engage in prototyping assistance services to SMEs
- **Education**
 - Provide guidance for Centers to begin to engage SMEs interested in AM
 - Built a virtual community of practice for learning
 - Regularly scheduled webinars explore AM technologies, modes of use, applications, resources available, economic trends
 - Led regional AM cluster formation

Mapping uses of AM in MEP projects

Taxonomy for AM use through PD lifecycle

		PRODUCT DEVELOPMENT STAGE			
		Concept	Preliminary Design	Final Design	Production
PURPOSE	Form & Fit	Concept explanation	Concept review – aesthetics, overall size		
		Overall Function	Ergonomics		
	Sales	Investor model	Focus Group model	Trade Show model	Component in final assembly
				Marketing Tool	Replacement parts
	Engineering		Fit Test of sub assembly	Assembly compatibility	Diagnostic planning (e.g., surgical)
				Strength testing	
				Analysis validation – FEA, Flow, Thermodynamic	
				Test/Research fixture	
	Fabrication		Rapid Tooling: Injection Molding		Jigs, tools, fixtures for assembly
			Rapid Tooling: RTV mold master		Master for soft tooling, casting

Manufacturing entrepreneurship - connecting Makers with MEP resources

Background

Leverage recent trends in the Maker Movement:

- Makerspaces
- designs sharing internet platforms
- marketing e-platforms for makers

to form partnerships and develop services to impact the manufacturing entrepreneurship community.

Build on nascent relationships (CA, AR sub-recipients)

Manufacturing entrepreneurship

- connecting Makers with MEP resources

Approach

- Maker Movement session at November Quarterly Update
 - educate MEP center leadership about maker trends
 - inform them about NIST MEP collaborations with Maker communities, and
 - explore center ideas for broadening and accelerating collaboration.
- Competition of centers includes language regarding the importance of serving emerging companies and other hard-to-serve manufacturers.
- Work with centers already engaging makers / examine roles and responsibilities that make for effective collaboration / share insights.
- MEP will reach out to maker convenings (October-Urban Mfg Alliance) to educate makers about available resources and services, learn about where maker needs match available services, and explore potential relationships.

MEP Collaboration with NIST Labs

- **Engineering Laboratory – industrial robotics**
 - Smart Manufacturing Program is conducting research to speed development, adoption, and integration of leading-edge intelligent technologies to advance U.S. manufacturing.
 - MEP is working with EL to engage small manufacturers to inform EL research.
 - Specific near-term efforts include leveraging MEP to bring SMEs to workshops focused on robotics, and prognostics and health management systems - planned for late 2014 and early 2015.
- **Additive Manufacturing – cross-cutting projects**
 - Forum being established to increase information sharing and interactions among NIST researchers and active engagement with MEP centers through lab visits, seminars, and discussions.
- **Boulder Labs Technology Showcase**
 - NIST’s portfolio of technologies and opportunities for collaboration will be presented to private firms, entrepreneurs, investors, intermediaries.
 - CO MEP center is central player in steering committee.

Questions for the Board

- Are we on the right track?
- Are there particular initiatives that you'd like to know more about?
- Do you have insights to help us develop a framework to structure this work and prioritize among the efforts?
- Others?

MEP STATE COMPETITIONS

Bill Kinser, Director, Center Operations, NIST MEP

Diane Henderson, Federal Program Officer, Center Operations, NIST MEP

Robin Bunch, Division Chief, Grants Management Division (GMD)

Jannet Cancino, Grants Officer, Grants Management Division (GMD)

Jedd Vertman, Acting Deputy Chief Counsel, Federal Assistance Law Division (FALD)

MEP State Competition – Overview/Background

- **Introductions**
- **Background**
 - **The Administration’s FY2015 Budget**
 - Ø Proposed a 10% increase (\$13 million) for MEP and noted
 - Ø MEP’s strategic planning process and operational reform agenda; and
 - Ø NIST Management’s direction in FY 2014 to initiate a carefully planned, systematic, multi-year re-competition of the national system of Centers.
 - **The Government Accountability Office (GAO)** (March 2014) report “MEP: Most Federal Spending Directly Supports Work with Manufacturers, but Distribution Could Be Improved” recommended that *“Commerce’s spending on cooperative agreement awards be revised to account for variations across service areas in demand for program services and in MEP centers’ cost of providing services. Commerce agreed with GAO’s recommendation.”*
 - **H.R. 5035 - NIST Reauthorization Act of 2014** “To reauthorize the National Institute of Standards and Technology, and for other purposes” passed the House on July 22, 2014, which provided that if a recipient has received a Center award for 10 consecutive years, then the Director shall conduct a competition to select a Center operator. Current Centers in good standing are eligible.

MEP State Competition – Overview/Background (2)

- **Background (continued)**
 - **Primary objective:** Optimize the impact of the Federal investment on U.S. manufacturing and to allocate additional funds to areas with higher concentrations of manufacturers.
 - **Goal:** Complete competition of the entire 50 State (plus Puerto Rico) national network over three years.
 - **Tool:** Demonstration Pilot

MEP State Competition – State Selection Criteria

Criteria for States to be competed:

Threshold Criteria

- States where the MEP program has not been re-competed within past 10 years.
- States where NIST investment in terms of dollars per manufacturing establishment (\$/Mfg using 2012 County Business Patterns) is below the MEP national average.

Quantitative Criteria

- Importance of manufacturing to the State's economy, as measured by manufacturing employment as a percentage of State employment.
- Importance of the State's manufacturing sector to national economy as measured by State's share of total U.S. manufacturing establishments.

Qualitative Criteria

- State support for manufacturing and MEP.
- States where MEP has gone through a recent "refresh" (e.g., recent change in organizational leadership or structure).
- Federal program requirements such as audit repayment obligations, high risk/agency review status.

MEP State Competition – State Selection Criteria (2)

- **NIST MEP determined to include at least one and not more than two States from each MEP region in the demonstration program, for three reasons:**
 - 1) to ensure the continued effective support of the MEP system while conducting the pilot phase of the competition,
 - 2) to ensure sufficient breadth and depth in NIST staff resources, and
 - 3) to ensure appropriate geographic diversity in selected States.

MEP State Competition – State Visits

The purpose of the visits was three-fold:

- 1) to share information directly with State leaders regarding MEP's new strategic plan and its implications;
 - 2) to share information directly with State leaders regarding the upcoming re-competition and the inherent opportunities and risks involved; and
 - 3) to engage State leaders in discussion regarding their views about the role of manufacturing and MEP in the State's economic development priorities.
- **Participants included:**
 - State Economic Development Leaders
 - Host Organization Leaders
 - Center Leaders, Center Staff and Center Board Leaders
 - MEP Center representatives were not include in the meeting with State leaders
 - Based on this rigorous process and selection criteria, NIST MEP determined that 10 States among six Regions should be included in the pilot program.

MEP State Competition –Working Groups

- Comprehensive evaluation of overall process conducted
- Two working groups established
 - Federal Funding Opportunity (FFO)/Standard Operating Procedures (SOP) Working Group
 - Realignment Working Group
- Representing cross-section of MEP staff, leadership, GMD and FALD
- Project Charters developed for each working group

MEP State Competition – FFO/SOP Working Group

Structure:

- Led by Diane Henderson
- Team Consisted of Representatives from:
 - MEP Center Operations
 - MEP System Operations
 - MEP Program Development Office
 - MEP Manufacturing Policy & Research
 - NIST Grants Management Division
 - DOC Federal Assistance Law Division

Purpose:

- Develop FFO/FRN
- Develop SOP
- Update Guidance Documents
- Launch of Pilot FFO/FRN by August 1, 2014

MEP Competitions – FFO/SOP Working Group (2)

Activities:

- Federal Funding Opportunity/Federal Register Notice
- Working Group Project Schedule
- Communications Plan (Internal FAQs)
- FAQs for Public
- Staffing Plan for Evaluation Panels
- Standard Operating Procedures (SOP)

MEP State Competition – Realignment Working Group

- Led by Tab Wilkins
- Team Consisted of Representatives from:
 - MEP Center Operations
 - MEP System Operations
 - MEP Program Development Office
 - MEP Manufacturing Policy & Research
 - MEP Panel Review Team
 - MEP Communications Team
 - MEP Partnerships
 - NIST Grants Management Division
 - DOC Federal Assistance Law Division

PURPOSE:

- Leverage the momentum created by the MEP re-competitions to align MEP reporting processes, including Strategic plans, CPRs/data sets, Panel/Annual reviews, 5-year Operating Plans, and Quarterly reports.
- Evaluate the current state of programmatic monitoring of Centers, identify the desired future state
- Update guidance documents (General Terms and Conditions, Operating Guidelines, Special Award Condition Template, Renewal Webinar Slides, FAQ) in conjunction with the FFO SOP Working Group

MEP State Competition – Realignment Working Group (2)

- **Activities:**
 - Create a streamlining plan through the following process:
 - Review MEP System Strategic Plan
 - Analyze and map existing process
 - Review requirements for 5 year awards
 - Design and map streamlined process
 - Streamlining Annual & Panel Review Processes
 - Looking at semi-annual reporting
 - Working to support concept of post-award training
 - Begin comparing document requirements across all mechanisms – develop future state
 - MEP General Terms & Conditions
 - MEP Operating Plan Guidelines
 - Center Progress Report
 - Progress Narratives
 - Work on Review processes leading to renewal or new competition

FFO/FRN – Initial Results: FFO Enhancements

- Alignment of Evaluation Criteria with MEP System Strategic Plan
- Post-Award Kick-Off Conference
- Ramp up of Operations
- Multi-Year Funding
- Potential for Additional 5 Years
- Reduced Reporting Requirements

Development of Resources

- Reviewer Training for Internal & External Resources
- Scheduling/Resource Management
- Standard Operating Procedures

Promoting Full & Open Competition

- **In an effort to ensure complete transparency of competition process, MEP has put into place the following:**
 - Development of external pool of evaluators – Non-MEP Staff
 - Resources identified by knowledge/expertise
 - Familiarity with MEP Program
 - Cross-utilization of Regional Managers and Federal Program Officers
 - Establishment of 5 Review Panels for Pilot Competition – 2 States per Panel
- **In addition to the above actions, MEP has enhanced their communication tools:**
 - Communication Plan for MEP Staff
 - Information Webinar
 - MEP weekly E-Blast Newsletter
 - MEP Public Website
 - Frequently Asked Questions (FAQs)

Timeline/Next Steps

- **August 1st** – Federal Funding Opportunity (FFO)/Federal Register Notice (FRN) Published
- **October 1st & 8th** - Evaluator Training
- **October 15th** - FFO/FRN Closes – Proposals Due
- **October 15th** – December 15th - Technical Reviews/Discussions, Site Visits or Teleconferences
- **December 15th** – **December 31st** – Ranking Recommendation Review by Selecting Official
- **January 1st** – **January 31st** - Review and Execution of Awards by NIST Grants/FALD

Questions?

MEP EXPORT INITIATIVES

Mike Simpson, Director, System Operations, NIST MEP

Antwaun Griffin, Deputy Assistant Secretary for U.S. Operations, ITA

Mike Stone, President/CEO, Stone & Associates

Buckley Brinkman, Executive Director/CEO, Wisconsin MEP

THE FACTS ABOUT EXPORTING

Some misconceptions can lead companies to believe that exporting isn't for them, including that the market is "big enough here" and that exporting is too difficult. The facts show a different story:

WHO'S EXPORTING?

- 97% of exporters are small or mid-sized businesses.
- 67% of exporters have fewer than 20 employees.

Exporting works for manufacturers of all sizes!

95%

of the world's customers live outside the United States

If you aren't exporting, you are only hitting

5%

of the world's potential customers

BENEFITS OF EXPORTING

- U.S. companies that export grow faster than non-exporting companies
- Exporting provides companies with a diversified sales base and increases productivity
- Companies that export are 8.5% less likely to go out of business
- Exporting spurs innovation in product design and applications

ExporTech™ is a program designed to accelerate export growth for small and mid-size manufacturers.

GET STARTED TODAY
Click Here for Details

MEP - MANUFACTURING EXTENSION PARTNERSHIP | www.nist.gov/mep | 1-800-MEP-4MFG | SOURCES: International Trade Association, Export.gov | INFOGRAPHIC DESIGNED BY: Grew Photo Marketing, Inc. | National Institute of Standards and Technology U.S. Department of Commerce | NIST

MEP Landscape

- 47 MEP centers have completed over 1,600 export projects since 2006
 - Projects include: growth through export, market research, assessments, international business development program, outsourcing and compliance/ITAR

ExporTech highlights

- 106 ExporTech sessions
- 29 states have completed an ExporTech program
- 578 clients have completed the program
- Export sales within 6 months of completing program

ExporTech average Impacts

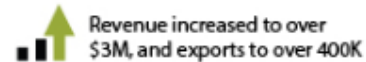
- \$770,000 average sales increase / retention per company
- \$50,000 average cost and investment savings per company
- \$400 Million in total program sales (new/retained) to date
- \$12,000 average follow-on sales for centers per client

Company Growth Through Export



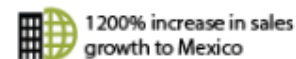
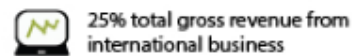
Rekluse Motor Sports (Idaho)

Rekluse Motor Sports started in Boise, Idaho in 2002. The company sells performance clutches to motorcyclists, racers, and recreational riders. Rekluse is an innovator of autoclutch technology. The company has a strong belief in supporting the local and national economy and its products are engineered, developed and manufactured in Boise. [Learn more about Rekluse ExporTech Success](#)



Louroe Electronics (California)

Louroe Electronics has 30 Employees and has maintained the highest quality standards in audio monitoring systems, microphones and base stations for more than 30 years. Its extensive audio technologies are used in numerous industries, including law enforcement, security, health care, entertainment, hospitality, retail, and surveillance. [Learn more about Louroe's ExporTech Success](#)



Growth Framework



Context and Perspective

- Advisory Board's request to learn more about export activities within the MEP System
- Perspectives
 - National
 - Program
 - Local
- Challenge/Opportunity
 - Getting more CEOs to focus on growing their business at the right time



INTERNATIONAL
TRADE
ADMINISTRATION

Supporting U.S. Exports through NEI/NEXT

Antwaun Griffin

Deputy Assistant Secretary for
U.S. Operations

Status of U.S. Exports Since 2009

- 4 consecutive years of record exports, reaching \$2.3 trillion in 2013
- Nearly 30,000 U.S. businesses started exporting
- 1.6 million more export-supported jobs, bringing our total to 11.3 million
- With more and more businesses online, it is a new era for exporting
- Global middle class growth has created tremendous demand for U.S. goods and services
- The U.S. now has trade agreements with 20 countries and is negotiating agreements with countries that together make up 60+ percent of the world's GDP.

NEI/NEXT



- Obama Administration builds upon the success of the National Export Initiative with NEI/NEXT
- Announced in May 2014 by U.S. Secretary of Commerce Penny Pritzker, NEI/NEXT is a data-based, customer service-driven initiative to ensure that more American businesses can fully capitalize on markets that are opening up around the world.
- Implemented through the Export Promotion Cabinet and Trade Promotion Coordinating Committee (TPCC), which consists of representatives from 20 federal departments and agencies with export-related programs.

NEI/NEXT: Goals

- Help businesses find their NEXT customer abroad
- Increase the efficiency of a company's first and NEXT shipment
- Help firms finance their NEXT order
- Help communities integrate trade and investment into their NEXT growth plans
- Open up the NEXT big markets around the world while ensuring a level playing field

NEI/NEXT: Focus on Working with Metro Areas and States

- Strengthen the federal export assistance infrastructure and foster local export assistance pipelines
- Partner with more local leaders to share best practices and build awareness of trade and investment resources
- Prioritize, emphasize, and promote opportunities for private and non-profit players to apply to existing grant programs for funding to develop and implement regional initiatives
- Coordinate with SelectUSA to provide information and technical assistance as well as facilitate trade and investment programs

Supporting NEI/NEXT: Trade Events



- Discover Global Markets
- Trade Winds

Supporting NEI/NEXT: Trade Events

Discover Global Markets



- An unprecedented national series of high-profile international business development events.
- Organized by the U.S. Commercial Service Export Assistance Centers in collaboration with local trade partners across the U.S.
- Featuring U.S. trade officials bringing the latest actionable market intelligence and industry trends directly to the U.S. business community.
- Supported by key U.S. export promotion partners from the private and public sectors.

Supporting NEI/NEXT: Trade Events

Discover Global Markets



- Engage in private, pre-scheduled meetings with U.S. Commercial Diplomats visiting from American embassies and consulates abroad.
- Participate in dynamic panel discussions on emerging overseas opportunities and industry trends important to U.S. business.
- Learn about U.S. export assistance programs that will cut the time to market, mitigate risks, and provide export financing solutions.
- Network with U.S. trade officials, leading private sector experts and like-minded U.S. businesses active in overseas markets.

Supporting NEI/NEXT: Trade Events

Discover Global Markets



Supporting NEI/NEXT: Trade Events

Trade Winds



- A business conference highlighting opportunities and challenges across a region or set of markets.
- One-on-one meetings with Senior Commercial Officers / Specialists from U.S. Embassies and Consulates for guidance on market entry strategies.
- Business-to-business meetings with potential partners / customers in select or multiple markets
- High-visibility business networking events with leading industry and government officials in select markets.

Supporting NEI/NEXT: Trade Events

Trade Winds



- Host Locations
 - 2007 – Crystal City, Virginia
 - 2008 – Istanbul, Turkey
 - 2009 – Warsaw, Poland
 - 2010 – Sao Paulo & Rio De Janeiro, Brazil
 - 2011 – Mexico City, Guadalajara, Monterrey, Mexico
 - 2012 – Southeast Asia (Singapore, Thailand, Vietnam, Malaysia, Indonesia)
 - 2013 – Asia (Korea, Japan, Taiwan, Hong Kong, The Philippines)
 - 2014 – The Americas (Colombia, Panama, Ecuador, Peru, Chile)
 - 2015 – Sub-Saharan Africa (Ethiopia, Tanzania, Mozambique, Angola, Kenya, South Africa, Nigeria and Ghana)

Supporting NEI/NEXT: Trade Events

Trade Winds

Trade Winds Summary 2007 - 2014

Event	Companies	Attendees	SCOs	SCO Appmts.	B2B Meetings
2007 - Crystal City	264	400	38	550	0
2008 - Turkey	72	85	28	610	400
2009 - Poland	68	140	28	840	245
2010 - Brazil	122	200	16	510	330
2011 - Mexico	112	230	16	570	350
2012 - Southeast Asia	68	212	14	540	325
2013 - Korea	64	155	14	325	280
2014 - Colombia	100	200	14	450	425
TW Series Total	870	1622	168	4395	2355

NEI/NEXT: Metrics

- NEI/NEXT is a cross-cutting initiative and supports the creation of improved data
- NEI/NEXT continues to track the overall dollar value of U.S. exports, but will also include:
 - the number of exporting companies
 - the number of markets our exporters are reaching
 - the extent to which trade agreements are helping our companies grow
 - client satisfaction goals

NEI/NEXT: Potential for Collaboration

- The National Export Initiative achieved great success through a whole-of-government approach and through the efforts of American small and medium-sized firms.
- NEI/NEXT looks to replicate this success through collaboration from existing and new partners
 - ExporTech
 - Joint effort by the Manufacturing Extension Partnership and the U.S. Export Assistance Centers
 - Helps small-to-medium-sized companies enter or expand into global markets by assisting in the development of a customized international growth plan
 - Startup Global and Centers of Innovation
 - Designed to help start-ups consider exporting at their earliest stages of growth through technical training and expert personalized assistance.



EXPORTECH™

*An Export Acceleration System
for Achieving Profitable Growth*

Program Overview

MEP Advisory Board Meeting

September 18, 2014



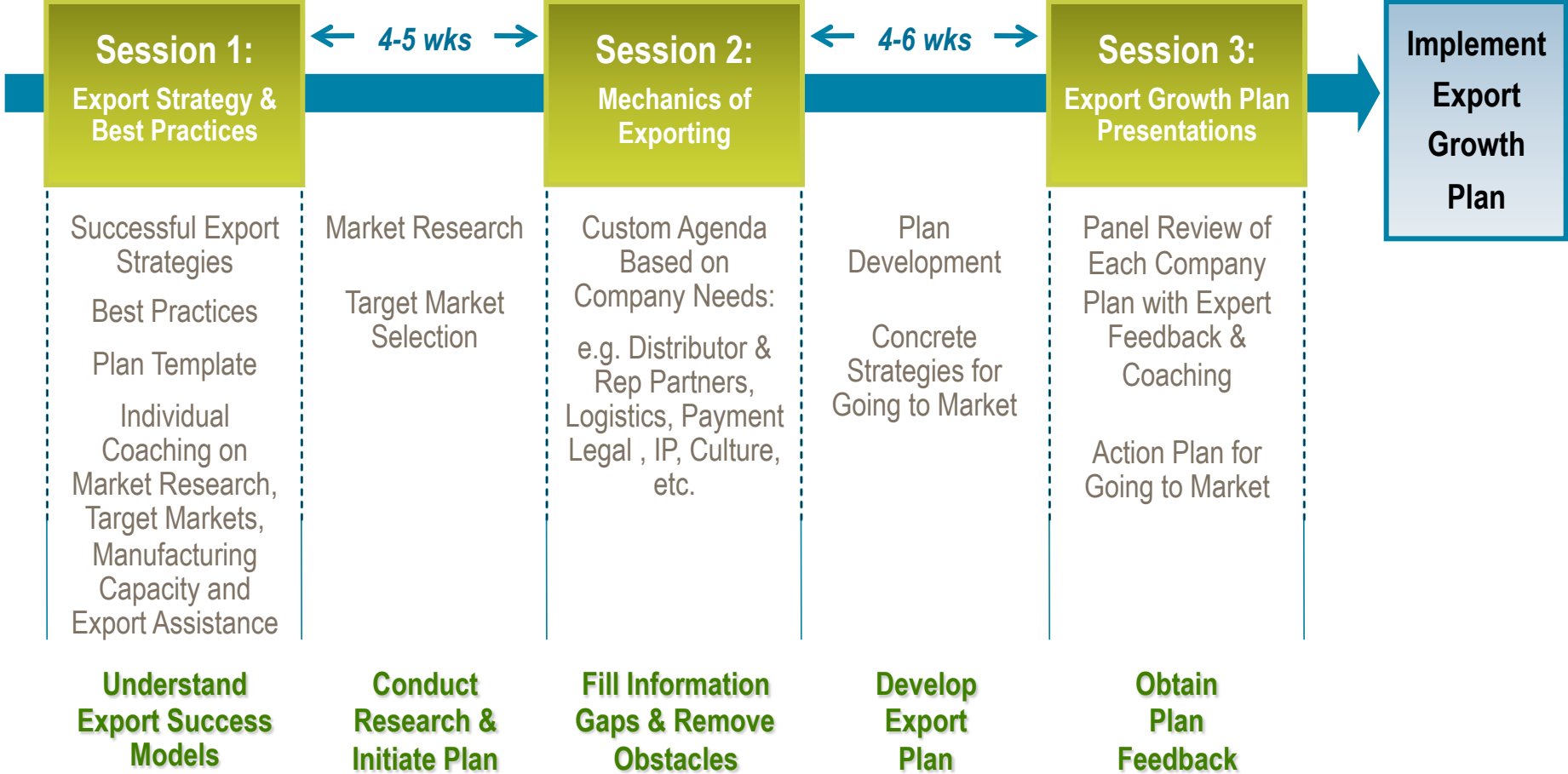
**MEP • MANUFACTURING
EXTENSION PARTNERSHIP**



What is ExporTech™?

- *What:* Export strategy and business development process
- *Why:* Intensive program to “jump start” international sales growth
- *How:* Key elements
 - Structured process for developing international growth plan
 - Ø 4-8 companies
 - Ø Leads to export plan in 10 weeks
 - Ø Plans vetted by panel of experienced exporters
 - Combines three group workshops and individual coaching
 - Efficient connection to experts/organizations in one place
 - C-level peer group model → drives learning and action

Program Timeline

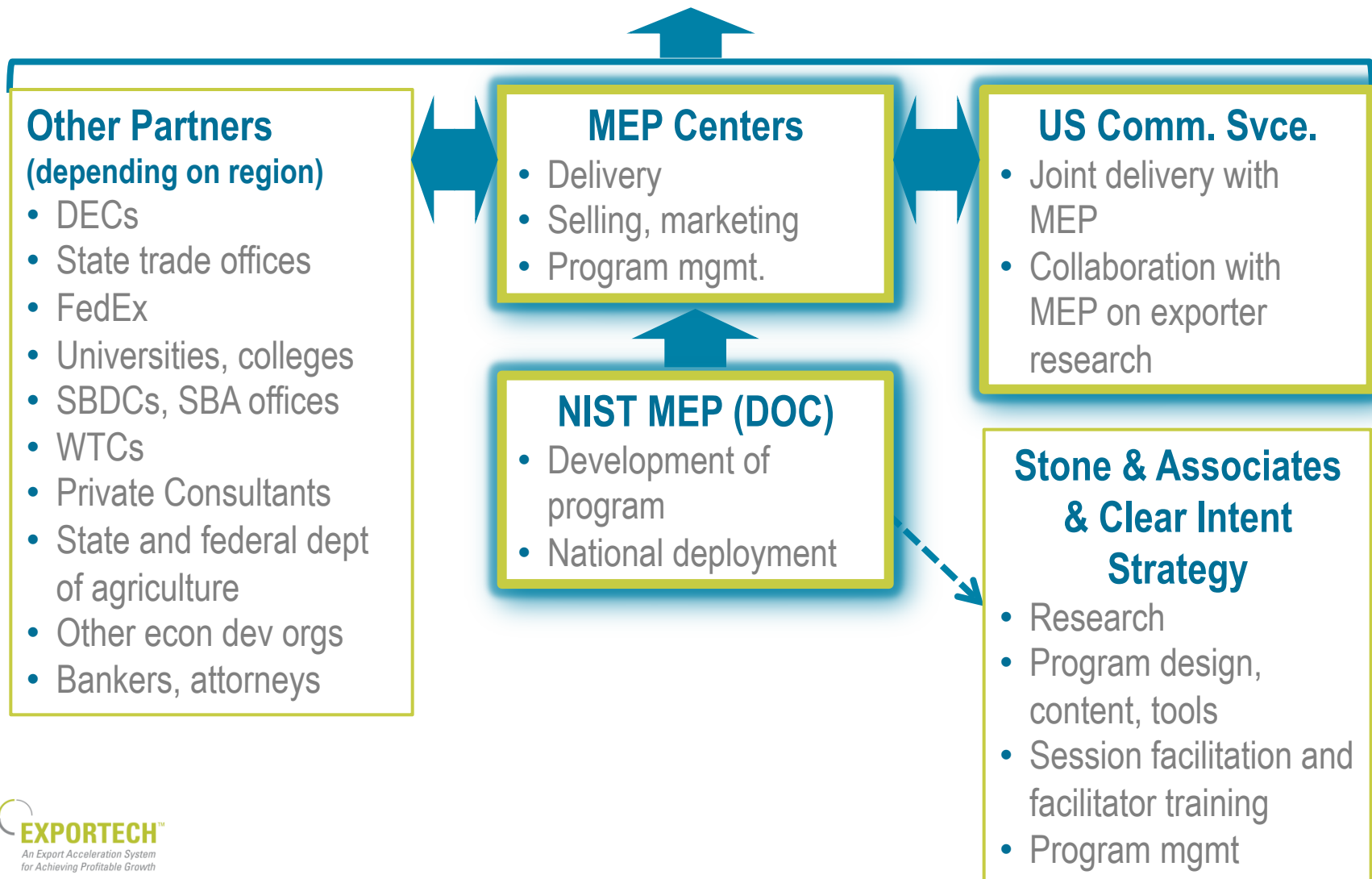


What Distinguishes ExporTech?

- Strategic export growth plan tailored to each company
- Plan presentations to panel that includes experienced exporters
- Connection to wide range of local and national experts
 - Concentration of resources, firepower in one place
- Innovative sessions that avoid “death by powerpoint”
 - Customized agenda, exercises, one-on-one consultations, ability to extract info relevant to company
- Intensive, structured process – workshops, coaching, planning tools
- Peer group model – accountability, action, learning
- 3rd party verified results

ExporTech Provides Structure for Collaboration Among Partners

SMM Exporters



Target Companies

Target Company

- New-To-Export
 - Receive foreign inquiries
 - Ready to commit resources
- Moderate or Reactive Exporter
 - <10% of sales, reactive approach, serve 1-5 markets
 - Wants to become more proactive and aggressive about international
- Experienced Exporter
 - International sales has grown to 10-35%
 - But wants to become more proactive, get to next level, develop plan for new region

Target Participant

- Executive Level
 - CEO or Owner
 - VP/Director of International Sales
 - VP/Director of Sales and Marketing

Resources for Implementation of Export Plans

Today

- Connection to US Commercial Service, state trade organizations, and other partners
- FedEx sponsorship support for Gold Key or other CS services



ExporTech 2.0

- Combines ExporTech strategy and planning process with go-to-market component
 - Builds in business development component: trade missions, tradeshow and Gold Keys
 - Provides incentives to go-to-market
- Benefits
 - Increased implementation of plans
 - Enhanced program value, improved marketing
 - Pipeline of better prepared companies for trade missions/shows, Gold Keys

Key Challenges

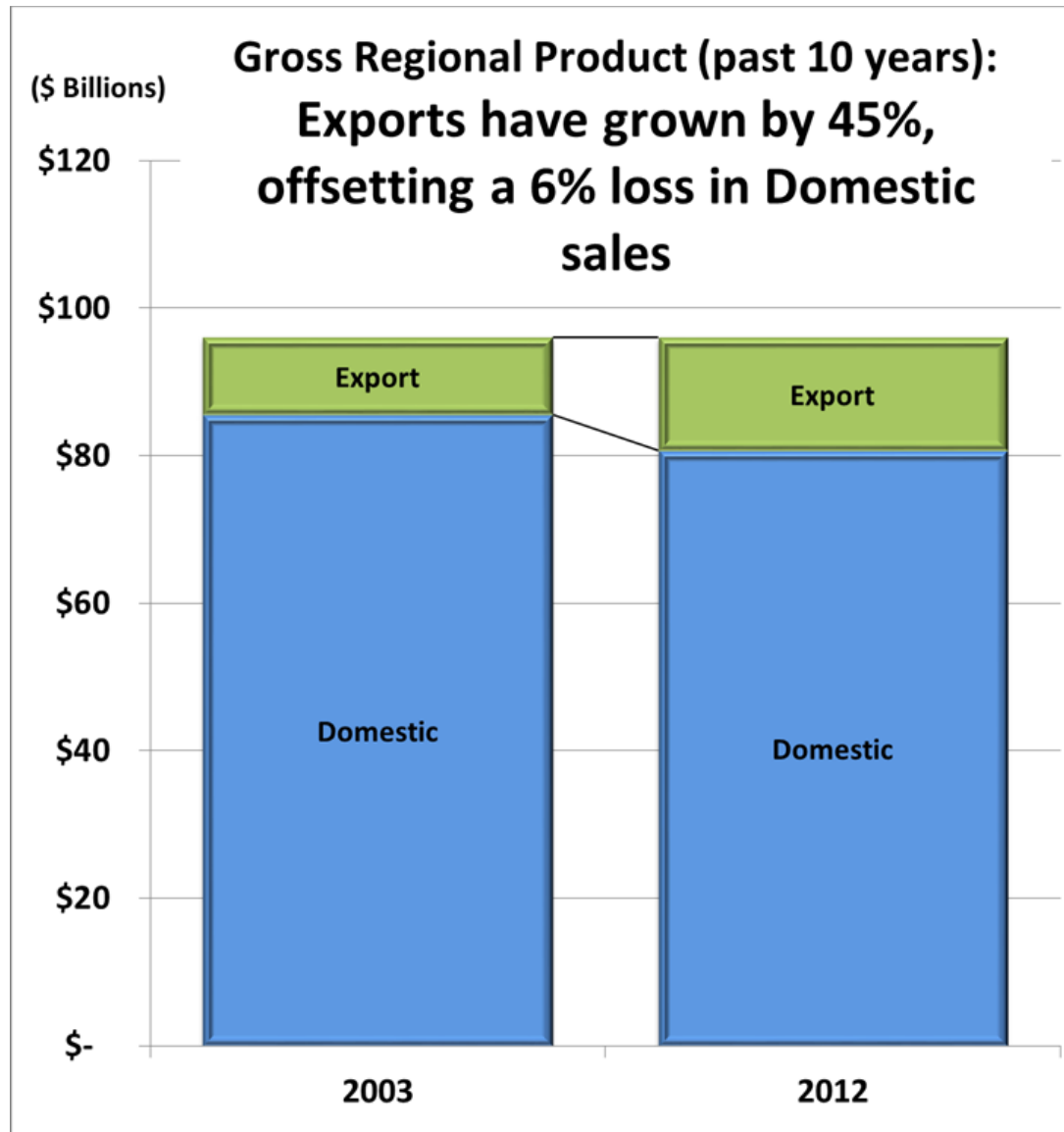
- Recruitment of Companies / Selling and Marketing
- Business Model

Exporting is Critical to Wisconsin's Growth

- § \$262B billion GSP – \$50 billion (19%) Manufacturing
- § Exports \$23 billion
- § Manufacturing 94.6% of Exports
- § *Growth in Wisconsin depends on exports!!!*



Here's what we discovered in Milwaukee



* Brookings Export Nation 2013 data.

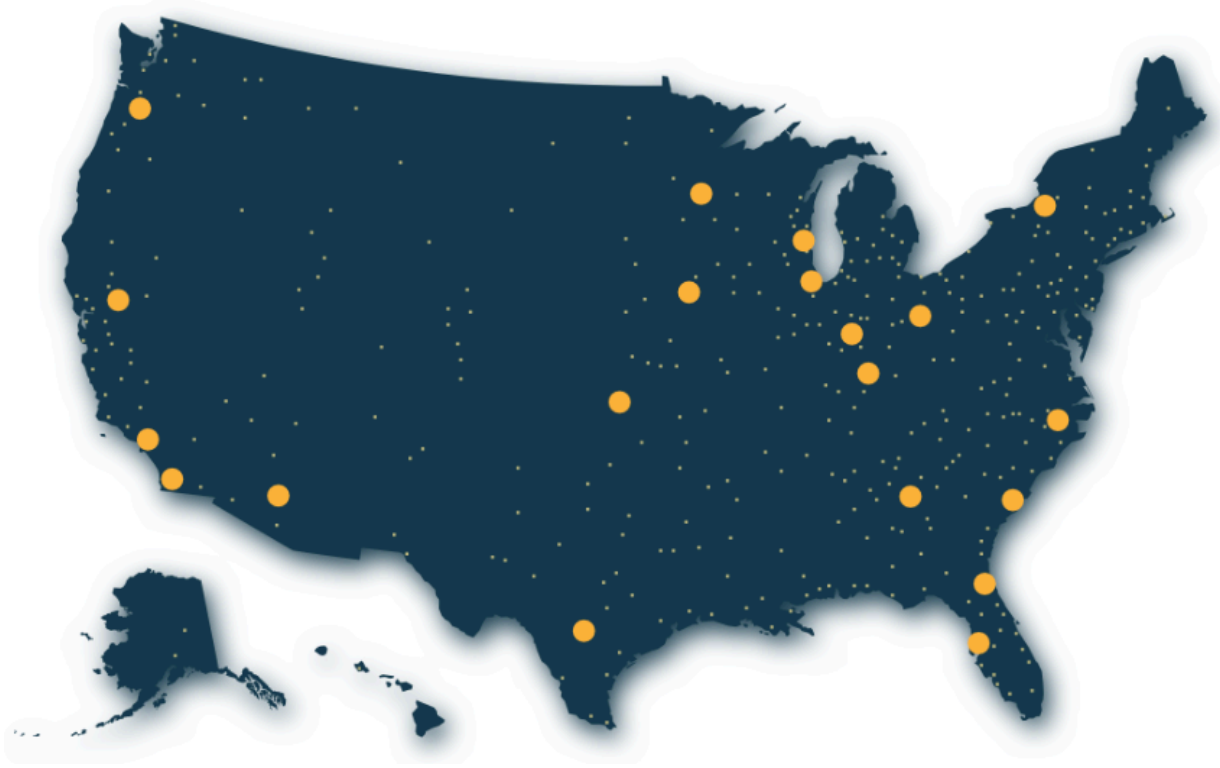
ExporTech™ Overview



Wisconsin “Special Sauce”



Global Cities Initiative



Results



Enterprise Value

Value = EBITDA X Multiple

Strong Relationships



Challenges for MEP Centers

- § **Financial Investment – WMEP will invest \$350,000+**
- § **Equal partnership between State, USEAC, & MEP**
- § **Volunteer Network – Finding Value-Adding Partners**
- § **Effective Champion**

Opportunities for National MEP System

- § **Global Cities Initiative – 19 other markets**
- § **Export Communities**
- § **National Network**
- § **Visibility in a high-profile area**
- § ***Another issue with national implications where the NIST-MEP is the organization connecting with SMMs***



BOARD DISCUSSION

Enhance the Economic Competitiveness of U.S. Manufacturers		
Serve as a Voice to and a Voice for Manufacturers	Support National, State, and Regional Manufacturing Ecosystems and Partnerships	Develop MEP's Capabilities as a Learning Organization and a High-Performance System

OUTCOME AREAS	DESIRED FUTURE STATE	STRATEGIC ACTIVITIES NIST MEP will . . .	INDICATORS OF SUCCESS	KEY ACTIVITIES
<p>ENHANCE COMPETITIVENESS</p> <p>Technology Acceleration</p>	<p>NIST MEP is recognized as a national leader in identifying usable technologies from multiple sources (labs, universities, institutes, etc.) and assisting with deployment to SMEs</p>	<p>Conduct inventory of centers' activities and expertise</p> <p>Examine best practices of states and other organizations</p> <p>Conduct a pilot program with NIST labs and other NIST resources (NNMI, etc.)</p> <p>Develop a framework for technology acceleration</p> <p>Use framework to identify and promote technologies from other federal laboratories and universities</p> <p>Conduct analysis and assessment of progress and adapt plans based on lessons learned</p>	<p>For Discussion at September Board Meeting</p>	<p>TBD</p>
<p>CHAMPION MANUFACTURING</p> <p>Data as a Service</p>	<p>All MEP centers have access to the information and data necessary to make day-to-day and strategic decisions anytime/anywhere</p> <p>National, state, and other partners (associations, etc.) will have access to meet their needs and expectations</p>	<p>Identify and communicate industry specific practices that create value for SME's</p> <p>Identify and communicate services for under-served SME's</p> <p>Identify federal and state stakeholder common data needs and develop products responsive to these needs</p> <p>Develop capability to deliver all data products across multiple platforms (web, mobile, print, etc.)</p>		

OUTCOME AREAS	DESIRED FUTURE STATE	STRATEGIC ACTIVITIES NIST MEP will . . .	INDICATORS OF SUCCESS	KEY ACTIVITIES
<p>CHAMPION MANUFACTURING</p> <p>Increased Role of National and Center Boards</p>	<p>MEP System has established collaborative methods for leveraging the collective knowledge and practices of the MEP Center Boards (i.e in sharing, understanding and implementing best practices) for the purpose of ensuring that MEP Center Boards are knowledgeable, engaged, and responsible for MEP program governance and have adopted best practices as a high performance organization.</p>	<p>Establish effective forums that engage MEP Center Boards across the system with each other and the National Advisory Board for cross-learning, benchmarking and information exchange;</p> <ol style="list-style-type: none"> 1. Expanded Regional Calls with Board Chairs, 2. Annual Meeting with National Advisory Board, 3. Board Specific Working Groups and 4. Sessions at Quarterly and future National Meetings) 5. Increasing the connectivity between National and Center boards <p>Document Best Practices and where appropriate develop tools and resources for purposes of:</p> <ol style="list-style-type: none"> 1. Insuring long-term viability of the MEP Center (e.g. Succession Planning) 2. Regularly Refreshing and Addressing the Needs of the Local Market 		
<p>SUPPORT PARTNERSHIPS:</p> <p>Manufacturing Eco-system</p>	<p>NIST MEP and MEP centers are recognized as central players by federal, state and local partners to advance manufacturing eco-systems including building collaboration, expertise, and capacity of manufacturing advocates and service providers</p> <p>MEP Center partnerships are well-designed, provide mutual benefit, and strengthen regional eco-systems.</p>	<p>Inform and support Administration multi-agency efforts (e.g., IMCP, NNMI, AMP, workforce, etc) that strengthen national and regional eco-systems.</p> <p>Provide opportunities for MEP Centers to participate in collaborative opportunities that align with regional priorities and needs.</p>		

OUTCOME AREAS	DESIRED FUTURE STATE	STRATEGIC ACTIVITIES NIST MEP will . . .	INDICATORS OF SUCCESS	KEY ACTIVITIES
DEVELOP CAPABILITIES Learning Organization	National network will be a system characterized by: <ol style="list-style-type: none"> 1. All system members have a process for continuously identifying and acting on opportunities for improvement 2. Rapid identification, sharing, and implementation of best practices occurs across the system 	Reinstate National Conference in 2016 Continue and evolve knowledge sharing opportunities currently in place through RMST engagement with centers Develop MEIS SharePoint implementation into a widely used, highly effective virtual collaboration solution Disseminate best/exemplary practices identified during Center Panel Reviews and Annual Reviews Utilize Work Groups to identify common best practice needs		
	A performance measurement system that supports the strategic plan and meets all stakeholders needs and expectations has been implemented	Develop System Scorecard for Board and leadership review Implement cohort benchmarking for centers and center boards use Align performance metrics with work of realignment work group including role of Panel and Annual Reviews		
System Refresh	Performance and long-term sustainability of the system will be enhanced by a carefully planned, systematic, multi-year re-competition of the Centers.	Lessons learned will be identified and incorporated into subsequent rounds Complete full system refresh over period of three years		

Considerations for Successful Implementation:

- What are the capabilities that staff need?
- What is the organizational structure needed?
- What is the management policy needed?
- What information and knowledge management structures are needed?
- What are the elements of a supporting culture?



BUILDING A NATION OF MAKERS

*Six Ideas to Accelerate
the Innovative
Capacity of America's
Manufacturing SMEs*

Executive Summary



Commission Co-Chairs

Haley Barbour, Former Governor, Mississippi

Evan Bayh, Former Governor and U.S. Senator, Indiana

Executive Summary

Sixty years ago, it was an article of faith that “as GM goes, so goes the nation.” For generations, manufacturing was a bellwether for the health of the U.S. economy and the vitality of the American Dream. Sadly, since GM President Charles Wilson first popularized this axiom, U.S. manufacturing has experienced a slow and painful decline. It is no coincidence that the promise of the American Dream—where individuals are rewarded for initiative and hard work and are able to achieve homeownership, access to health care and higher education, and a secure retirement, in hopes of providing a better life for their children—has in turn become more difficult to attain. Rebuilding the American Dream will require a national effort encompassing a broad range of policy areas. But if the Dream is to be restored, that work must begin with the longtime engine of middle-class jobs: American manufacturing. That was the charge of this commission.

We focused specifically on small- and medium-sized manufacturing enterprises (SMEs)¹. According to the 2010 Census, the more than 258,000 manufacturing SMEs in America represent more than 98 percent of all manufacturing firms and employ 4.9 million workers. While overall manufacturing employment declined from 21 million in 1972 to 10 million in 2010, the share of jobs provided by SMEs has grown from 29 percent to 45 percent. Even in the rubble of the Great Recession, SMEs were one of the few sectors of the American economy to thrive. Further, approximately 90 percent of the inputs used by multinational corporations come from SMEs, providing further incentive to dedicate our national attention to supporting this vital sector.

But as National Association of Manufacturers President Jay Timmons quipped, “Today’s manufacturing is not your grandfather’s manufacturing.” Much like other industries that have endured disruption in recent years, the sector is being forced to develop new models to adapt to a changing landscape marked by technological breakthroughs such as 3D printing, cloud computing, and the Internet of Things; increased demand for customized, high-value products; and burgeoning global markets. To be sure, America’s economic future will be driven by the ability of our “makers” to fulfill the demands of the 21st-century global economy.

Recent history has demonstrated that SMEs have the agility to capitalize on this dynamic new environment. Nonetheless, barriers still remain. Outpacing the global competition requires a highly skilled workforce, yet there exists no efficient mechanism to match supply and demand within the labor market, leading to systemic inefficiency. The pipeline of skilled workers is impeded by a K-12 culture that often stigmatizes workforce training and careers in manufacturing, which then results in a lack of collaboration between private enterprise and higher education. Undertaking a serious, comprehensive effort to change how manufacturing jobs and workforce training programs are viewed is a critical part of supporting the next generation of makers and the future growth of America’s SMEs.

Even when skilled workers enter the labor market, SMEs often lack access to the capital required to invest in these workers or in the vocational training imperative to keep their workforce current. And many SMEs do not possess the know-how to institute the latest technology trends, connect with other points on the supply chain, or bring their products to market.

1. The Small Business Administration defines SMEs as firms with less than 500 employees.

Addressing these barriers is a significant undertaking. The connective tissue that binds these challenges is that they all relate to our nation's innovation capacity. Innovation is an important indicator of the overall economic health of a nation and, more broadly, of competitiveness on a global scale. The nimbleness and energy often associated with smaller firms poises SMEs to be on the cutting edge of innovation, driving change in products, services, processes, and overarching business models. It is at the core of growth and value creation for individuals, organizations, and society as a whole. Thus, it is vital to the restoration of the American Dream.

We therefore propose six bipartisan, action-oriented ideas (summarized below) to accelerate the pace of innovation for America's small- and medium-sized manufacturers.



Talent Investment Loans to Expand Human Capital

Government-backed talent investment loans will give SMEs the capital to hire the workers necessary to expand their businesses, as well as to up-skill these and current employees. These loans will include incentives to encourage economic and social goods, such as worker retention, attainment of certified skills, and hiring from target populations.



Upside-Down Degrees to Connect Classroom Learning with On-the-Job Learning

"Upside-down" programs allow students to transfer accredited technical training, work experience, military training, or community college coursework as credit toward a bachelor's degree. Expansion of such programs, with emphasis on manufacturing-related fields, will reduce barriers between skills training and degree attainment, and enhance the quality of the manufacturing workforce.



A Skills Census to Build a More Efficient Skilled Labor Force

A regular survey of employers to determine current and projected skills needs – commissioned by state governments, with data freely available to the public – will allow businesses, policymakers, and educators to tailor their programs in real-time in order to forestall projected imbalances between skills and employer needs.



A National Supply Chain Initiative to Fully Map America's Manufacturing Ecosystems

A fully-mapped manufacturing supply chain will allow businesses and policymakers to fill gaps in the existing infrastructure and keep up with rapid changes to ecosystems formed around emerging technologies. A toolkit for SMEs will allow small manufacturers to extract maximum value from participation in the supply chain.



Up-Skilling High School Students with Expanded Technology and Engineering Certification Programs

All students should have the opportunity to acquire a certified technical skill before graduating high school. Just as Advanced Placement tests offer transferrable college credit, electives in technology and engineering with optional, industry-recognized certification exams should be available to high school students to build a more skilled and responsive labor market.



A "Big Trends-Small Firms" Initiative to Diffuse the Latest Technologies to Manufacturing SMEs

Emerging technologies promise to produce major disruptions to established business models, yet SMEs often do not possess the tools to leverage these technologies. A "Big Trends-Small Firms" initiative, implemented through the Commerce Department's Manufacturing Extension Partnership, will connect small- and medium-sized manufacturers with the latest trends.

Together, these recommendations wield transformative potential. Talent investment loans allow companies to expand their human capital. Upside-down degrees move us toward a more flexible education system with emphasis on skills in demand. Market surveys help disseminate the data required to enable stakeholders to understand their strengths and shortcomings, and act on them. A fully-mapped supply chain will reveal new growth opportunities for SMEs. Certification programs give students a greater chance to both receive and qualify for meaningful employment in the new skills-based manufacturing economy. And finally, bringing the latest technology trends back to the manufacturing base will ensure that SMEs have the tools to compete in the global economy.

In developing these ideas, we were guided by three fundamental principles:

- » First, our focus was limited to what we deemed to be remediable problems. While all problems are theoretically solvable, some simply have little chance of being enacted in today's political climate. For instance, comprehensive tax reform and an overhaul of the nation's energy policy were two areas identified by this commission as critical to U.S. economic and manufacturing growth. While we strongly urge policymakers to identify a way forward on both issues, we agreed that the environment is not ripe for such grand reform and was thus beyond the ambit of this body.
- » Second, the recommendations had to have a viable path to implementation. A wide range of perspectives and interests across the political spectrum, both within the commission and outside, had to be considered. We had to possess reasonable confidence that the ideas could marshal broad support from key stakeholder groups. In addition, it was imperative that each recommendation included identifiable catalysts to action.
- » Third, the recommendations had to add value to the marketplace of ideas. In the course of our work, we found that there were key areas of our commission topic where either good work was being done or sound ideas had already been proposed. For instance, we believe the future of American manufacturing will be largely determined by our success in generating a skilled workforce. Yet, the Aspen Institute has already developed an outstanding model to address this challenge with its Skills for America's Future initiative. Therefore, rather than proposing new models to supplant this work, we focused instead on where we could add value.

In the broad historical sweep of American manufacturing, we are in the midst of fulcrum years. Our manufacturing SMEs are poised to capitalize on the opportunities available in the 21st-century global economy—and with it, the ability to create stable, middle-class jobs. But they must possess the tools needed to remain at the vanguard of innovative capacity. We urge policymakers, business and industry leaders, educators, and social entrepreneurs to act on these recommendations.

Milstein Commission on New Manufacturing

Governor Haley Barbour, Co-Chair

Former Governor, Mississippi

Governor Evan Bayh, Co-Chair

Former Governor and U.S. Senator, Indiana

W. Bernard Carlson, Chair, Department of Engineering and Society, University of Virginia

Rebecca Bagley, President and CEO, NorTech

Aaron Bagshaw, President, W.H. Bagshaw Co.

Matthew Burnett, Founder, Maker's Row

Jennifer Clark, Associate Professor, School of Public Policy, Georgia Institute of Technology

Governor John Engler, President, Business Roundtable; Former Governor of Michigan

James Fallows, National Correspondent, The Atlantic

James Manyika, Director, McKinsey Global Institute; Senior Partner, McKinsey & Company

Kate Sofis, Founding Executive Director, SFMade

Howard Wial, Executive Director, Center for Urban Economic Development, University of Illinois-Chicago



About the Milstein Symposium

In September 2013, with support from the Howard and Abby Milstein Foundation, the Miller Center launched the **Milstein Symposium: Ideas for a New American Century**. This multi-year initiative convenes policymakers, business and industry leaders, scholars, and journalists to define and advance bipartisan, innovative—yet achievable—ideas to rebuild the American Dream. The Miller Center organizes three Milstein commissions each year.

The Challenge: Rebuilding the American Dream

The development of a broad and thriving middle class was a signature achievement of post-WWII America. However, during the 1970s the American Dream began to erode and today—coming on the heels of “the lost decade”—some alarming long-term trends have emerged. Wages have stagnated, wealth has plummeted, debt continues to mount, and the cost of key middle class items—health care, housing, and education—has risen faster than wages. More broadly, public optimism and belief in attaining a middle-class life is near an all-time low. By almost any measure, the future of the American Dream is in peril. Policymakers are only now beginning to recognize the political, economic, and social dynamics that have been evolving for decades. Unfortunately, for many the Dream has already been lost.

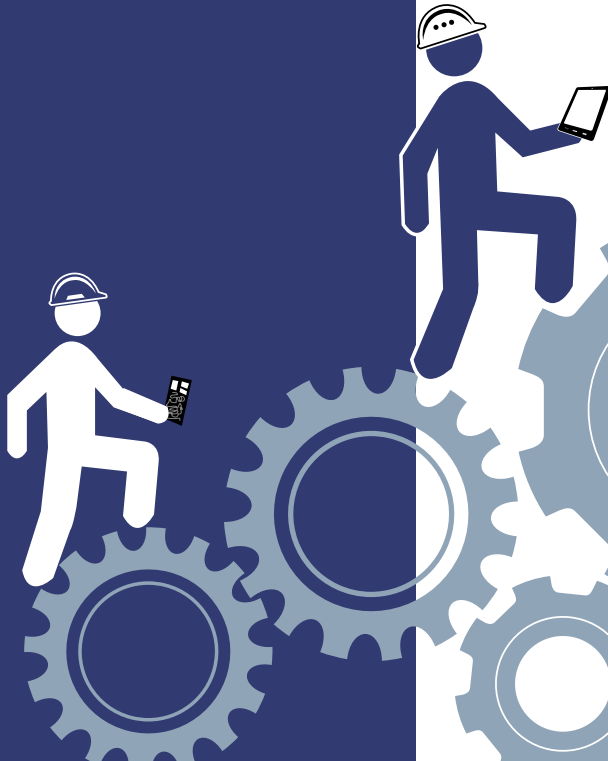
What must be done to reinvigorate the American Dream in the 21st century? That question, so vital to the future of our nation, is at the heart of the Milstein Symposium.

Milstein Symposium 2013-14—“Creating the Jobs of the Future”

The American people, more today than ever before, view employment as fundamental to a middle-class lifestyle. An August 2013 Pew poll found that 86% of Americans feel that having a secure job is essential to being in the middle class. With over 14% of Americans currently unemployed or underemployed, the Symposium’s first year is focusing on “Creating the Jobs of the Future.”

The first Milstein commission, co-chaired by Governor Haley Barbour and Senator Evan Bayh, explored how to facilitate the growth of America’s small- and medium-sized manufacturing firms. The second commission, co-chaired by Steve Case and Carly Fiorina, looks at how entrepreneurship can be used to create and sustain middle-class jobs (*projected release: September 2014*). The final commission of the 2013-14 season, co-chaired by Secretary Ray LaHood and Mayor Antonio Villaraigosa, will examine how to create middle-tier jobs and expand opportunities for middle-class Americans through infrastructure policy (*projected release: November 2014*).

Together, these three commissions will produce innovative, nonpartisan, action-oriented ideas to spur middle-class employment and help more people achieve the American Dream.



BUILDING A NATION OF MAKERS

Six Ideas to Accelerate the Innovative Capacity of America's Manufacturing SMEs



Commission Co-Chairs

Haley Barbour, Former Governor, Mississippi

Evan Bayh, Former Governor and U.S. Senator, Indiana

THE MILLER CENTER • UNIVERSITY OF VIRGINIA



About the Milstein Symposium

The Miller Center launched the **Milstein Symposium: Ideas for a New American Century** in September 2013. This multi-year initiative convenes distinguished stakeholders and eminent scholars to define and advance innovative, nonpartisan, action-oriented ideas, grounded in history, to help rebuild the American Dream. The Miller Center will organize three Milstein commissions each year. Funding for this initiative was provided by philanthropist, business and civic leader Howard P. Milstein.



BUILDING A NATION OF MAKERS

*Six Ideas to Accelerate the Innovative Capacity
of America's Manufacturing SMEs*

JUNE 2014

MILSTEIN COMMISSION ON NEW MANUFACTURING

Commission Co-Chairs

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Evan Bayh, Former Governor and U.S. Senator, Indiana



Historic Faulkner House, home to the Miller Center, University of Virginia

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The Milstein Commission on New Manufacturing
Clockwise from top left: Aaron Bagshaw, Rebecca Bagley, Kate Sofis, Jennifer Clark, Howard Wial, Bernie Carlson, Matthew Burnett, Evan Bayh, Gerald L. Baliles, and Haley Barbour

Not pictured: John Engler, James Fallows, James Manyika

Letter from Gerald L. Baliles

*Director and CEO, Miller Center, University of Virginia
Governor of Virginia (1986–1990)*



What must we do to reinvigorate the American Dream in the 21st century? That question, so vital to the future of our nation, is at the heart of the Miller Center's newest initiative—**The Milstein Symposium: Ideas for a New American Century**.

By almost any measure, the American Dream is in peril. The robust middle-class growth that defined the 1950s and 1960s began to show signs of strain in the 1970s, and the core elements of the American Dream—homeownership, secure retirement, building a better life for your children—steadily eroded in the decades that followed. In September 2013, with the generous support of Howard P. Milstein, the Miller Center launched this multi-year initiative to develop nonpartisan, innovative, action-oriented—yet achievable—ideas to rebuild the American Dream.

In this first commission, co-chaired by two distinguished statesmen, Governors Haley Barbour and Evan Bayh, we brought together 12 eminent thought leaders to examine the future of small- and medium-sized manufacturing enterprises (SMEs). Throughout our nation's history, manufacturing SMEs have been an engine of well-paying, middle-class jobs. Over the next decade, advanced technologies, major shifts in global demand, and greater emphasis on customization will fundamentally redefine manufacturing and create significant growth potential for SMEs. But for American firms to thrive, we must out-innovate the global competition.

Over several months, the commission developed six fresh ideas to expand the innovative capacity of our manufacturing SMEs: *talent investment loans* to help firms upscale their human capital; *upside-down degrees* to encourage synergies between work experience and college education; a *skills census* to collect the data needed to enhance labor force efficiency; a *national supply chain initiative* to fully map America's manufacturing supply chain ecosystems; *renewed focus on technology and engineering skills* for high-school students; and a "*big trends-small firms*" initiative to connect SMEs with the latest technologies. Individually, these ideas have the power to produce meaningful change. Together, they can propel our "nation of makers" into a new era of global leadership.

Benjamin Franklin once counseled, "Speak little, do much." Our goal is not simply to contribute to the crowded marketplace of ideas, but rather to catalyze transformational policy change. We look forward to working with you, the reader, in rebuilding the American Dream.

Letter from Howard P. Milstein

Philanthropist, Entrepreneur



We are pleased to present the first commission report of the **Milstein Symposium: Ideas for a New American Century**.

Working with the Miller Center, we developed the Milstein Symposium to find practical, nonpartisan solutions to some of the most pressing economic issues facing our nation, and especially the middle class, in areas that include manufacturing, entrepreneurship, education, and infrastructure. Though our topic areas are broad, our vision for this ambitious undertaking is laser-like in its focus: to examine the steps our nation needs to take to ensure the continued vitality of the American Dream in the 21st century.

For generations, the American Dream was typified by the notion that each succeeding generation would be better off than the last: better educated, more stable and secure, with a chance for even greater success. Our forebears, immigrants all, held the belief that if they worked hard every day and took responsibility for their future, they had a good chance of providing a better life for their families. I believe this is a unique and critical aspect of American success and one that needs to be re-energized for each new generation of Americans. With this in mind, the Milstein Symposium is tasked with finding solutions that ensure our American Dream remains a viable, achievable goal.

Our first commission, led with great talent and energy by former Governors Haley Barbour and Evan Bayh, considered the future of small- and medium-sized manufacturing enterprises (SMEs). With changes in technology, logistics, and global economic conditions, we believe the United States can experience a manufacturing renaissance—if we, as a nation, have the fortitude to make the right decisions now. We must foster small- and medium-sized businesses that will drive the growth of American manufacturing in the 21st century. In the pages of this report, our 12-member commission of experts, academics, and businesspeople present six innovative ideas that we believe can revitalize a manufacturing engine that has, for more than a century, been the foundation of American economic prosperity.

We hope that these ideas serve to stimulate private and public sector action, at both the state and federal levels. We look forward to providing more ideas—practical, nonpartisan, and implementable—in the months and years to come.

Letter from the Co-Chairs

Hons. Haley Barbour and Evan Bayh

It has been an honor and a pleasure to co-chair the inaugural commission of the **Milstein Symposium: Ideas for a New American Century**.

Our commission, while very diverse, believes the United States can have a robust manufacturing sector as a bulwark of the national economy.

Our report is aimed at identifying and emphasizing ways to strengthen the manufacturing sector, especially advanced manufacturing by small and medium-sized enterprises (SMEs).

You will notice a strong focus on human capital. Improving the quality of America's workforce is necessary if manufacturers are to have employees who have the skills to effectively deploy ever-changing technology and successfully improve productivity so companies can stay competitive in the global marketplace.

Economic growth and the creation and maintenance of more high-quality, well-paying jobs will produce not only a stronger, more robust economy but also profound social benefits.

Thus, we consider the main goal of our recommendations to be “producing quality employees for our workforce so SMEs can grow, prosper and provide more jobs, higher pay, better benefits, local and regional economic growth and a bigger, more competitive American economy: That is the social benefit, first and foremost.”

We, and the other Commission members, unanimously approve this report.



Co-Chairs Haley Barbour and Evan Bayh during the Milstein Symposium

The Honorable Haley Barbour, Co-Chair
Former Governor, Mississippi

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Executive Summary

Sixty years ago, it was an article of faith that “as GM goes, so goes the nation.” For generations, manufacturing was a bellwether for the health of the U.S. economy and the vitality of the American Dream. Sadly, since GM President Charles Wilson first popularized this axiom, U.S. manufacturing has experienced a slow and painful decline. It is no coincidence that the promise of the American Dream—where individuals are rewarded for initiative and hard work and are able to achieve homeownership, access to health care and higher education, and a secure retirement, in hopes of providing a better life for their children—has in turn become more difficult to attain. Rebuilding the American Dream will require a national effort encompassing a broad range of policy areas. But if the Dream is to be restored, that work must begin with the longtime engine of middle-class jobs: American manufacturing. That was the charge of this commission.

We focused specifically on small- and medium-sized manufacturing enterprises (SMEs)¹. According to the 2010 Census, the more than 258,000 manufacturing SMEs in America represent more than 98 percent of all manufacturing firms and employ 4.9 million workers. While overall manufacturing employment declined from 21 million in 1972 to 10 million in 2010, the share of jobs provided by SMEs has grown from 29 percent to 45 percent. Even in the rubble of the Great Recession, SMEs were one of the few sectors of the American economy to thrive. Further, approximately 90 percent of the inputs used by multinational corporations come from SMEs, providing further incentive to dedicate our national attention to supporting this vital sector.

But as National Association of Manufacturers President Jay Timmons quipped, “Today’s manufacturing is not your grandfather’s manufacturing.” Much like other industries

1. The Small Business Administration defines SMEs as firms with less than 500 employees.

that have endured disruption in recent years, the sector is being forced to develop new models to adapt to a changing landscape marked by technological breakthroughs such as 3D printing, cloud computing, and the Internet of Things; increased demand for customized, high-value products; and burgeoning global markets. To be sure, America's economic future will be driven by the ability of our "makers" to fulfill the demands of the 21st-century global economy.

Recent history has demonstrated that SMEs have the agility to capitalize on this dynamic new environment. Nonetheless, barriers still remain. Outpacing the global competition requires a highly skilled workforce, yet there exists no efficient mechanism to match supply and demand within the labor market, leading to systemic inefficiency. The pipeline of skilled workers is impeded by a K-12 culture that often stigmatizes workforce training and careers in manufacturing, which then results in a lack of collaboration between private enterprise and higher education. Undertaking a serious, comprehensive effort to change how manufacturing jobs and workforce training programs are viewed is a critical part of supporting the next generation of makers and the future growth of America's SMEs.

Even when skilled workers enter the labor market, SMEs often lack access to the capital required to invest in these workers or in the vocational training imperative to keep their workforce current. And many SMEs do not possess the know-how to institute the latest technology trends, connect with other points on the supply chain, or bring their products to market.

Addressing these barriers is a significant undertaking. The connective tissue that binds these challenges is that they all relate to our nation's innovation capacity. Innovation is an important indicator of the overall economic health of a nation and, more broadly, of competitiveness on a global scale. The nimbleness and energy often associated with smaller firms poises SMEs to be on the cutting edge of innovation, driving change in products, services, processes, and overarching business models. It is at the core of growth and value creation for individuals, organizations, and society as a whole. Thus, it is vital to the restoration of the American Dream.

We therefore propose six bipartisan, action-oriented ideas (summarized on the next page) to accelerate the pace of innovation for America's small- and medium-sized manufacturers.



Talent Investment Loans to Expand Human Capital

Government-backed talent investment loans will give SMEs the capital to hire the workers necessary to expand their businesses, as well as to up-skill these and current employees. These loans will include incentives to encourage economic and social goods, such as worker retention, attainment of certified skills, and hiring from target populations.



Upside-Down Degrees to Connect Classroom Learning with On-the-Job Learning

“Upside-down” programs allow students to transfer accredited technical training, work experience, military training, or community college coursework as credit toward a bachelor’s degree. Expansion of such programs, with emphasis on manufacturing-related fields, will reduce barriers between skills training and degree attainment, and enhance the quality of the manufacturing workforce.



A Skills Census to Build a More Efficient Skilled Labor Force

A regular survey of employers to determine current and projected skills needs – commissioned by state governments, with data freely available to the public – will allow businesses, policymakers, and educators to tailor their programs in real-time in order to forestall projected imbalances between skills and employer needs.



A National Supply Chain Initiative to Fully Map America’s Manufacturing Ecosystems

A fully-mapped manufacturing supply chain will allow businesses and policymakers to fill gaps in the existing infrastructure and keep up with rapid changes to ecosystems formed around emerging technologies. A toolkit for SMEs will allow small manufacturers to extract maximum value from participation in the supply chain.



Up-Skilling High School Students with Expanded Technology and Engineering Certification Programs

All students should have the opportunity to acquire a certified technical skill before graduating high school. Just as Advanced Placement tests offer transferrable college credit, electives in technology and engineering with optional, industry-recognized certification exams should be available to high school students to build a more skilled and responsive labor market.



A “Big Trends-Small Firms” Initiative to Diffuse the Latest Technologies to Manufacturing SMEs

Emerging technologies promise to produce major disruptions to established business models, yet SMEs often do not possess the tools to leverage these technologies. A “Big Trends-Small Firms” initiative, implemented through the Commerce Department’s Manufacturing Extension Partnership, will connect small- and medium-sized manufacturers with the latest trends.

Together, these recommendations wield transformative potential. Talent investment loans allow companies to expand their human capital. Upside-down degrees move us toward a more flexible education system with emphasis on skills in demand. Market surveys help disseminate the data required to enable stakeholders to understand their strengths and shortcomings, and act on them. A fully-mapped supply chain will reveal new growth opportunities for SMEs. Certification programs give students a greater chance to both receive and qualify for meaningful employment in the new skills-based manufacturing economy. And finally, bringing the latest technology trends back to the manufacturing base will ensure that SMEs have the tools to compete in the global economy.

In developing these ideas, we were guided by three fundamental principles:

- » First, our focus was limited to what we deemed to be *remediable problems*. While all problems are theoretically solvable, some simply have little chance of being enacted in today's political climate. For instance, comprehensive tax reform and an overhaul of the nation's energy policy were two areas identified by this commission as critical to U.S. economic and manufacturing growth. While we strongly urge policymakers to identify a way forward on both issues, we agreed that the environment is not ripe for such grand reform and was thus beyond the ambit of this body.
- » Second, the recommendations had to have a *viable path to implementation*. A wide range of perspectives and interests across the political spectrum, both within the commission and outside, had to be considered. We had to possess reasonable confidence that the ideas could marshal broad support from key stakeholder groups. In addition, it was imperative that each recommendation included identifiable catalysts to action.
- » Third, the recommendations had to *add value to the marketplace of ideas*. In the course of our work, we found that there were key areas of our commission topic where either good work was being done or sound ideas had already been proposed. For instance, we believe the future of American manufacturing will be largely determined by our success in generating a skilled workforce. Yet, the Aspen Institute has already developed an outstanding model to address this challenge with its Skills for America's Future initiative. Therefore, rather than proposing new models to supplant this work, we focused instead on where we could add value.

In the broad historical sweep of American manufacturing, we are in the midst of fulcrum years. Our manufacturing SMEs are poised to capitalize on the opportunities available in the 21st-century global economy—and with it, the ability to create stable, middle-class jobs. But they must possess the tools needed to remain at the vanguard of innovative capacity. We urge policymakers, business and industry leaders, educators, and social entrepreneurs to act on these recommendations.



IDEA #1:

Talent Investment Loans

Challenge

Having the right talent is essential to the growth and success of SMEs. Small- and medium-sized firms can grow rapidly, and existing staff often cannot keep pace with the demands of growth, thus impeding the ability to exploit opportunities for expansion. In addition, the smaller the business, the more areas of specialization each employee has to cover. It is not uncommon for one person to manage marketing, communications, and IT at the same firm, for instance. Finding quality talent that is able to provide expertise in essential business functions is critical to a firm's ability to scale up.

SME owners often know the talent they require but lack the money to invest in new workers. Funding provided by microloan programs is often insufficient to hire a full-time worker for any meaningful duration—SBA's Microloan program provides up to \$50,000 in funding, with an average loan of just \$13,000. More traditional financing can be an onerous process as well. And the current lending environment prioritizes loans for equipment and other non-human investments over new hires or income replacement. The need for loans to hire new talent is particularly acute within the manufacturing sector, where high-skilled workers are pivotal to deploy the innovations that will increase productivity and enhance firm competitiveness.

As part of the 2009 American Recovery and Reinvestment Act (ARRA), states were permitted to allocate \$1.3 billion toward subsidized employment programs to reduce unemployment and teach new skills, thereby stimulating economic growth. More than 260,000 subsidized jobs were created before funding expired in September 2010. A new mechanism, sustainable in this time of fiscal constraint and broadened to include high-skilled and high-demand talent, is needed to stimulate similar employment and firm growth.

Idea

We propose the creation of low-interest-rate “talent investment loans” (TILs). Unlike incentive programs such as the Work Opportunity Tax Credit, where the injection of capital is delayed until taxes are filed, TILs would provide capital up front. The loans would be built according to specific guidelines with the government acting as guarantor, similar to SBA loans. However, we recommend that the loan application process be streamlined to allow easier access (the two-page pre-qualification under San Francisco’s Jobs Now program is an effective model). The loans would have low, fixed interest rates. Firms could be given a one-year, interest-free grace period on loan payments so that savings can be directed toward growth activities.

While loan programs should be tailored to the needs and objectives of each participating state for maximum impact, three general guidelines are suggested. First, similar to Social Impact Bonds, the terms of the loan should become more attractive based on certain value criteria being met; for instance, employee retention, hiring from a population in need, or enabling new and existing workers to earn an industry-recognized credential. Ultimately, loans will be forgiven for companies that achieve pre-determined benchmarks as determined by participating jurisdictions, such as passing employment thresholds or increasing tax receipts. While such incentives may advance economic or social goods, the main goal is to provide greater opportunities for companies to add—and retain over the long run—high-skilled and high-demand talent.

Lessons from **History**

Investing in Skills: FDR and the National Youth Administration

In 1935, President Franklin Roosevelt initiated the National Youth Administration to enable students to continue their educational training by providing grants in exchange for “work study” and to equip non-students with skills training to help them find gainful employment. While this grant program differs from TILs, some lessons may be instructive. The program succeeded in stanching unemployment, while also developing the skills and talents of America’s next generation. By 1937, there were more than 400,000 NYA youth either employed or in job-training programs, and growing numbers received skills training in defense-related industries following the outbreak of World War II. The NYA was dissolved in 1943 due to low unemployment and reduced worker numbers following America’s entrance into World War II.

MISSISSIPPI TAKES 'STEPS' TO LOWER UNEMPLOYMENT, GROW BUSINESS

In 2010, Mississippi Governor Haley Barbour launched the Subsidized Transitional Employment Program and Services (STEPS) program using ARRA funds. Initiated to meet the needs of Mississippi businesses while also providing income and transferrable work skills to the state's long-term unemployed, the program provided a wage subsidy to employers who hired from a specific population in need. Businesses received a 100 percent wage subsidy for the first two months, which was "stepped down" to 25 percent by the sixth month. After that, employers had to pay full salaries. Priority was given to businesses with 25 employees or less, and a quarter of the placements came in the manufacturing sector. Between January and September 2010, 3,228 adults were placed into new jobs, and 47 percent of workers were retained after the subsidy ended. Participating workers also saw their average annual earnings increase by 54.7 percent in the year after STEPS compared to the year before. Over 80 percent of participating firms said STEPS had a positive effect on productivity, profits, the number of workers able to be employed, and employee satisfaction. When federal funding ended, the state used the governor's discretionary funds to continue a four-month wage subsidy program, STEPS II, from August to December 2011.

Second, a September 2013 study by the Economic Mobility Corporation examining a set of ARRA-funded employment subsidy programs found that the subsidy duration correlated with employers' likelihood of participating. And since a majority of participating companies created new positions to bring on subsidized workers, greater participation equated to more jobs. Loans for new employees should cover no less than one year of wages to minimize the use of loans to hire temporary workers and give employees time to learn transferable skills and complete certification programs, which will in turn increase the prospects for retention or applicability elsewhere.

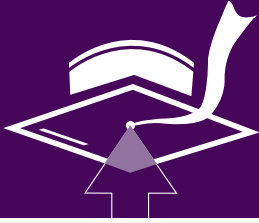
Third, since the principal goal of TILs is to increase the talent pool of the manufacturing workforce and improve human capital, loans must be structured to meet employer needs. Employers should be able to utilize these loans to attract new workers and augment the skills of current employees. Costs associated with training, test preparation, and credentialing should be allowed. Finally, policymakers must ensure that companies use TILs only to expand hiring and training rather than funding existing or planned activities.

Impact

- » **Workers** By giving SMEs access to the capital needed to bring on new talent, demand will more often meet supply. This provides a more favorable labor market for individuals seeking the income necessary to join the middle class. Expanded opportunity for certification programs will allow workers to gain important skills transferrable to better employment prospects. In addition, if TILs are combined with other existing loan and grant programs (e.g. Pell Grants—see Idea #2) to reduce the size of the needed loan, companies will have an added incentive to hire these employees.
- » **SMEs** Expansion of the current business lending model to include human capital could have a transformative effect on SME firm growth. An Economic Mobility Corporation survey of employers found that the investment in human capital generated a variety of “positive effects,” including increased productivity (79 percent), job growth (77 percent), profits (76 percent), and the ability to recruit qualified workers (68 percent).
- » **Local Economies** By reducing costs and expanding opportunities to hire new employees, TILs will increase the likelihood that a business will expand its workforce (and, thus, the ratio of income-earning people contributing to the local economy), leading to economic growth within participating jurisdictions.

Catalysts

- » **Federal Government** Federal appropriation, allocated to states to develop and execute their own programs, is recommended. The shift from subsidies to loans with performance benchmarks will reduce the needed funding and should enhance bipartisan support. Policymakers should consider the creation of a dedicated fund, similar to a state revolving fund, which would only require initial capitalization. Before allocating new funding, policymakers should review current federal job training and loan programs to determine if the necessary funding for TILs can be found within existing programs.
- » **State and Local Governments** The employment subsidy programs initiated using ARRA revenue demonstrated that the infrastructure exists to manage a TIL program at the state and local levels. If federal funding is unavailable, state and local governments will also have to find feasible ways to fund these programs, much as they did after ARRA funding ceased (see box on page 14). Consideration of funding options would be up to the governing bodies of each participating jurisdiction.



IDEA #2:

Upside-Down Degrees

Challenge

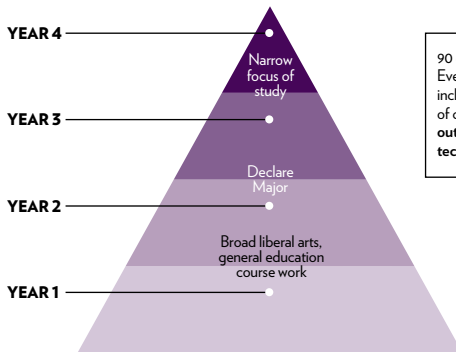
For generations, America's leading manufacturing SMEs have succeeded by combining practical production knowledge with the business acumen needed to raise capital, take goods to market, and grow organizations. Corning, Incorporated serves as such an example, founded in 1851 by glassmaker Amory Houghton and led by the Houghton family for more than 150 years. One key to that continuity was to ensure that various members of their extended family simultaneously acquired technical and managerial expertise to ensure cohesion across the firm.

Unfortunately, our current system tends to disconnect skills acquisition and higher education. If a young person wants to learn a skill—say programming, basic electronics, or welding—then he or she must learn that skill through classes at a vocational high school or community college, or via an apprenticeship program. Meanwhile, acquiring the management, finance, or marketing knowledge necessary to run a business presumably requires a four-year degree.

More troubling is that students are given little incentive to connect these two tracks. Colleges and universities frequently do not offer transfer credit for technical skills acquired either on the job, in community colleges, in the military, or through training. As a result, students must essentially start over when seeking a bachelor's degree. The time and money required to overcome that obstacle is often too large an impediment. Further, this decision is made with an ongoing stigma against the skills path as its backdrop. Consequently, young people are inherently swayed against attaining the skills necessary to pursue careers in manufacturing, not to mention that they have not received the well-rounded education required to succeed in the 21st-century industrial workplace.

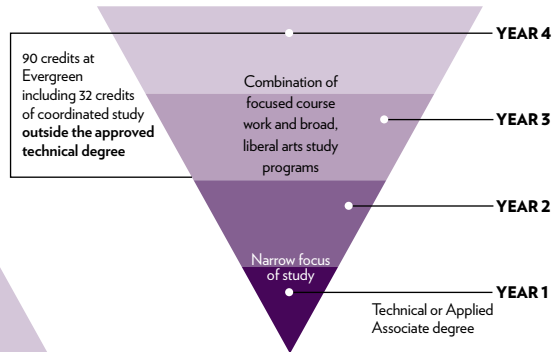
Traditional Four-Year College Curriculum Model

Bachelor of Arts = 180 quarter hours credits



Upside Down Degree at Evergreen Curriculum Model

Bachelor of Arts = 180 quarter hours credits



Source: Evergreen University Upside Down Degree Program

Idea

To overcome this disconnect, we propose an expansion of upside-down degrees. In a handful of states, educational institutions are experimenting with programs that allow varying combinations of technical training, military training, associate's degrees, or job experience to directly transfer as up to two years of college credit. Students then need only complete the remaining coursework to earn a bachelor's degree from a four-year institution. This type of program is referred to as being "upside-down" because it essentially inverts the traditional four-year college model. Undergraduates at most universities begin their studies with broad interdisciplinary subjects such as writing, mathematics, or science and then advance to more specialized courses. Upside-down students start with the focused technical training and then take the broader coursework to both expand their knowledge base and enhance their critical thinking (see diagram above).

Existing upside-down degree programs effectively facilitate the transfer of students from community colleges to public universities. Yet, they tend to focus primarily on the liberal arts. We recommend that colleges and universities expand the concept of upside-down degrees to include business and engineering programs. Should a major state university endorse the concept, it would significantly change the adoption curve and allow the integration of technical skills and business aptitude to move forward on a national scale.

EVERGREEN STATE COLLEGE STAYS AHEAD OF THE LEARNING CURVE

Evergreen State College in Olympia, Washington, is a trailblazer in the concept of upside-down degrees. Evergreen accepts transfer applications from students who possess either a two-year technical degree or an Associate in Applied Science-Transfer (AAS-T) degree. The applicant is considered eligible as long as his or her previous school holds accreditation. Two-year degrees transfer directly as two years of completed coursework toward a four-year degree from Evergreen. Applicants are also eligible to receive a full semester's worth of transfer credits for non-academic vocational or technical work completed. The program has been in place for more than thirty years and has seen steady growth, with additional degree offerings added every year.

Impact

- » **Students, Workers, and Military Personnel** The faulty premise that one must choose between becoming a technician or a college graduate is diminished. Degree seekers will have a stronger incentive to acquire technical skills. College will be more attractive for those already in the workforce or with military training who want to pursue a degree and view the upside-down path as a viable option. It will also be more affordable for those that have acquired in-demand skills and secured a high-paying job that helps cover costs. These costs would be further mitigated if Pell Grants were to become available for workforce training programs (see page 19). Concurrently, reduced classroom time translates to a diminished student debt burden, and increased program flexibility should positively impact retention rates.
- » **Employers** Companies would have access to a more dynamic and diverse talent pool. Potential employees would understand the specifics of production and also what it takes to run a business. Such versatile human capital would be of particular impact to SMEs, who rely heavily on workers who can perform a diverse set of tasks.
- » **Educational Institutions** Upside-down degree programs will allow community colleges and universities to attract more students, and thereby generate greater revenue. Further, enhanced cooperation with non-four-year institutions will improve the quality of transfer students.
- » **American Manufacturing** Upside-down degrees should aid in mitigating the stigma against manufacturing work amongst young people.

Catalysts

- » **State and Federal Government** The market alone has not generated widespread adoption of upside-down degree programs. Government has a few policy levers it can use to enact change. Financial incentives such as tax breaks or subsidies for participating institutions might be considered for both public and private universities. States must also aggressively market this idea as a viable path for both high school students and incumbent members of the workforce, and make it easier for degree-seekers to attain credits, not only when enrolled in an educational institution, but also when pursuing workforce training programs that will transfer as college credit. For instance, it is worth considering an expansion of Pell Grants to cover such training programs.
- » **Colleges and Universities** Upside-down degree programs will not reach a critical mass until larger universities with a national brand participate, especially major public university systems and leading private research universities (e.g., Carnegie-Mellon and MIT). Schools that emphasize manufacturing-related fields and possess strong ties to the private sector should take the lead in implementing pilot programs. It will also be important that schools offer night, part-time, online, and accelerated options as many prospective applicants will need to continue working while completing their degrees.

Lessons from History

The Upside-Down Education of Nikola Tesla

Although he didn't plan it that way, one of America's great inventors, Nikola Tesla (1865-1943), had a type of upside-down education. He began by studying mathematics and physics for two years at the Joanneum Polytechnic Institute in Graz, Austria. When his military scholarship was cancelled in 1878, Tesla dropped out and went to work in a machine shop. After his father died, Tesla was persuaded by his uncles to honor his father's memory and resume his studies, this time at the Karl-Ferdinand University in Prague. There, Tesla studied languages and philosophy. The result of this unusual educational journey was that Tesla could not only invent new electrical equipment but also could market his inventions by drawing on science, poetry, and business. His upside-down degree gave him the metaphors and stories he used to capture the imagination of both the public and investors.



IDEA #3: Skills Census

Challenge

A persistent problem confronting American manufacturers today is the so-called “skills gap”: employers would like to hire more workers but can’t find individuals with the desired skills. In a 2012 MIT survey of manufacturing employers, 41.4 percent responded that the most important reason for significant long-term job vacancies was that “candidates lack specific skills” for their industry; 17.8 percent of employers surveyed said that was the second most important reason. Groups within both the public and private sectors are working to address this gap. Among the more familiar themes are Common Core Standards in K-12 education; enhanced science, technology, engineering, and math (STEM) programs; skills certification initiatives; and a renewed focus on skills training at community colleges.

We laud these efforts in the main and are heartened by the mobilization of various stakeholder groups. However, expert opinion remains mixed as to the extent and composition of the skills gap. The lack of consistent and reliable data on the gap between skills in the labor pool and the current and projected needs of employers remains a significant barrier to progress. Employers misunderstand the labor market, job seekers cannot discern the skills they need, the government wastes resources on inefficient programs, and educational institutions do not offer the most relevant coursework. Each negative outcome is to the collective detriment of all parties.

This is a particular challenge for manufacturers. Industrial firms require dynamic individuals with precise skill sets. Unfortunately, firms are often left with suboptimal options as a result. Many choose to hire less qualified individuals and either expend precious resources on training, or not train them, thus functioning inefficiently. Some companies decide that potential workers are so unfit for a vacancy that the firm cannot justify hiring

anyone. The sector-wide figures speak for themselves. In a 2011 survey by Deloitte and the Manufacturing Institute, two-thirds of U.S. manufacturers said they had “moderate to severe shortages of available, qualified workers”—a figure that led to approximately 600,000 unfilled U.S. manufacturing jobs. Systemic inefficiencies on this scale put American manufacturing at a competitive disadvantage within the global economy.

Idea

We propose that state governments commission periodic surveys of manufacturing employers to determine their current and projected needs. Numerous sources of data collection might be utilized, depending on what is most effective for each state. Research could be conducted internally by the federal government, as it does with the Census, or by universities with strong survey experience. The state might also seek a public-private partnership with a polling organization. In any case, the surveys should be simple enough to justify the use of scarce time, particularly among SMEs. Findings would be available free-of-charge on a public website. Policymakers, business owners, educators, job seekers, and other stakeholders would all have input into what’s included in the survey, and equal access to its results.

One viable model for states to consider is Denmark’s “Flexicurity” program

Lessons from History

The National Employer Survey

The U.S. Census Bureau administered a broadly similar program at the federal level twice in the early 1990s. The “National Employer Survey” was conducted by the nonprofit National Center on the Educational Quality of the Workforce in 1993, with a follow-up in 1996. Officials used computer-assisted telephone interviews to question 3,000 businesses on a voluntary basis. The study focused primarily on the link between education and productivity. Data showed that just 80 percent of employers believed that they had a fully proficient labor pool. Companies were not making large investments in basic education or remedial training. And firms tended to look at education level and certification but not scores or performance. The lack of training investment proved to be costly. The data showed that productivity returns on investments in education far outstripped those made in capital stock.

DENMARK'S FLEXICURITY PROGRAM

The Danish government spends more than four percent of its gross domestic product on “job training and support”—nearly six times the U.S. figure in the corresponding area. This includes wage subsidies, unemployment support, and customized worker retraining. The latter is supported by what are known as “business trend surveys.” Danish officials utilize Gallup pollsters to survey employers every three months. Companies are asked to list their projected near-term labor needs. The government then takes the feedback and modifies training programs to avoid labor shortages. The European Union (EU) covers half of the costs, while Denmark pays the rest. The total outlay for 2012 was €335,000. It is difficult to discern the impact of the surveys relative to other elements of Denmark’s broader program to promote adaptability of employees and enterprises in the global economy, known as “Flexicurity.” However, aggregate job numbers are strong. The country’s unemployment rate of 2.8 percent is the second lowest in the OECD.

(see box above). The Danish government regularly surveys employers to uncover foreseeable employment needs. This feedback is then collated for the whole nation. The research is used to tailor training programs in a way that forestalls projected imbalances between skills and employer needs. While the Danish government has a more direct role in its training programs than exists in the U.S., such data would be useful nonetheless in responding to changing employer needs.

Other worthwhile efforts are attempting to address this challenge. For example, ACT recently produced a study that used a proprietary skills database to provide more precise labor market subheadings than the Bureau of Labor Statistics currently does. Starting in September 2013, the Alabama Department of Labor began conducting a telephone survey of manufacturers to determine the skills required of employees by industry. And JP Morgan Chase and Co. plans to produce a series of “workforce readiness gap reports” in selected major urban areas as part of its “New Skills at Work” initiative. However, we maintain that a more comprehensive and sustainable approach is imperative to meet the needs of American manufacturing writ large.

Data should be collected for entire states to ensure that a consistent and reliable information source is freely available to all stakeholders. Employers should offer input as to what they would find most useful in the surveys. Information gathered in the census should include: what workforce development training is available; what the demand is for specific skill sets; pay levels for skills, by industry; and occupation and pay for workers with

different amounts of education, training, and work experience. The skills census would be utilized as a cross-sectional study with comparative value over time.

Impact

- » **State Governments** The state would better grasp employer and regional demand. This data would help maximize the impact of tax incentives, regulations, applied programs, and relocation efforts.
- » **Educators** Educational and training institutions could better tailor their service offerings to meet current and future needs.
- » **Students and Counselors** Students and their counselors at the high school, college, and technical school levels will better understand where opportunities exist and will arise, aiding them in determining viable career paths.
- » **Unemployed Workers** Individuals out of work can use the information to identify which retraining programs will be most effective in their areas. Or, displaced workers could determine where their current skillsets are in higher demand and relocate.
- » **Private Industry** Employers will better understand the labor market using the same methods as the state government. They can alter strategic models using that data or opt to relocate to regions with a supply of human capital that better suits their needs. Employers can also collaborate with educational institutions to improve job placement rates.

Catalysts

- » **State Governments** Surveys should be initiated and managed at the state level where governments and local industry can collaborate with greater efficiency. Many states have a tradition of collecting and disseminating data in order to stimulate economic activity, and there is a vested interest in matching skills with employer needs. They are, therefore, well-positioned to catalyze action.
- » **Private Industry** To maximize the effectiveness of the skills survey, private companies will have to actively participate in the data-gathering process. Companies will also need to provide timely feedback on the precision of the research following each study and help consult as the state attempts to build a platform for the data. For instance, a partnership with a firm like LinkedIn that already has a strong reputation for providing a similar product could be beneficial in building a user-friendly website.



IDEA #4:

Mapping America's Manufacturing Supply Chain

Challenge

The recent improvement in the state of U.S. manufacturing is all the more remarkable when one considers its suboptimal supply chains. While many of America's global competitors have made considerable investments to build a more reliable and transparent supply chain system, U.S. manufacturers have essentially been left to navigate it on their own. Many large companies, such as Wal-Mart, invest heavily in supply-chain management as a source of competitive advantage. But for most manufacturers, particularly SMEs, who do not possess the resources to fully leverage the supply chain, the current system imposes high costs.

A September 2013 report by MIT's Production in the Innovation Economy initiative warned that many of our most innovative ideas—particularly those emanating from individuals and small businesses—are failing to reach the marketplace. This is not for lack of ideation or entrepreneurial spirit. Rather, many SMEs do not possess the know-how to work horizontally to locate the suppliers needed to move beyond the design stage. The potential suppliers, in turn, suffer as similar opportunities pass them by.

The inefficiency of vertical linkages between SMEs and multinational companies (MNCs) inflicts even greater costs. Nearly 90 percent of the intermediate inputs purchased by MNCs are sourced from SMEs, yet large firms often have little knowledge about current and potential suppliers. It is difficult for large firms to identify and certify a replacement if they are not integrated into the digital economy, especially those thousands of miles away. Conversely, when SMEs lose a customer in one industry, their ability to nimbly redesign and retool their product offerings for a different industry is impeded by the lack of awareness of opportunities in adjacent ecosystems. As a result, SMEs are missing out on significant business opportunities with large firms.

Current trends will only exacerbate these aggregate losses. The growth of new supply chain ecosystems driven by emerging technologies such as 3D printing, the increasing specialization of tasks and supply inputs, and the trend toward globalization add a new imperative for supply chain mapping. These ecosystems are highly fluid. They require a modern supply chain to keep up. Unfortunately, America's present infrastructure stalls growth and innovation. As global competitors rush to leverage new technology for their own domestic supply chains, building more fully mapped systems is critical to the future of America's manufacturing SMEs.

Idea

We propose a nationwide manufacturing supply chain initiative with two goals: 1) to fully map America's manufacturing supply chain ecosystems, and 2) to provide a toolkit for SMEs to extract maximum value from participation. The public sector has led some valuable efforts in this area. In July 2013, the SBA issued a request for proposals "to conduct supply chain analysis of disrupted or at-risk regional manufacturing communities." And the Defense Department is conducting an effort to fully map the supply chain of the U.S. industrial base. There also exists a variety of strong private sector and public-private partnership (PPP) models, including pay-for-access networks like Ariba, and platforms linking

Lessons from **History**

Philadelphia Takes on Lowell

While Massachusetts' "Lowell Mills" captures the popular imagination when thinking of 19th-century American textile production, Philadelphia also became a major player in this market by employing its own unique approach. Rather than trying to match Lowell's focus on bulk standard goods, companies in Philadelphia—many of whom were SMEs—concentrated on styled goods and high-value-added textiles with fragmented and variable demand, which firms in Lowell were not set up to produce. At its height, more than 20 percent of Philadelphia's labor pool worked in textiles. The model was based on a concentration of interests. Business owners found it easier to develop relationships owing to relative proximity, which led to expanded subcontracting, idea sharing, and favorable terms in securing financial capital among other benefits. Supply chain actors are less concentrated today, but proper mapping and connectivity can serve a similar function in narrowing the space between production phases.

MAKER'S ROW BUILDS 'MADE IN USA' MARKETPLACE

In 2011, while toiling at The Brooklyn Bakery, a leather accessories maker, Matthew Burnett and Tanya Menendez often struggled to find American manufacturers that could bring their designs to market. The problem was the lack of available information within their ecosystem's supply chain. To solve the problem, they developed a model for a "Made in USA" digital marketplace to connect domestic buyers and manufacturers. In 2012, they brought the concept to life with the creation of Maker's Row. In its first year, the site connected 26,000 buyers to 2,000 domestic manufacturers with its easy-to-access platform. In effect, their platform has plugged holes within a variety of manufacturing ecosystems. The company is working with makers, civic organizations, and government institutions to build digital communities grouped around both industry and geography, with the ultimate goal being an expansion of the framework to other regions across the country.

large firms with SMEs, like the National Supply Chain Network Initiative and Supplier Connection.

This concept is different: Rather than focusing primarily on certifying SMEs and linking firms within the supply chain, we have a broader goal of building a reliable and fully mapped supply chain. By taking a national view, this initiative will expose so-called "holes" and fragile points in the supplier ecosystem, which industries and innovation potential may be affected by those missing elements, and where action needs to be taken. The initiative will be ongoing, ensuring that the platform reflects the current composition of each supply chain. The platform will also include a toolkit for SMEs to fully leverage their participation in the ecosystem. Its focus on long-term SME vitality could help narrow the gap between small and large firms in productivity, input costs, process innovation, access to foreign markets, and other critical drivers of growth.

We recommend that this initiative be catalyzed at the federal level by the SBA, who would provide funding, develop norms and protocols, and build the architecture. Once this is completed, we recommend the SBA partner with private or non-profit actors to "steer" the initiative. This bottom-up approach to supply chain mapping, keyed to the rhythms of America's diverse manufacturing communities, offers the greatest prospect for success. The initiative's pilot phase would begin with mapping a small list (no more than three) of select industries and their supply chains to build the most effective framework. If successful, new regions and industries would be added.

Impact

- » **U.S. Manufacturing** This idea holds significant growth potential for SMEs, as well as the nation's broader manufacturing sector, including:
 - > **Job Creation** A March 2011 study found that when small businesses became corporate suppliers, revenues increased by 266.4 percent and job growth rose by 164 percent. In numerous cases, large firms will also be able to avoid offshoring or relocating if the smarter supply chain reveals local suppliers they did not know existed.
 - > **Accessing the Global Marketplace** In large capital goods, foreign MNCs already attracted to the U.S. market will find it easier to partner with American suppliers if they know where to find them, thereby increasing foreign investment. A stronger supply chain may also increase exporting opportunities for SMEs in foreign markets.
 - > **Community Building** Supply chain ecosystems will strengthen communities built around industries, regions, and specialties, and expand networking opportunities.
 - > **Increasing Innovation** The growth of communities also reduces the physical distance between innovation, design, supply, and production. That growth will facilitate cross-pollination across these four stages, leading to a virtuous innovation cycle.
 - > **Marketing** Participation in a mapped supply chain provides valuable awareness of buyers' needs and manufacturers' services. It enhances brand awareness for companies within that ecosystem, particularly SMEs with limited marketing budgets and well-run SMEs located in less economically vibrant regions.
- » **Policymakers** Policymakers at all levels will have more reliable and updated information about the manufacturing supply chain to inform policy development.

Catalysts

- » **Public-Private Partnership** We recommend that the SBA provide the funding and framework for this initiative to ensure that the protocols and resources offered advance the interests of America's SMEs, and that the consequences of mapping on SMEs are properly monitored. They would eventually partner with private and nonprofit actors to execute the project.
- » **State and Local Government** Facilitate growth across the platform by providing critical information on business and industry within their jurisdictions.
- » **Civic Institutions** Trade groups and other professional organizations can cooperate with the organizations conducting the mapping by providing data on manufacturing companies by geography and industry, advising on the framework of the platform, and generating broader awareness and buy-in. In addition, universities can provide original research.



IDEA #5:

High School “TE” Certifications

Challenge

Numerous high schools nationwide are failing to make classes like “shop” part of their offered curricula. For example, Los Angeles County has eliminated shop classes at 90 percent of its public schools. Other districts are following a similar path. The trend is emblematic of a longer-running shift in emphasis toward the completion of a four-year college degree. The problem, however, is that only about two-thirds of high school graduates even pursue post-secondary education. And of those, only 59 percent who enroll in four-year degree programs graduate within six years, and just 31 percent who enroll in two-year degrees receive them within three years. Thus, the more educators move to a one-size-fits-all approach, the more a significant portion of the population gets isolated.

Curriculum changes also underutilize employment projections. According to a December 2013 report from the Bureau of Labor Statistics, occupations that do not typically require postsecondary education (but need skills) are projected to add 8.8 million jobs between 2012 and 2022—more than half of all new jobs anticipated over that span. And yet fewer young people are being given the chance to acquire the skills to meet that demand.

American manufacturing, in particular, depends on employees who possess a wide range of skills not being taught in high school. For instance, the number of jobs in “computer systems design and related services” is expected to grow over 68 percent by 2020. However, according to the Hour of Code campaign, led by Code.org and supported by President Obama, nine out of ten high schools do not offer a computer programming class. Clearly, there are systemic deficiencies preventing us from meeting the skills demands of the 21st century.

A key problem is that numerous individuals still look at “shop” classes as an antiquated,

unnecessary expense. Experts concur at this point that education in science, technology, engineering, and math (STEM) is critical to the nation's future, and educators have answered the call by pushing math and science to the forefront. Yet, somehow the “T” and “E” in STEM are being overlooked. Educators are failing to connect the dots between vocational electives and their essential role in readying the nation for a future so dependent on technology- and engineering-based growth. A concerted effort must be made to enact a paradigm shift and break through the pervasive stigma that engenders these sorts of outcomes.

Idea

To reverse these trends, we propose an expansion of technology and engineering electives with optional, industry-recognized certification components. Every high school graduate—whether pursuing college, the workforce, or military service—should have the opportunity to acquire an industry-recognized skill that they can use to find work. Thus, the availability of electives in diverse areas ranging from pipe fitting to robotics should be expanded in high schools across the country. Students should then be able to convert these electives into a certification that will boost their marketability to employers.

We envision this program functioning similar to Advanced Placement (AP) courses,

Lessons from **History**

The Smith-Hughes Act of 1917

At the turn of the century, economic depression and rising competition from Europe revealed the need for more skilled labor in the United States. President Theodore Roosevelt emerged as an early advocate for technical training and began a national push for its inclusion in public education together with the American Federation of Labor, the National Association of Manufacturers, and various educators among other groups. With the support of President Woodrow Wilson nearly two decades later, these efforts resulted in passage of the Smith-Hughes Act of 1917. The Act provided federal funding to states for vocational education programs in the public school system, and thus “shop” class was born. Prior to the passage of the Smith-Hughes Act, U.S. vocational students numbered just 200,000, with a budget of under \$3 million. These figures grew to 3.4 million students and \$176 million in annual spending by the end of the 1950s.

A SHOP CLASS FOR THE 21ST CENTURY

Georgia's Dalton High School is redefining traditional notions of taking "shop." The school has outfitted its classroom with welding stations, 3-D printers, and a computer-controlled plasma cutter. Across the hall, students can participate in robotics projects. Seventy-four percent of Dalton High's students are enrolled in career or technical coursework. According to Principal Steve Bartoo, vocational training is part of a well-rounded education for today's economy—"it's not an either/or with us." The school combined these rigorous career and technical programs through a partnership with CTE. In the past decade, the school has lifted its graduation rate from 56 percent to 92 percent, doing so even as education funding in Georgia has contracted roughly 15 percent per student since 2002. Undeterred, Dalton officials supported the new CTE programs via state grants and a redirection of funding for previously offered electives deemed less impactful.

where students may take an exam that can transfer directly as postsecondary course credit. In our program, students will have the chance to demonstrate proficiency in a skill area and transfer the vocational certification to an employer rather than an educational institution. Taken on aggregate, all parties will benefit. Employers will access a stronger labor pool with reliable credentials. Individuals without postsecondary education will have expanded opportunity for quality, good-paying jobs. And the U.S. labor force will operate with greater efficiency, particularly in mid-skill positions. Managed in conjunction with the data provided in the skills census (see Idea #3), states can be agile in their programmatic offerings and ensure that the skills training provided matches the current and projected needs of employers.

Existing skills programs offer some useful lessons. The Career Technical Education Consortium (CTE) runs a skills certificate program popular in Utah, where it awarded 103,963 such certificates (though not a formal certification program) last year. Perhaps the most impactful way to certify skills would be via public-private partnerships with companies like Cisco and associations like CompTIA that are industry leaders in defining standards for employers (this would be the most costly option as well). There is also value in the "digital badge" developed by the Alliance for Excellent Education to help students track their acquired skills online. A program that includes an amalgam of best practices should be produced to ensure the most transformative impact, with the goal being to provide students with a path to the certification programs most prized by American manufacturers.

Impact

- » **Students** High school graduates looking to immediately enter the workforce would have something applicable to add to their resumes. College students could use the certificates to find part-time work while in school. College graduates would have something to augment their diplomas. Finally, if certifications became commonplace, the stigma surrounding skills-based careers would likely diminish.
- » **Manufacturers** While some may utilize these skills for positions outside the manufacturing sector, widespread adoption would greatly increase the quality and quantity of the labor pool available to manufacturing firms. And a skills certification movement could be coupled with broader efforts to promote the importance of manufacturing in American life and hence attract more young people to careers in the field.

Catalysts

- » **State Governments/Local Districts** State departments of education must take the lead with this concept, with implementation at the local level. The government can continue to work within programs such as CTE to strengthen the link between industry demand and academic programs. Governors could also become more actively involved by pursuing public-private partnerships with organizations such as Cisco and CompTIA to save money and ensure that students receive industry-standard accreditation. The state would need to seek similar partnerships with manufacturers of high-quality equipment for use in the classroom. Governors will also be instrumental in funding. Increasing portions of K-12 budgets directed toward workforce training and development would help. Another idea is to administer a cost-share plan with the federal government that includes financial incentives for participating schools and companies willing to subcontract their services. These financial measures should increase in areas of greater socioeconomic need, given that schools in lower income areas tend to need these options most, yet have the fewest resources.
- » **Federal Government** The U.S. Departments of Education and Labor can play a valuable role in broadly promoting the idea that skills are an essential part of a 21st-century education. For example, the White House could leverage a program like its “Skills for America’s Future” initiative and broaden its mission to form industry partnerships in order to increase high school certification programs. A federal imprimatur would give such programs greater clout within various industries.
- » **Trade Associations** Once implemented, other industry groups could articulate the need for skills and advocate for other forms of know-how available to high school students.



IDEA #6:

“Big Trends–Small Firms” Initiative

Challenge

In a May 2013 report, the McKinsey Global Institute identified a set of rapidly developing technology areas with the potential to “transform life, business, and the global economy.” For example, progress in the field of advanced robotics was projected to generate between \$1.7 trillion and \$4.5 trillion in economic impact by 2025. Also highlighted was the Internet of Things—placing sensors in physical objects and connecting data on these objects across a network—which is being heralded by some as the next Industrial Revolution. Many of the technologies listed will produce major disruptions to established business models, including in the manufacturing sector.

SMEs are especially vulnerable to technology-driven disruptions. Keeping current with technology—particularly cutting-edge technology—can require large capital investment and strategic commitment. SMEs are often late adopters compared to larger firms, and many are unable to overcome these barriers. As the power of technology increases, the gap between the haves and have-nots, and the attendant benefits (e.g., productivity gains, process innovation), widen. Most troubling, America’s global competitors are devoting comparably more attention to connecting SMEs with the latest technology.

Keeping American manufacturing at the forefront of innovation has been a key element of President Obama’s domestic agenda. He has proposed the creation of 45 “manufacturing innovation institutes” to generate breakthroughs in various manufacturing-related fields. The National Additive Manufacturing Innovation Institute was launched as the pilot program in August 2012, and the administration has announced the creation of three more institutes, on next generation power electronics, digital manufacturing and design, and lightweight and modern metals manufacturing.

As new advances are made by these institutes and others, diffusion of the latest trends back to the nation's SME manufacturing base will be critical. To achieve these goals, two elements are essential: a standing national effort to track the latest trends and analyze how they impact the work of manufacturing SMEs, and a vehicle to connect with SMEs and empower them with the resources in order to leverage these technologies.

Idea

We propose broadening the scope of the Commerce Department's Manufacturing Extension Partnership (MEP) to include a "Big Trends-Small Firms" initiative charged with examining the latest technology trends and delivering them back to the manufacturing SME base. For the past 25 years, MEP centers in each of the 50 states have provided SMEs with a variety of performance-enhancing services. While the program focused traditionally on facilitating lean manufacturing expertise, in recent years MEP has shifted to its Next Generation Strategy, which aims to make SMEs more competitive and innovative. We agree that this course is sound, and adding this new element on technology trends remains in line with the program's broader strategic objectives.

MEP's existing public-private model is well-positioned to implement a "Big Trends-Small Firms" project. Under our plan, the National Institute of Standards and Technology (NIST), which oversees MEP, would be responsible for tracking the latest technology

Lessons from History

The Morrill Acts of 1862 and 1890

As agriculture grew more mechanized in mid- to late-19th century America, the federal government grew concerned that not enough citizens had the requisite knowledge in science and engineering to keep up. Thus, Congress offered free federal land to states that would establish "land-grant colleges" to teach a variety of critical subjects, such as agriculture and mechanic arts. Through the indirect provision of human capital improvement, the federal government was able to assist small businesses and entrepreneurs to adapt to changing trends. The Act fundamentally altered education in two key ways. Land-grant colleges marked a shift from classical studies to more applied coursework with direct ties to work outside of the classroom. The legislation was also significant in its provision of educational support directly from the government.

INNOVATION: CANADA'S INDUSTRIAL RESEARCH ASSISTANCE PROGRAM

Those advocating a stronger role for the public sector in facilitating national innovation capacity often point to Germany's Fraunhofer Society or Taiwan's Industrial Technology Research Institute (ITRI) as the vanguard of this concept. Also on this shortlist is a program that has generated success right in America's backyard: Canada's Industrial Research Assistance Program (IRAP). For more than 60 years, IRAP has been the primary mover in expanding access to new technology trends among Canada's nearly two million SMEs. Designed to "stimulate wealth creation for Canada through technological innovation," IRAP provides "technology advice, assistance and services to SMEs to help them build their innovation capacity." Unlike the Fraunhofer and ITRI, IRAP does not conduct research, focusing more squarely instead on supporting SMEs. The success of IRAP and the importance of innovation in the 21st century global economy led the Canadian government to double the program's support in 2012, to CA\$220 million per year.

trends, including those emanating from the manufacturing innovation institutes referenced above. It would then work with state MEP centers to assist SMEs in leveraging these new technologies. NIST MEP headquarters would also look to state MEP centers, nonprofit organizations, consultancies, and international peers to discover and apply best practices.

The market for dispersing big ideas back to the manufacturing base is already strong. For decades, in the absence of a viable public model, non-profits have cropped up to advance innovation and economic development among small- and medium-sized firms. For instance, NorTech was founded in 1999 to advance economic vitality in Northeast Ohio by accelerating the pace of innovation and fostering clusters in high-tech industries. But organizations such as NorTech can only reach a small percentage of existing manufacturers, and where they do not exist most SMEs cannot afford private consulting fees. To advance these goals on a national scale, support at the federal level is imperative.

Impact

This initiative offers significant advantages for manufacturing SMEs, including:

- » **Firm Growth** It is estimated that each dollar of federal investment in MEP yields nearly \$19 in new sales growth and \$21 in new client investment.
- » **Participation in the Digital Economy** Increased technological know-how will allow

SMEs to continue to leverage new technology going forward and be more active participants in the rapidly growing digital economy, which is projected to add up to three billion more potential consumers by 2025.

- » **Flexible IT** By delivering applications and services via networks or the Internet, cloud technology (one of the leading trends) has the potential to reshape how SMEs utilize and manage their IT. Rather than investing capital in a sophisticated IT infrastructure, SMEs can opt for a pay-as-you-go model, scaling up or down as necessary. This allows them to test the value of new technology without a significant capital investment. They can also access this technology anywhere through mobile technology.
- » **Efficient Workforce** Technology allows companies to build a more efficient and productive employee base. Social networks enable companies to access a much larger talent pool. With online meeting tools, companies can hire workers who would be unable to work in the office, and can work remotely and tap into part-time and contract work more easily as business demands rise and fall.
- » **Operational Improvement** The list of operational improvements enabled by technology is seemingly endless. By accessing part-time or off-site workers to fill certain administrative tasks, higher-paid workers will be able to focus on the most high-value tasks. Sensor technology will enhance productivity from those monitoring equipment, inventory, and product flows. Financial transactions will be streamlined. Mobile internet applications will aid knowledge workers at all levels—from those monitoring the supply chain to those in marketing, sales, and customer service capacities. If harnessed properly, technology can yield significant savings for SMEs via operational improvements.

Catalysts

- » **Government** The role of NIST MEP headquarters in driving this initiative has been outlined above. Proper funding will be crucial to its long-term success. In 2013, the federal government contributed roughly one-third of MEP's approximately \$300 million budget. Additional funds for MEP centers come through state governments, client fees, and philanthropic organizations, with a federal match of one dollar for every two dollars raised by each center. To avoid the ebbs and flows of these revenue streams, we recommend revising the match formula to ensure sufficient and sustainable funding.
- » **MEP Centers and Nonprofits** Existing MEP centers and nonprofits devoted to fostering connections between businesses, research institutions, and government will ultimately provide the implementation capacity to power this initiative.
- » **SMEs** In FY2013, MEP served more than 30,000 SMEs nationwide. We anticipate continued buy-in to services provided by MEP centers under the Big Trends-Small Firms banner.

Commission Members

Co-Chairs

» Evan Bayh

Partner, McGuire Woods; Former U.S. Senator (D-IN) and Governor of Indiana

Evan Bayh is a partner at McGuire Woods and a senior advisor at Apollo Management in New York. He served two terms as the governor of Indiana from 1989 to 1997 and two terms in the U.S. Senate (D-IN) from 1999 to 2011. While in Congress, Bayh was a member of several committees, including Armed Services; Banking, Housing and Urban Affairs; Energy and Natural Resources; Small Business and Entrepreneurship; Aging; and Senate Intelligence.



» Haley Barbour

Founding Partner, BGR Group; Former Governor of Mississippi; Former RNC Chairman

Haley Barbour is a founding partner of government affairs firm BGR Group. Barbour returned to BGR after serving two consecutive terms as governor of Mississippi from 2004 to 2012. During his tenure as governor, he attracted numerous large economic projects in the energy, aerospace, and automotive fields to Mississippi, and per capita income in the state rose by 34 percent. While governor, Barbour served concurrently as the chairman of the Republican Governors Association from 1993 to 1997.



Lead Scholar

» W. Bernard Carlson

Chair of the Department of Engineering and Society; Professor of Science, Technology, and Society; Professor of History, University of Virginia

W. Bernard Carlson chairs the Department of Engineering and Society at the University of Virginia. He is also professor of science, technology, and society and professor of history at U.Va., and his specialties include the history of technology, American business history, and entrepreneurship. Carlson is the author of *Tesla: Inventor of the Electrical Age* (Princeton University Press, 2013), and he is editing *The Handbook of the History of Technology* for Oxford University Press.



Commissioners

» Rebecca Bagley

President and Chief Executive Officer, NorTech

Rebecca Bagley is president and chief executive officer of NorTech, a technology-based economic development organization focusing on Northeast Ohio. She joined NorTech from the Pennsylvania Department of Community and Economic Development (DCED). At DCED, she served as director of venture investment and deputy secretary for the technology investment office, with responsibility for the administration of several major state initiatives and investments. Bagley writes about regional economic development as a contributing writer for Forbes.com.



» Aaron Bagshaw

President, WH Bagshaw Co.

Aaron Bagshaw is the president of WH Bagshaw Co. Formed in 1870, the family-owned company, based in Nashua, New Hampshire, is the oldest pin manufacturer in the United States. It has evolved its manufacturing to perform computer numerical control machining for the medical, aerospace, defense, and high-tech industries. Bagshaw has testified before the House Small Business Committee on the contributions of small manufacturers to the American economy.



>> Matthew Burnett

Founder, Maker's Row

Matthew Burnett is the founder of Maker's Row, a company endeavoring to simplify the manufacturing process by connecting designers to domestic manufacturers. The site presently links apparel and accessories manufacturers but plans to expand further this year. Burnett previously served as a designer and manufacturer of a line of watches called Steel Cake and for a leather goods and accessories company named The Brooklyn Bakery. Those experiences served as the impetus for developing Maker's Row as a resource for new designers.

**>> Jennifer Clark**

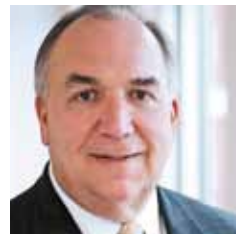
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Jennifer Clark is an associate professor at the School of Public Policy and director of the Center for Urban Innovation in the Ivan Allen College at the Georgia Institute of Technology, where she specializes in regional economic development, manufacturing, industry clusters, and innovation. Her book, *Working Regions: Reconnecting Innovation and Production in the Knowledge Economy*, examines U.S. policy models attempting to link innovation and manufacturing, and she also co-edits *The Handbook of Manufacturing Industries in the World Economy*.

**>> John Engler**

President, Business Roundtable; Former Governor of Michigan

John Engler is president of the Business Roundtable (BRT), an association of member-CEOs from global companies boasting close to 16 million workers and more than \$7 trillion in annual revenues. He joined BRT after serving as president and CEO of the National Association of Manufacturers from 2004 to 2010. Engler also served as the governor of Michigan from 1991 to 2003 and chairman of the National Governors Association from 2001 to 2002.



>> James Fallows

National Correspondent, The Atlantic

James Fallows is a national correspondent for *The Atlantic*. He has worked for the magazine for nearly 30 years, and in that time, has also served as chief White House speechwriter for Jimmy Carter, editor of *U.S. News & World Report*, program designer at Microsoft, and founding chairman of the New America Foundation. Fallows was awarded the National Magazine Award, the American Book Award for nonfiction, and an Emmy for the documentary series “Doing Business in China”. His latest book is entitled *China Airborne*.

**>> James Manyika**

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James Manyika is a director of McKinsey & Company’s Global Institute, the firm’s business and economics research think tank. He is also the director of the Global High Tech, Media, and Telecom Practice. President Obama appointed him as a member on his Global Development Council in 2013, and he was appointed to the national Innovation Advisory Board in 2011. Manyika is a non-resident senior fellow at the Brookings Institution and a member of the Council on Foreign Relations.

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Kate Sofis is founding executive director of SFMade, a nonprofit corporation working to bolster San Francisco’s economic base through local manufacturing. She also co-founded the Urban Manufacturing Alliance, a collaborative of public and private stakeholder groups devoted to growing urban manufacturing. Sofis has held diverse entrepreneurial, business management, and operations roles, previously serving as the COO of a local artisan manufacturer; the founder of a small supply-chain management company; and leader of a World Bank-funded business development project for Algeria.



» **Howard Wial**

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Howard Wial is executive director of the Center for Urban Economic Development (CUED) and an associate research professor in CUED and the Department of Urban Planning and Policy. He is also a non-resident senior fellow at the Brookings Institution. Wial has held previous posts as a research director at Keystone Research Center and the Working for America Institute and as an economist at the U.S. Department of Labor's Office of Technology Assessment and General Accounting Office.



Sources

OVERVIEW & RECOMMENDATIONS

“Achieving the American Dream: An Evolving Challenge,” Currier, Erin. www.pewtrusts.com.

“As GM Goes, So Goes... *The Nation*,” Dispatch, Tom. www.thenation.com/blog/gm-goes-so-goes

“Germany’s Mighty Mittelstand,” Mann, Juliet.

<http://edition.cnn.com/2012/05/24/business/german-economy-mittelstand/>

“Manufacturing Extension Partnership,” accessed February 26, 2014. www.nist.gov/mep/.

“Disruptive Technologies: Advances that Will Transform Life, Business, and the Global Economy,” Manyika, James et. al. www.mckinsey.com.

“Translating Innovation into U.S. Growth: An Advanced-Industries Perspective,” Manyika, James, Pachthod, Daniel, and Park, Michael. www.mckinsey.com/insights/business_technology/disruptive_technologies

“National Network for Manufacturing Innovation (NNMI),” accessed February 26, 2014.

<http://manufacturing.gov/nnmi.html>.

“National innovative capacity,” Porter, M. E., & Stern, S. *The Global Competitiveness Report*, 102-118.

“The Secrets of Germany’s Success.” *Foreign Affairs*. June 16, 2011. Accessed April 24, 2014.

www.foreignaffairs.com/articles/67899/steven-rattner/the-secrets-of-germanys-success.

“Skills for America’s Future Initiative,” accessed February 26, 2014.

www.aspeninstitute.org/policy-work/economic-opportunities/skills-for-america-s-future.

“Statistics of U.S. Businesses.” accessed February 27, 2014. www.census.gov/econ/sub/.

“Survey Reveals Small Businesses Struggling to Keep Up With Web Developments,” accessed February 27, 2014.

<http://online.wsj.com/article/PR-CO-20130423-915099.html>.

“The Competitiveness and Innovation Capacity of the United States,” accessed February 26, 2014.

www.commerce.gov/sites/default/files/documents/2012/january/competes_010511_0.pdf.

“Jay Timmons: A Growth Agenda that Puts Manufacturing Front and Center,” Timmons, Jay.

www.ideaslaboratory.com.

“Jay Timmons: Expand Opportunity and Strengthening Manufacturing,” Timmons, Jay. www.ideaslaboratory.com.

“Washington Post-Miller Center Poll,” accessed February 26, 2014.
<http://apps.washingtonpost.com/g/page/politics/washington-post-miller-center-poll-september-6-12-2013/489/>.

“What are the Major Reasons for Small Business Failure,” accessed February 26, 2014.
www.sba.gov/content/what-are-major-reasons-small-business-failure.

“What is SBA’s Definition of a Small Business Concern?” accessed February 26, 2014.
www.sba.gov/content/what-sbas-definition-small-business-concern.

IDEA #1: TALENT INVESTMENT LOANS

“Stimulus Jobs on State’s Bill in Mississippi,” Cooper, Michael.
www.nytimes.com/2010/02/17/business/economy/17mississippi.html?_r=0

“Stimulating Opportunity: An Evaluation of ARRA-Funded Subsidized Employment Programs,” Elliot, Mark, and Roder, Anne. www.economicmobilitycorp.org.

“Jobs Now! Wage Subsidy Program,” accessed February 26, 2014. www.sfhsa.org/1537.htm.

“Mississippi’s Jobs Program: A New National Model?” Lohr, Kathy.
www.npr.org/2011/10/04/141046490/mississippi-jobs-program-a-new-national-model.

“More About the WPA,” accessed February 26, 2014. www.indiana.edu/~liblilly/wpa/wpa_info.html.

“Ninth Report to Congress,” accessed February 26, 2014.
www.acf.hhs.gov/programs/ofa/resource/ninth-report-to-congress.

“Extending the TANF Emergency Fund Would Create and Preserve Jobs Quickly and Efficiently,” Pavetti, LaDonna, and Schott, Liz. www.cbpp.org.

“The Talent Imperative: The Essential – And Overlooked – Ingredient for Corporate Growth,” Rogers, Bruce.
www.forbes.com/forbesinsights/bmoharris_talent_imperative/.

“SBA Loan Programs,” accessed February 26, 2014. www.sba.gov/loanprograms.

“Social Impact Bonds,” accessed February 26, 2014. www.americanprogress.org/series/social-impact-bonds/view/.

“State’s Stimulus-Funded Jobs Program ‘STEPS’ Returns,” accessed February 26, 2014.
<http://msbusiness.com/blog/2011/08/23/states-stimulus-funded-jobs-program-steps-returns/>.

“Saving a ‘Lost Generation’ Through the National Youth Administration,” Woolner, David.
www.nextnewdeal.net/saving-%E2%80%9Clost-generation%E2%80%9D-through-national-youth-administration

“Work Opportunity Tax Credit,” accessed February 26, 2014. www.doleta.gov/business/incentives/optax/.

IDEA #2: UPSIDE-DOWN DEGREES

W. B. Carlson, *Tesla: Inventor of the Electrical Age*. Princeton, NJ: Princeton University Press, 2013.

“Help Wanted: Projections of jobs and education requirements through 2018,” Carnevale, A.P., Smith, N., and Strohl, J. www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/FullReport.pdf.

Davis Dyer and Daniel Gross. *The Generations of Corning: The Life and Times of a Global Corporation*. Oxford: Oxford UP, 2001.

“Federal Pell Grant Program,” accessed February 26, 2014. www2.ed.gov/programs/fpg/index.html.

“Registered Apprenticeship: Earn, Learn, Succeed,” accessed February 26, 2014. www.doleta.gov/oa/.

“The Upside Down Degree,” accessed February 26, 2014.
www.wvu.edu/fairhaven/academics/degrees/upside-down.shtml.

“Upside Down Degree Program,” accessed February 26, 2014.
<http://evergreen.edu/admissions/requirements/upsidedown>.

“U.S. Manufacturing Sees Shortage of Skilled Workers,” Whoriskey, Peter. www.washingtonpost.com/business/economy/us-manufacturing-sees-shortage-of-skilled-factory-workers/2012/02/17/gIQAo0MLOR_story.html

IDEA #3: SKILLS CENSUS

“A Better Measure of Skills Gaps,” accessed February 26, 2014.
www.act.org/research/policymakers/pdf/abettermeasure.pdf.

“JP Morgan Plans to Unveil a New Program for Job Skills,” Abrams, Rachel.
<http://dealbook.nytimes.com/2013/12/11/jpmorgan-chase-to-spend-250-million-on-jobs-initiative/>

“ADOL to Conduct Skills Survey to Determine Training Needs,” accessed February 26, 2014.
www2.dir.state.al.us/skills_Survey_Release_9-20-13.pdf.

“Agency History,” accessed February 25, 2014. www.census.gov/history/www/census_then_now/.

“First Findings from the EQW National Employer Survey. EQW Results,” accessed April 24, 2014. www.eric.ed.gov/.

“Flexicurity,” accessed February 26, 2014. <http://denmark.dk/en/society/welfare/flexicurity/>.

“Manufacturing Opportunity,” Giffi, Craig A. <http://dupress.com/articles/manufacturing-opportunity/>

“President Obama Wants America to Be Like Germany – What Does That Really Mean?” Hill, Steven. www.theatlantic.com/business/archive/2013/02/president-obama-wants-america-to-be-like-germany-what-does-that-really-mean/273318/

“Job Openings and Labor Turnover,” accessed February 26, 2014. www.bls.gov/news.release/pdf/jolts.pdf.

“The Copenhagen Consensus.” Foreign Affairs. March 1, 2008. Accessed April 24, 2014.
www.foreignaffairs.com/articles/63223/robert-kuttner/the-copenhagen-consensus.

“National Employer Survey,” accessed February 26, 2014. www.census.gov/econ/overview/mu2400.html.

“New Skills at Work,” accessed February 26, 2014.
www.jpmorganchase.com/corporate/Corporate-Responsibility/new-skills-at-work.html.

Paul Osterman and Andrew Weaver, *Skills and Skills Gaps in Manufacturing*. Cambridge: MIT Press, 2014.

“Stubborn Skills Gap in America’s Workforce,” Porter, Eduardo.
www.nytimes.com/2013/10/09/business/economy/stubborn-skills-gap-in-americas-work-force.html

“Taking Action on Education and Workforce Preparedness,” accessed February 26, 2014. http://businessroundtable.org/sites/default/files/legacy/uploads/studies-reports/downloads/BRT_TakingActionEW_V903_10_04_13.pdf.

“The Other Shoe: Education’s Contribution to the Productivity of Establishments,” accessed February 26, 2014.
www.thelearningalliance.info/Docs/Jun2003/DOC-2003Jun25.1056542378.pdf.

“For the Danish, A Job Loss Can Be a Learning Experience.” Walker, Marcus. <http://online.wsj.com/news/articles/SB114290848917403735>

IDEA #4: MAPPING AMERICA'S SUPPLY CHAIN

"SME's Participation in Global Production Chains," Bayhaqi, Akhmad, and Yuhua, Zhang.
www10.iadb.org/intal/intalcdi/PE/2013/11674.pdf

"Growth and Competitiveness in the United States: The Roles of its Multinational Companies," Cummings, Jonathan et. al. www.mckinsey.com/insights/americas/growth_and_competitiveness_in_us

"Achieving an Innovation Nation," Dizikes, Peter. <http://newsoffice.mit.edu/2013/mit-pie-conference-0924>.

"IMF Multi-Country Report: German-Central European Supply Chain Cluster Report," accessed February 24, 2014. www.imf.org/external/pubs/ft/scr/2013/cr13263.pdf.

"Maker's Row – Factory Sourcing Made Easy," accessed February 24, 2014. <http://makersrow.com/>.

"Strengthening America's Small Business Supply Chain," Mills, Karen.
www.sba.gov/community/blogs/strengthening-america%E2%80%99s-small-business-supply-chain

"National Supply Chain Network Initiative (NSNI) Launched at the Clinton Global Initiative," accessed February 24, 2014. www.prweb.com/releases/2013/8/prweb11041734.htm.

Phillip Scranton, *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800-1885*. Cambridge, MA: Cambridge University Press, 1983.

"Supplier Connection: Welcome," accessed February 24, 2014.
<https://www.supplier-connection.net/SupplierConnection/index.html>.

"The Ariba Network," accessed February 24, 2014. www.ariba.com/community/the-ariba-network.

"Wal-Mart Used Technology to Become Supply Chain Leader," Traub, Todd.
www.arkansasbusiness.com/article/85508/wal-mart-used-technology-to-become-supply-chain-leader?page=all

IDEA #5: HIGH SCHOOL "TE" CERTIFICATIONS

"Anybody Can Learn," accessed February 24, 2014. <http://code.org/>.

"AP Courses and Exams for Students," accessed February 24, 2014. <https://apstudent.collegeboard.org/home>.

"The Death of Shop Class and America's Skilled Workforce," Brown, Tara.
www.forbes.com/sites/tarabrown/2012/05/30/the-death-of-shop-class-and-americas-high-skilled-workforce/

"Career and Technical Education Skill Certificate Program," accessed February 24, 2014.
www.schools.utah.gov/ate/skills/Documents/ProgramBrief.pdf.

"College Enrollment and Work Activity of 2012 High School Graduates," accessed February 24, 2014.
www.bls.gov/news.release/hsgec.nr0.html.

"Shop Class as Soulcraft," Crawford, Matthew B. <http://thenewatlantis.com>.

"Careers in the Growing Field of Information Technology Services," Csorny, Lauren.
www.bls.gov/opub/btn/volume-2/careers-in-growing-field-of-information-technology-services.htm.

"Employment Projections: 2012-2022 Summary," accessed February 24, 2014.
<http://bls.gov/news.release/ecopro.nr0.htm>.

"Expanding Education and Workforce Opportunities through Digital Badges," accessed February 24, 2014.
<http://all4ed.org/reports-factsheets/expanding-education-and-workforce-opportunities-through-digital-badges/>.

“Longview School District Puts the Brakes on Auto Shop Classes,” Garrison, Greg. http://tdn.com/news/local/longview-school-district-puts-the-brakes-on-auto-shop-classes/article_4faf8d0a-6fa4-11e0-b3cb-001cc4c002e0.html

“Get IT Certified,” accessed February 24, 2014. <http://certification.comptia.org/>

“Graduation Rates,” accessed February 24, 2014. <http://nces.ed.gov/fastfacts/display.asp?id=40>.

“Industry Employment and Output Projections to 2020,” Henderson, Richard. www.bls.gov/emp/ep_data_industry_out_and_emp.htm

“High School Skill Certificates and the 21st Century Workforce,” accessed February 24, 2014. www.dol.state.ga.us/spotlight/sp_high_school_skill_cert.htm.

“IT Certifications and Career Paths,” accessed February 24, 2014. www.cisco.com/web/learning/certifications/index.html.

“Smith-Hughes Act of 1917 (PL 347),” Patterson, S. www.jschell.myweb.uga.edu.

“President Obama to Announce Launch of Skills for America’s Future,” accessed February 24, 2014. www.whitehouse.gov/the-press-office/2010/10/04/president-obama-announce-launch-skills-america-s-future.

“The Future of Shop Class,” Quinton, Sophie. www.theatlantic.com/education/archive/2013/12/the-future-of-shop-class/282389/.

“Skills Certificate Program,” accessed February 24, 2014. www.schools.utah.gov/ate/skills/skills.html.

IDEA #6: “BIG TRENDS-SMALL FIRMS” INITIATIVE

“21st Century Manufacturing: The Role of the Manufacturing Extension Partnership Program,” accessed February 24, 2014. www.nap.edu/catalog.php?record_id=18448.

“A Brief History of the U.S. Federal Government and Innovation (1787-1917),” accessed March 7, 2014. www.todaysengineer.org/2011/Jun/history.asp.

Jennifer Clark, *Working Regions*. Seaford: Regional Studies Association, 2008.

“Giving Small Firms the Business,” Foggin, Mark. <http://nycfuture.org/research/publications/giving-small-firms-the-business>

“Why Does Manufacturing Matter? Which Manufacturing Matters? A Policy Framework,” Helper, Susan, Krueger, Timothy, and Wial, Howard. www.brookings.edu/~media/research/files/papers/2012/2/22%20manufacturing%20helper%20krueger%20wial/0222_manufacturing_helper_krueger_wial.pdf

“National Additive Manufacturing Innovation Institute Announced,” Huergo, Jennifer. www.nist.gov/director/pilot-082112.cfm

“History,” accessed February 24, 2014. www.sba.gov/about-sba/what_we_do/history.

“Industrial Research Assistance Program,” accessed February 24, 2014. www.nrc-nrc.gc.ca/eng/irap/index.html.

“The Morrill Act of 1862,” Lightcap, Brad. www3.nd.edu/~rbarger/www7/morrill.html

“The Internet of Things and the Future of Manufacturing,” Loffler, Markus and Tschiesner, Andreas. www.mckinsey.com/insights/business_technology/the_internet_of_things_and_the_future_of_manufacturing

“Help Wanted: The Future of Work in Advanced Economies,” Manyika, James et al. www.mckinsey.com/insights/employment_and_growth/future_of_work_in_advanced_economies

"Disruptive Technologies: Advances that Will Transform Life, Business, and the Global Economy," Manyika, James et. al. www.mckinsey.com/insights/business_technology/disruptive_technologies

"President Obama Announces New Public-Private Manufacturing Innovation Institute," www.whitehouse.gov/the-press-office/2014/01/15/president-obama-announces-new-public-private-manufacturing-innovation-in.

"Whom We Serve," accessed February 24, 2014. www.nortech.org/what-we-do/whom-we-serve.

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