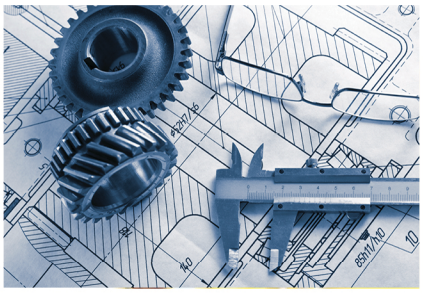
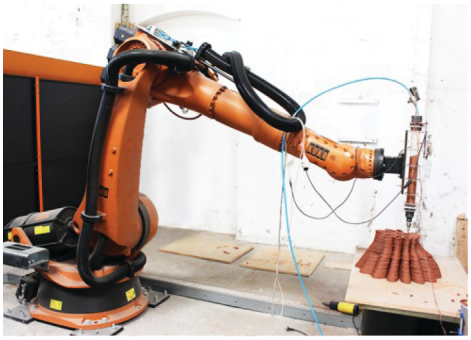
Strengthening Regional Relationships to Support Manufacturing:

10 Successful Initiatives







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Executive Summary

This report examines ten ongoing regional initiatives that support manufacturers. Drawing on a diverse group of individual case studies, the report identifies the key partners and their roles, the resources they accessed, the impact of the effort, and the prospects for the future. In particular, the case studies often note the many roles that the National Institute for Standards and Technology's Manufacturing Extension Partnership (NIST MEP) centers are playing in the success of these efforts.

The report is intended to stimulate thinking among economic development leaders about what they can do to support their own region's manufacturing sector. Interest in manufacturing has grown since the recession of 2007-2009, and the sector has played an outsized role in the resurgence of the U.S. economy. The manufacturing sector accounts for one out of every eight dollars generated in the United States. The manufacturers that survived the recession emerged stronger, leaner, more competitive, and more innovative.

For the most part, America's manufacturers are no longer positioned to hire large numbers of low-skilled workers. Rather, the most advanced manufacturers provide jobs in high-tech occupations that generate significant output for the U.S. economy. As a result of this shift, manufacturers pay higher-than-average wages and remain one of the economy's most important sources of research and development (R&D) and innovation.

Given the sector's outsized role, manufacturing trends can significantly influence a region's economic trajectory. Many economic development practitioners are working to strengthen their region's manufacturing ecosystem—a shorthand way of referring to the environment in which individual companies operate. In today's fast-changing global marketplace, manufacturers benefit from a resource-rich environment that encourages the formation of peer networks, makes available specialized expertise to companies in developing new products and making manufacturing processes more efficient, while encouraging the continuous training of a skilled labor force.

Regional partnerships are emerging to improve the manufacturing ecosystem in places large and small, urban and rural. Some are spurred by federal and state investments; others are developed from the ground up, through activities of local organizations. A great strength of these often informal collaborations is that stakeholders function independently and are able to act quickly and flexibly.

An era of scarce resources brings pressures that make regional collaboration more important than ever. Elected leaders may seek innovative solutions, and these often necessitate breaking down institutional silos to pool and share resources. Economic development organizations may be driven to think creatively about how to leverage their most valuable assets for the most economic benefit. Service organizations may need to focus on their core competencies, relying on their allies within the region to fill the gaps. A region's ability to leverage the resources, networks, expertise, and energy of a coalition of partners will ultimately determine the success of a manufacturing support initiative.

Regional initiatives involve many different partners, but NIST MEP centers often play especially important roles. MEP staff has a thorough understanding about manufacturer needs at the workplace level. Their networks and expertise create an ability to generate significant economic impact with limited resources. As several of the case studies in this report illustrate, MEP centers may not always lead regional manufacturing initiatives, but they always serve as a critical resource.

We selected case studies that speak to a variety of issues, and these individual cases represent a diversity of challenges, partnerships, regional contexts, and goals. After taking these factors into consideration, we selected the following ten regional initiatives for analysis:

- **San Francisco:** SFMade's support for San Francisco's urban manufacturers.
- **Chicago Region:** The Illinois Manufacturing Excellence Center's (IMEC) efforts to connect manufacturers to resources throughout the Chicago region.
- **Kansas City Region:** Kansas City, Kansas, pilot energy efficiency program.
- **Southwestern Pennsylvania Region**: Southwest Pennsylvania's "New App for Making it in America" initiative.
- **New York:** FuzeHub: Making connections for manufacturers in New York State's regions
- **South Texas Region:** South Texas' North American Advanced Manufacturing Research and Education Initiative (NAAMREI).
- **East Tennessee Region:** The Advanced Manufacturing and Prototyping Center of East Tennessee (AMP!).
- **New Mexico:** The New Mexico's Small Business Assistance Program (NMSBA).
- **Northwest Wisconsin Region:** Northwest Wisconsin's ExporTech initiative.
- **Southwest Virginia Region:** Southwest Virginia Manufacturing Technology Center's E3 (Economy-Energy-Environment) initiative.

Common Themes and Trends

The case studies presented in this report are intended to stimulate thinking about how regional partnerships can support manufacturing. The case studies touch on several common themes about the different key issues and how this affects the initiative's partners. They also speak to the various roles that MEP centers may play in different regional initiatives. In addition, the case studies offer examples of how regions have started their manufacturing initiatives, attracted resources, and sustained those efforts over time.

The report details the following common themes and trends.

One size does not fit all

The case studies show that there is no one way to support regional manufacturers. Ultimately, these initiatives are context dependent. Their structure and outcomes reflect the different challenges that regions face, the partners' motivation and capacity, and the region's available resources and assets.

Initiatives of different scale and scope come with their own advantages and challenges. For example, broad-based efforts can address many different concerns, but they may create more implementation challenges, requiring more resources and greater coordination from a broader coalition of participants. By contrast, more narrowly conceived initiatives can focus regional energy on only a few specific manufacturing issues, limiting the initiative's overall impact. Regional actors must think through the various issues that present themselves, understand the crux of an issue, and then craft realistic strategies that take into account the interests and capabilities of available partners and resources.

Partnerships are issue dependent

The focus of a regional manufacturing initiative dictates the composition of the partnerships required to move them forward. A coalition of the willing is necessary to advance manufacturing support efforts, but it alone is not sufficient. Rather, initiative leaders must engage the *right* partners—not just willing partners. Partners play different and, sometimes multiple, roles; successful initiatives blend the right expertise, networks, resources, and constituencies. The case studies present a range of different partnerships, while the composition of these partnerships reflects the driving regional issues and challenges. Different partners play important parts in regional strategies. Their exact roles will differ according to each organization's capabilities and the personalities of the people involved.

MEP centers play different roles, but are always a resource

Regional initiatives require multiple partners to play a variety of roles—leaders, experts, facilitators, investors and advocates. The case studies demonstrate how MEP centers can fit into a variety of roles. In many focused manufacturing initiatives, MEP centers can provide leadership by organizing activities, securing funding, and recruiting partners. Frequently, however, MEP centers may not be the designated lead, even when they are fulfilling important roles in the effort.

The roles that MEP centers most commonly play are those of experts and facilitators. The ability of MEP centers to solve specific problems for individual firms makes them a tremendous source of expertise. MEP centers are also highly adept at filling the connector and facilitator role. The centers have extensive knowledge of the service-provider landscape and are able to match manufacturer needs with appropriate providers. These capacities enable MEP to effectively bridge these different communities. MEP centers can also be important investors in initiatives, by providing resources that help leverage the capacity and networks of other service providers through formal partnerships.

Successful efforts find ways to build and maintain momentum

Manufacturing initiatives can gain early momentum by completing smaller tasks or so-called "low hanging fruit." These smaller projects often involve easy, short-term activities or pilot projects. They do not require significant resources and can help demonstrate proof-of-concept, generate additional interest among current and potential partners, and lead to larger next steps.

By demonstrating success with these smaller efforts, regions may position themselves for bigger opportunities. Avoiding early mistakes is also important to maintain momentum. Partners should learn

from the experiences of other stakeholders both inside and outside of the region, and avoid designing redundant or duplicative regional initiatives.

Resources are important, but a lack of resources should not prevent action

Funding typically dictates the initiative's scale and scope, and it is an important consideration. However, a lack of funding should not prohibit action. Regions can launch many initiatives, such as establishing a regional referral network, that require little or no money. Similarly, smaller pilot projects can help spur interest or demonstrate proof-of-concept. Even if pilot efforts have limited impact, they may lay the foundation for more expansive future efforts. Throughout, we find that successful regions engage in an active, ongoing, and comprehensive pursuit of funding that looks beyond just federal and state sources. Through an ongoing effort, partners can find the right project funding, not just the first funding opportunity that arises.

Sustainability must be a forethought, not an afterthought

Many of the manufacturing initiatives described in this report address major, long-term challenges. Responding to these challenges requires sustained attention and commitment. Too often, regional initiatives quickly lose momentum after the expiration of an initial grant. Successful regional initiatives make longer-term sustainability part of the initial design. This report features several case studies where key stakeholders have taken steps to ensure that they are relevant and responsive over time. These steps in include regular stakeholder meetings, dedicating staff to the effort, and working to continually onboard new partners. They also take care to scale their effort in a way that allows them to deliver on their stated objectives without overextending their partners.

Introduction

This report—written on behalf of the National Institute for Standards and Technology's Hollings Manufacturing Extension Partnership (NIST MEP)—demonstrates how strong sub-state regional collaborations can support and grow manufacturing. The report examines ten ongoing regional manufacturing initiatives from around the country. These case studies cover diverse parts of the country, operate over areas large and small, and are located in urban and rural settings. Some are recent efforts, while others are more established.

This report serves several purposes. The case studies present down-to-earth examples of how different regions are working to strengthen their own manufacturing sector. It is, therefore, intended to stimulate thinking—among community leaders, economic development practitioners, university faculty, and policy makers—about the range of possibilities for supporting their region's manufacturing sector.

What all these efforts have in common is that they are built on a strong foundation of partners. Strong partnerships, both formal and informal, can facilitate breaking down institutional silos, pool and share resources, and set up systems that enable better utilization of important economic development assets. As a result, the report details the types of partners who are generally involved in different kinds of manufacturing initiatives, and how those regional partnerships can drive this success.

Throughout, we highlight the many roles played by MEP centers in supporting these efforts. The MEP centers deliver programs and services intended to help manufacturers—particularly small- and medium-sized manufacturers—become more innovative and competitive. Nationwide, the MEP system has 60 centers and over 1,200 technical experts available to support the manufacturers in their state.[1] As the report illustrates, MEP centers may not always lead or be central to a regional manufacturing initiative, but they always serve as a valuable resource.

Manufacturing: A Re-energized Force in the U.S. Economy

Interest in manufacturing has grown since the recession. Many past manufacturing-support efforts focused on trying to stop the rapid decline of manufacturing employment. Diminishing job losses have spurred many policymakers to rethink their views on the manufacturing sector.[2] Supporting manufacturing increasingly is seen as not about preserving existing jobs, but rather about facilitating a manufacturing restructuring process that will lead to higher productivity and growth. As commentators

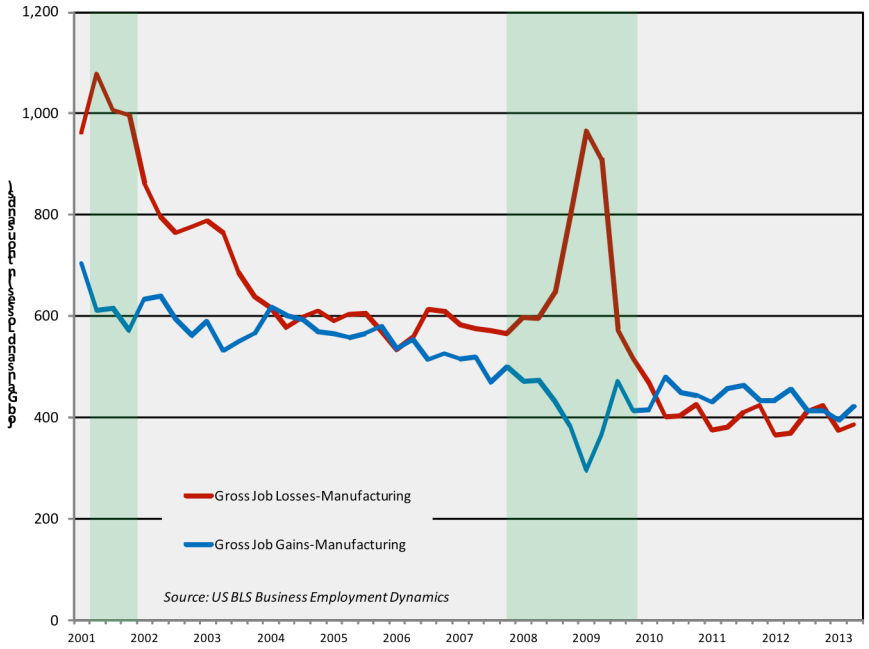
[1] The MEP program, which is part of the Department of Commerce, has a relatively modest budget and centers are further support by state matching funds and fee for service activities. For more information on the MEP program, see: http://www.nist.gov/mep/about.cfm

[2] Sparks, E. and Waits, M.J. (2013) *"Making" our Future: What States are Doing to Encourage Growth in Manufacturing through Innovation, Entrepreneurship, and Investment.* National Governors Association: Washington, D.C. Available at: http://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-ehsw-publications/col2-content/main-content-list/making-our-future.html

Ezell and Atkinson point out, manufacturing decline is neither natural nor inevitable.[3] A motivated, well organized, regional partnership can be a game changer, and policy levers are available to foster a more supportive manufacturing environment. Generating support for manufacturing, however, requires clarifying both to policy makers and the public the manufacturing sector's importance and the outsized role that it plays in the economy.

Several key statistics suggest the importance of the role that manufacturing plays in generating wealth, creating quality jobs, and spurring innovation. In the simplest terms, manufacturing accounts for one out of every eight dollars generated in the U.S. economy. The U.S. Bureau of Economic Analysis reports that this is manufacturing's highest share of GDP since 2007.[4] Some sectors, such as retail and healthcare, are largely driven by population trends; they tend to recycle existing money within a regional economy, rather than generate new wealth. Manufacturers, however, sell their goods well beyond their region of origin, tapping markets that are national or international in scope. Manufactured goods accounted for almost 75 percent of the value of total U.S. exports in 2013.[5] The manufacturing sector, therefore, brings new money and wealth into a region. There is a strong multiplier effect. Nationwide, $1 spent in manufacturing creates $1.48 in the U.S. economy.[6]

Figure 1: Gross Job Gains and Losses in the U.S. Manufacturing Sector (2001-2013)



The manufacturing sector often creates high-quality jobs. While not the source of employment that it was historically, this sector nevertheless accounts for 11.9 million jobs nationwide, or 9.0 percent of

[3] Ezell, S. and Atkinson, R. (2011) *The Case for a National Manufacturing Strategy.* The Information Technology and Innovation Foundation: Washington, D.C. Available at: http://www2.itif.org/2011-national-manufacturing-strategy.pdf

[4] http://www.bea.gov/newsreleases/industry/gdpindustry/gdpindnewsrelease.htm

[5] http://www.census.gov/foreign-trade/statistics/state/zip/2013/12/zipstate.pdf

[6] http://nist.gov/mep/upload/WhatMFGReallyLooksLikeFINAL.pdf

total U.S. employment.[7] These are often well paying positions. Among private sector employers in 2012, U.S. manufacturers paid average annual wages ($60,496) that were 23 percent higher than the average national wage ($49,200).[8]

The employment outlook for manufacturing has also improved significantly. The pronounced manufacturing job losses seen during the past decade have slowed. The sector is no longer a drag on the economy and in fact has become a source of moderate growth (see Figure 1).

The red line in Figure 1 (job losses in manufacturing) has generally declined since 2001, and particularly has slowed since spiking during the recent recession. The blue line (job gains) crossed the red line as the recession ended, and generally maintained its level so that—for the past several years—there are slightly more jobs being created than lost in the manufacturing sector.

The manufacturers that survived the recession emerged stronger, leaner, more competitive, and more innovative. This transformation means that manufacturing is no longer a place where a large number of low-skilled workers can find jobs. While manufacturers still employ laborers, these are now a smaller share of the manufacturing workforce. Increasingly, manufacturers are looking for workers with specialized technical skills. Manufacturing jobs now require much higher knowledge of science, technology, engineering, and math—and these jobs pay much higher wages.

Manufacturers represent an important source of innovation and R&D in the economy. According to the National Science Foundation, the manufacturing sector performs the overwhelming majority (72 percent) of total U.S. R&D.[9] Manufacturers that create innovative products in an increasingly efficient manner are more likely to generate higher profits and higher-wage jobs than are manufacturers that compete primarily on price and volume. These innovative firms are also more likely to be a source of economic strength. Awareness is growing that strengthening the innovative capacity of manufacturers is vital to retaining and expanding the regional manufacturing base.

The Crucial Role of Sub-state Initiatives

Given this important economic role, manufacturing trends can significantly influence a region's economic trajectory. To a certain extent, the ability to thrive relies on a region's talent and shared knowledge about an industry, as well as its R&D capacity, known as the "industrial commons," which serves as source of and support for innovation and competitiveness.[10] Once established in a region, a strong industrial commons can generate a virtuous cycle of growth, where success attracts greater talent and investment.

A central goal for many economic development practitioners is to find ways to strengthen their region's industrial commons. This goal is not easily achieved, in part because many manufacturers increasingly

[7] U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages
[8] U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.
[9] http://www.nsf.gov/statistics/nsf13332/pdf/tab100.pdf
[10] Pisano, G. and Shih, W. (July-August 2009) "Restoring American Competitiveness," *Harvard Business* Review, p. 3.

operate in a global environment. Global competitive pressures, while outside of local control or influence, can have great local consequences. A growing global marketplace offers greater opportunities, but global competitors may have lower operating costs. Manufacturers may also find it increasingly difficult to obtain key resources from other countries, which may push U.S. manufacturers to alter traditional supply chains. Manufacturers may require special expertise and guidance to respond to these global pressures and heighten a firm's global competitiveness.

Regional support efforts often focus on strategies to strengthen regional industry clusters.[11]These clusters are concentrations of related companies, service providers, research facilities, and government agencies that benefit through the formal and informal sharing of technology, skilled workers, and information. Proximity of firms and people with similar interests can create opportunities for informal communication and help develop trust relationships that make collaboration easier and less formal. These attributes help increase collaboration (and decrease the costs associated with collaboration) among firms that participate in cluster-based strategies. Sub-state regions have become a key place for cluster-related economic development policy making and action.

Federal and state policymakers have recognized the need to encourage sub-state regional collaboration in order to address economic challenges. For instance, in recent years, multi-agency federal funding opportunities such as the Jobs and Innovation Accelerator grants[12] and the Department of Housing and Urban Development's Sustainable Communities regional planning grants[13] sought to encourage regions to come together to strengthen and grow region-based industry clusters. Similarly, several state governments are using sub-state partnerships (such as New York State's regional economic development councils, Pennsylvania's Partnership for Regional Economic Performance regions) as a way to allocate economic development funds.

While these programs provide incentives for regional collaboration, many partnerships develop more organically—from the ground up. These locally initiated regional partnerships are built on the same foundation of trust and communication notable in successful cluster strategies, with collaborations evolving from a sense of mutual self-interest. Although they may begin with relatively small resources, these local- and regional-generated programs have an advantage over many federal and state government programs—in having the freedom to act quickly and flexibly to address issues of pressing concern.

These regional partnerships are especially important in an era of scarce resources, where key economic development actors face pressure to breakdown institutional silos, pool and share resources, and better utilize important economic development assets such as research universities and national laboratories.

[11] See for instance, the work undertaken by Harvard University's Institute for Strategy and Competitiveness: http://www.isc.hbs.edu/econ-clusters.htm

[12] One of these grant opportunities—the Advanced Manufacturing Jobs and Innovation Accelerator Challenge—spoke directly to issues around supporting manufacturing. For more information see: http://manufacturing.gov/accelerator.html

[13] http://www.sustainablecommunities.gov/grants.html

The region's ability to leverage the resources, networks, expertise, and energy of this broad coalition of partners will ultimately determine the initiative's success.

A regional partnership tends to be a flexible tool. Depending on the issue being addressed, regional actors may need to draw on business assistance providers, economic development organizations, education and training providers, leading employers, local elected officials, and many others. They can often successfully switch emphasis as new challenges develop or opportunities arise.

This report presents ten case studies that illustrate the importance of regional partnerships for supporting and growing manufacturers. The section that follows presents several factors that influenced the selection of the case studies. Individual case studies then follow. Each case discusses how the initiative began, identifies its key partners, traces its growth, and looks into its future. Each case study ends by identifying "Key Takeaways" that highlight important lessons learned. The report concludes by reviewing the key themes running through the case studies and the partnerships that make them successful. Finally, we provide several concluding thoughts on the vital roles that partnerships play in supporting regional manufacturing initiatives.

Case studies

The case studies in this report were selected from an initial list of initiatives identified through several sources, including lists of federal grant awardees as well as recommendations from economic development professionals. In order to make the report relevant to a broad audience, we chose programs that speak to a diversity of issues, including:

- **Diversity of challenges.** Different regions naturally face different challenges, requiring various responses. The case studies show how ten regions have improved their overall manufacturing ecosystem operating in five critical areas: technology acceleration, workforce development, firm growth strategies, sustainable manufacturing, and continuous improvement.[14]

- **Diversity of partnerships.** Regional initiatives, structured in different ways, are carried out by diverse sets of partners—reflecting their focus areas, pre-existing resources, and other considerations. Initiatives focusing on workforce development draw extensively on education and training providers, while technology acceleration efforts typically rely on research institutions such as universities and national labs. The analysis also considers the variety of roles (such as leader, connector, expert, advocate, and investor) that different partners may play.

- **Differences in maturity.** Newer initiatives demonstrate how to test new ideas and discover what ideas work or do not work when they are put into practice. By contrast, older initiatives can provide important lessons about sustaining efforts in response to changing leadership, resource availability, or regional conditions.

- **Diversity of context.** The challenges facing manufacturers in large cities differ from those in more rural areas. Urban manufacturers may experience difficulty in finding adequate or appropriate industrial space or navigating a wide array of service providers. By contrast, rural manufacturers are more likely to be challenged by skills shortages or limited resources. Additionally, traditional and non-traditional manufacturing regions may have different willingness or ability to address specific manufacturing challenges.

Taking these factors into consideration, we selected ten case studies that speak to these issues. Each case study describes the driving motivation underlying the regional initiative, the partners involved, the main elements of the effort, and important takeaways and lessons learned.[15] The selected case studies include:

- **San Francisco:** SFMade's support for San Francisco's urban manufacturers.
- **Chicago Region:** The Illinois Manufacturing Excellence Center's (IMEC) efforts to connect manufacturers to resources throughout the Chicago region.

[14] http://nist.gov/mep/ngs.cfm
[15] The case study research occurred between May 2013 and February 2014.

- **Kansas City Region:** Kansas City, Kansas, pilot energy efficiency program.
- **Southwestern Pennsylvania Region**: Southwest Pennsylvania's "New App for Making it in America" initiative.
- **New York:** FuzeHub: Making connections for manufacturers in New York State's regions
- **South Texas Region:** South Texas' North American Advanced Manufacturing Research and Education Initiative (NAAMREI).
- **East Tennessee Region:** The Advanced Manufacturing and Prototyping Center of East Tennessee (AMP!).
- **New Mexico:** The New Mexico's Small Business Assistance Program (NMSBA).
- **Northwest Wisconsin Region:** Northwest Wisconsin's ExporTech initiative.
- **Southwest Virginia Region:** Southwest Virginia Manufacturing Technology Center's E3 (Economy-Energy-Environment) initiative.

As a group, the case studies exhibit much diversity, ranging from well-financed efforts to those carried out on a relative shoestring, operating in places large and small, urban and rural. To provide an overview of the wide range of approaches presented in this report, Figure 2 lists the initiatives and identifies their primary focus areas.

Regions focused on a range of different areas, as the figure shows. Most regions tended to concentrate their efforts in a limited number of areas, while others are more broad-based in scope. For instance, the Chicago region's efforts touched on four focus areas (workforce development, sustainable manufacturing, continuous improvement, and manufacturing ecosystem). Others, like the Kansas City region (sustainable manufacturing), New Mexico (technology acceleration), and Northwest Wisconsin (firm growth through expanding exports) efforts focus on only one issue area.

Figure 2: Primary Focus Areas of Initiatives

	Primary Focus Areas of the Initiative					
Place of Initiative	**Technology Acceleration**	**Workforce Development**	**Firm Growth**	**Sustainable MFG**	**Continuous Improvement**	**MFG Ecosystem**
San Francisco		X	X			X
Chicago Region		X		X	X	X
Kansas City, KS, Region				X		
Southwest Pennsylvania Region	X	X	X			
New York	X		X			
South Texas Region		X			X	X
East Tennessee Region	X	X				
New Mexico	X					
Northwest Wisconsin Region			X			
Southwest Virginia Region				X	X	

Each case study explores how leaders in different parts of the country have promoted regional collaboration. We hope that the diversity of paths to success shown here will give practitioners ideas about how to harness their region's particular strengths to better support their own manufacturing sector.

SFMade's support for urban manufacturers

The Initiative and Its Partners

The manufacturing sector can be a source of high-quality jobs, not only for those places that offer large industrial sites and easy access to interstates, but also for smaller-scale manufacturers and those located in urban settings. San Francisco, like many large American cities, has a long manufacturing tradition, particularly in areas such as apparel manufacturing where San Francisco-based companies like Levi Strauss have become global brands. Within these urban settings, much of the demand for manufactured goods emerges out of a desire for locally made and locally crafted goods.

Small, urban manufacturers face the same challenges that all small firms do, such as developing a business plan, raising capital, and getting their products known. Urban manufacturers also face a number of unique challenges, such as finding industrial space, since many legacy industrial buildings may be converted to office or residential space. The rising costs of space alone can be prohibitive. In addition, urban manufacturers may be challenged to navigate relatively restrictive municipal codes and regulations, and by figuring out affordable public and private transportation options for their employees.

The City of San Francisco has made special efforts to directly address many of these urban manufacturing challenges. Reviving San Francisco's local manufacturing sector was one of the elements of Mayor Edwin Lee's jobs plan.[16] While San Francisco has long been known for advanced producer services related to finance and information technology, in recent years the city began to take a fresh look at how manufacturing might utilize the area's design capacity and at the same time provide many well-paying jobs for a broad base of workers.

To address these issues, the city provided some of the start-up funding for SFMade, a nonprofit economic development group charged with marketing and supporting local manufacturers.[17] SFMade was launched in 2009 with support from both the private sector and the City and County of San Francisco's Office of Economic and Workforce Development (OEWD). Since its inception, SFMade has partnered with the OEWD, the Corporation for Manufacturing Excellence (Manex), and other civic and foundation partners to become the city's go-to service provider, connecter, and ombudsman for San Francisco-based manufacturers. Manex is Northern California's MEP center.[18]

The organization started small, representing only 12 manufacturers in 2009, but now represents over 500 companies that employ roughly 4,000 workers. [19] From the beginning, SFMade's efforts focused primarily on establishing the SFMade brand and providing direct technical assistance to manufacturers. Its activities have expanded to include helping local manufacturers address issues of industrial space, workforce development and capital access.

[16] http://www.oewd.org/media/docs/Mayor%20Edwin%20Lee's%2017%20Point%20Jobs%20Plan.pdf
[17] www.sfmade.org
[18] www.manexconsulting.com
[19] http://www.sfmade.org/sfm/wp-content/uploads/2013_SLMReport_low_res.pdf

In order to address these wide ranging issues, SFMade relies on an array of key partners, experts, and funders, including:

- City of San Francisco: Office of Economic and Workforce Development, the Planning Department (land use and zoning), the San Francisco Municipal Transit Agency (transit to industrial areas) and San Francisco Unified School District (educational programming).
- The Corporation for Manufacturing Excellence (Manex Consulting—Northern California's MEP Center).
- Non-profit Capital Partners (OBDC, Working Solutions) and Workforce/Youth Partners (including Goodwill Industries, the United Way, Juma Ventures).

About the Initiative

Upon its launch, SFMade focused its efforts around two initial activities: 1) establishing the SFMade brand and 2) providing direct technical assistance to San Francisco-based manufacturers.

SFMade's local branding work built on the expertise of one of the organization's founders, who started Rickshaw Bags. This focus fit well with the nature of the city's manufacturing sector. San Francisco has a legacy of textiles and apparel, dating back to the 19th century. Roughly one-third of the companies in San Francisco's manufacturing sector today are in the apparel industry. Other significant areas are food and consumer products. Participation in the SFMade brand has helped these companies develop markets both locally and beyond the Bay Area. According to surveys of SFMade companies, access to that brand remains the primary reason companies join SFMade.

Providing direct technical assistance to businesses was another key area from the beginning. SFMade helps companies develop and review company business and financial plans; provides referrals to local capital providers; and assists companies in their search for industrial or retail space. These services are performed on a pay-as-you-go basis.

SFMade's Accelerator Program provides intensive services and counseling by assembling experts to help a select group of high-growth firms. This program serves firms that belong to SFMade, have been in business for at least two years, and have at least five employees. The program began with ten companies and subsequently expanded to 30. Two factors in this growth were the decision by the City of San Francisco to increase its contribution to SFMade through the use of Community Development Block Grant (CDBG) funds and through SFMade's partnership with Manex.

SFMade's Executive Director had once served on the board of the CMTC (California Manufacturing Technology Consulting—the MEP center in Southern California) and understood how MEP services could enhance their offerings. As a result, it seemed only natural for SFMade to form a strategic partnership with Manex Consulting. Manex has not only been a key contributor to the Accelerator program, but has also provided more specialized services relating to, for instance, factory set up and organization (a vital consideration in a place where space is a premium), lean principles, CEO coaching, and navigating the audit process for OSHA safety requirements.

This partnership with Manex has proven to be mutually beneficial. For SFMade companies, Manex can provide access to expertise that can help these companies overcome obstacles and barriers to growth. Even for firms that may not be able to afford to work individually with Manex, the company also leads seminars about a number of different manufacturing issues such as supply-chain management or lean manufacturing.

Manex benefits from its relationship with SFMade and its client companies as well. Unlike many other economic development partners, SFMade has a strong understanding of manufacturing and the issues facing manufacturers. Moreover, SFMade events provide a venue for Manex to meet and build relationships with companies based in San Francisco.

The Manex role in the Accelerator program has been particularly beneficial as it allows them to develop relationships with growth companies in a way that they could not by simply facilitating smaller two-hour workshops. Developing these relationships can prove beneficial in the long-term because as firms develop and grow, the more likely they will need and require Manex services. Since SFMade is a sub-recipient of MEP funding, companies that SFMade works with are surveyed and contribute to Manex's overall impact.

Becoming More Established and Expanding the Scope of the Initiative

Branding and business services were SFMade's initial focus areas, but its activities have expanded to other important issue areas. Most notably, SFMade is also working to address San Francisco's lack of industrial space, which is seen as one of the manufacturing sector's most significant obstacles to growth. Not only is industrial space limited and expensive, but much of that available space is being converted into more lucrative office or residential space. If firms cannot find affordable working space, then they will not be able to remain in the city and will instead look for space elsewhere, like the East Bay where space is cheaper and more plentiful.

To this end, SFMade works to evaluate existing zoning controls, preserve industrial space, and track the industrial space issues that arise. In addition, SFMade works with local manufacturers to help them find appropriate space in the city, as well as to walk them through the approval and permitting processes needed to operate in those spaces. However, SFMade is not alone in addressing space issues, as it works closely with the City of San Francisco and the Mayor's office. In its commitment to helping manufacturers start, stay, and grow in the City of San Francisco, the Mayor's office is actively involved in supporting manufacturers with space and permitting issues.

The Mayor can do this by convening key players such as the utilities, transit authorities or regulatory agencies to address issues as they arise. The Mayor's office introduced new legislation in late 2013 to address some of these issues.[20] This legislation is significant in that it will incentivize the development of new production, distribution, and repair space. This, in turn, will facilitate the development of small enterprise workspaces that will serve as incubators, simplifying the regulatory processes involved with

[20] http://www.sfmayor.org/index.aspx?recordid=483&page=846

locating in San Francisco. The legislation was written in part from feedback from many of the firms involved in SFMade.

SFMade has also taken up workforce issues in support of the area's manufacturers, but its workforce issues differ from other parts of the country in several important ways. For instance, San Francisco lacks a strong technical community college—a resource that is often vital to workforce training in other parts of the country. That situation has been somewhat mitigated by a relative lack of a significant skills gap because many skilled textile and apparel workers remain in the city, in spite of the significant job losses by large companies like Levi Strauss. Many of these apparel workers are immigrants, and several of the efforts to support manufacturers have involved organizations that are focused specifically on helping immigrant groups.

Nevertheless, SFMade organizes efforts around several key workforce issues. Like many other places throughout the country, there is a need to introduce young people to manufacturing career opportunities. To that end, SFMade has supported YouthMade—an internship program for low-income youth—in partnership with Juma Ventures and with funding from JP Morgan Chase. It also works to organize speakers and company visits for an area high school. For San Francisco-based businesses, SFMade provides help to companies seeking assistance with hiring and training. Its Hiring Made Better Program helps companies write better job descriptions, connect with potential workers through its job board, take advantage of tax incentives or direct them to appropriate service providers like human relations consultants or providers of payroll services. SFMade can also connect companies to appropriate training providers and resources, not only for their production workers but also for their executive level personnel. The latter services are often delivered in partnership with Manex Consulting.

SFMade provides a model for organizing small manufacturers in an urban area. Not only are the partners involved in providing a common brand and direct business services, but they also play a vital role in serving as an ombudsman for San Francisco's manufacturers. Through this role, SFMade addresses issues around preserving industrial space or reforming the business tax system so it is based on income rather than payroll (and therefore becomes less onerous for labor-intensive businesses). In the future, SFMade will focus greater efforts on growing the pool of start-up capital available to the city's new manufacturers. Currently, more than 50 percent of manufacturers based in San Francisco use crowdfunding (e.g. Kickstarter, Indiegogo) to get their businesses off the ground.

SFMade's partnership with the City of San Francisco has also been significant as Mayor Lee has played an important role in advancing the cause of the City's manufacturers. Not only is growing the manufacturing sector a part of his 17-point jobs plan, but he also has a dedicated manufacturing liaison in the Office of Economic and Workforce Development. The Mayor tours one of the city's manufacturers each Tuesday, remaining in touch with manufacturing issues. This high profile commitment has been instrumental in securing funding, convening key stakeholders, and solving problems.

Beyond key partners like Manex Consulting and the City of San Francisco, SFMade has also leveraged a variety of funding sources (often focusing funders on one specific initiative) and the talent found within San Francisco. As a result, SFMade has been able to utilize the talent base involved with local companies

like Levi Strauss and Google to provide assistance for manufacturing-related initiatives and individual manufacturers.

The Initiative's Wider Influence

In spite of its growth and successes, SFMade maintains its focus on the City of San Francisco. While there might be some temptation to expand its efforts to the rest of the Bay Area, the organization has several reasons for remaining focused on San Francisco proper. First, expanding beyond the City of San Francisco might dilute the strength of the SFMade brand. Access to this brand has been one of the primary motivators for San Francisco-based manufacturers to support and participate in the SFMade effort. Second, many of its issue areas are San Francisco-based. These concerns might not get the attention and focus required if the program were to be folded into a broader geographical effort. In addition, the positive momentum supporting San Francisco's manufacturing sector emerged from the deep relationships built among those key supporters and stakeholders. A key concern, therefore, is to encourage and maintain those relationships.

Yet, SFMade has had an influence well beyond the city. The initiative has also found ways to share its knowledge and experience not just to Bay Area cities like Oakland, but also to cities across the country, including New York City, Philadelphia, and Chicago. SFMade was one of the founding members of the Urban Manufacturing Alliance (UMA), a national collaborative group formed in 2011 to share best practices for supporting local manufacturing activities.[21] The Pratt Center for Community Development in New York City, another founding member, has particular expertise in addressing manufacturing land-use issues in urban environments.

Looking Ahead

SFMade has much to offer other cities in how to establish a local brand for consumer products manufactured in their cities.[22] For example, there are now Made in Philly and Made in Chicago campaigns, which were launched in the last year. The founding of UMA has drawn the attention of several philanthropic organizations including Citi Community Development, the Kauffman Foundation, and the Surnda Foundation. This philanthropic support will help grow the UMA's ability to support urban manufacturing efforts nationwide.

Key Takeaways

- High profile leadership can be important for addressing structural issues and solving the problems of individual partners.
    - A manufacturing support initiative can play an important ombudsman or advocacy role around city zoning and space issues.

[21] http://urbanmfg.org/
[22] http://urbanmfg.org/wp-content/uploads/2013/05/UMA-Local-Branding-Toolkit-Final1.pdf

- Regional branding strategies can help area manufacturers grow demand for their products.

- Partnering with urban/regional support groups can help MEP centers build relationships with companies and expand their footprint—providing a particularly cost-efficient means to reach communities of small manufacturers.

- Partnering with MEP centers can help urban manufacturing groups expand the level and sophistication of services that they can offer to their member companies.

- Widening the search for funding can broaden the scope of potential activities offered.
    - Focusing funders on one program or issue and demonstrating impact in those areas can help sustain funding over the longer term.
    - Local foundations can act as initiative partners.

- No region is entirely unique, and the experiences of other places offer lessons to be learned.
    - National collaborations and networking with other manufacturing-support groups around the country can be advantageous to local efforts.

The Illinois Manufacturing Excellence Center's (IMEC) efforts to connect manufacturers to resources throughout the Chicago region

The Initiative and Its Partners

In large metropolitan areas, the landscape for manufacturing support services can be crowded. This is particularly true in the Chicago region. Here the City of Chicago, Cook County, and the Illinois Department of Community and Economic Opportunity—as well as many other public agencies, nonprofit organizations, foundations, and private consultants—all offer support services for manufacturers.

Manufacturing is an important source of employment within the city and in the region. Many regional manufacturers, however, are unaware that these resources exist or do not know how to access them. For small- and medium-sized manufacturers focused on their daily operations, the sheer volume of available programs may discourage them from trying to choose among them.

In order to navigate this sea of resources, manufacturers often need a guide to help connect them with the right service provider. MEP centers can often play this role. Because of their special expertise, MEP representatives are comfortable speaking with manufacturers. They are adept at helping them identify key issues or pain points (chronic problem areas), and identifying the range of options available. Sometimes MEP centers can assist manufacturers themselves; but at other times, they may direct manufacturers elsewhere in a broader referral network.

The Illinois Manufacturing Excellence Center (IMEC),[23] Illinois' MEP center, acts as a liaison between a number of different partners and manufacturers in the Chicago region. The partners play diverse roles in the area's economic and workforce development efforts within overlapping networks of providers.

Support organizations all have their own structures and areas of emphasis; IMEC's partnerships with these groups reflect those differences. But for manufacturers seeking help, these differences are of little import. Manufacturers simply want to find assistance or resources that can help them address their pressing issues, and to be able to access this assistance easily and in a timely manner.

Companies facing challenges generally do not care who is providing these support services or resources so long as they receive quality services. For this reason, IMEC sees its mission not as promoting any one service provider, but rather to use the broad range of available resources to make companies better manufacturers. IMEC is works with a wide variety of service providers and economic development networks to connect manufacturers to the right service providers and resources. IMEC's key partners in the Chicago region include:

- City of Chicago Department of Housing and Economic Development (DHED).
- World Business Chicago (WBC).
- Chicago Workforce Funders Alliance (CWFA).

[23] http://www.imec.org/

About the Initiatives

Within the City of Chicago, IMEC has recently formed a partnership with the City's Department of Housing and Economic Development. A desire to keep manufacturers in the city and preserve designated industrial areas led to the creation of Chicago's Sustainable Industries Plan.[24] This plan takes a broad view of sustainability. Its strategies range from land use, to infrastructure, to utilities, to workforce development, and more. The plan's purpose is to help manufacturers make a long-term contribution to Chicago's economy and workforce, and to do so in an environmentally responsible manner.

As part of this plan, this spring a city ordinance formalized the relationship between DHED and IMEC. Under the agreement, the city has allocated $150,000 per year for an initial two-year period to IMEC to help implement the plan, while IMEC has placed dedicated staff at DHED. These personnel work with Chicago-based manufacturers to better understand their needs and increase their awareness of available support programs.

Although DHED has much expertise concerning the zoning, regulations, and city political processes that affect manufacturers, the agency has less experience in speaking to and working directly with manufacturers. The DHED-IMEC partnership is intended as an outreach effort to connect with manufacturers and help them make better use of DHED and other resources.

Through this relationship, IMEC and DHED help manufacturers though a wide array of programs. These range from rehabilitating industrial buildings for greater energy efficiency to financing worker training programs.

One element of the Sustainable Industries plan focuses on improving the energy efficiency of companies. Working with Commonwealth Edison (the utility company serving Chicago and Northern Illinois), DHED identified areas with a high density of heavy energy users.

IMEC representatives met with companies located in those areas to determine their needs. The organization then worked with individual companies to identify the best programs to help them address their key challenges. Although IMEC staff is present on behalf of DHED, they do not limit their recommendations to DHED programs alone. Instead, depending on the specific need, IMEC staff may recommend state or county programs as well. IMEC staff also guide companies through the application process, in order to ensure that bureaucratic challenges do not hinder companies from taking advantage of existing support programs.

The relationship between DHED and IMEC has proven mutually beneficial. Many firms lack awareness about the services available to them, let alone how to access them. In playing the role of broker to the small- and medium-sized manufacturers in Chicago, IMEC representatives work with manufacturers to

[24] http://www.cityofchicago.org/content/dam/city/depts/zlup/Sustainable_Development/Publications/Chicago_Sustainable_Industries/Final_CSI_Post_Commission_Edits_web_V1.pdf

help identify the programs with the potential to make them more competitive while remaining in their current location. Keeping manufacturers from moving outside city limits is also a DHED goal.

Expanding Reach by Connecting to Other Networks

While the IMEC-DHED partnership concentrates on strengthening manufacturing within the City of Chicago, IMEC also works with World Business Chicago (WBC) to bolster the manufacturing sector throughout the broader Chicago region.

WBC is a nonprofit economic development organization that seeks to promote private-sector growth within the 14-county Chicago MSA (Metropolitan Statistical Area). The Mayor of Chicago, Rahm Emanuel, chairs WBC and many of the region's prominent business leaders serve on its board of directors. WBC is tasked with staffing the Mayor's Plan for Economic Growth and Jobs.[25]

This plan has ten core strategies; several relate directly to advancing manufacturing. Goals include ensuring Chicago's place as a leading manufacturing hub, establishing the region as one of the nation's leading exporters, and investing in next generation infrastructure. The emphasis on manufacturing emerged as an issue during the research efforts that informed the Plan for Economic Growth and Jobs. Researchers found that much of the manufacturing employment in the Chicago MSA was in mature sectors such as metal, machinery and plastics products manufacturing. Moreover, as in many places, this workforce is aging and requires additional training to remain competitive.

WBC has partnered with IMEC to assist in moving these initiatives forward. Most notably, IMEC is one of the lead implementing agents for *Strategy 1–Become a leading advanced manufacturing hub.* The plan does not call for new programs to, for instance, help low growth legacy manufacturers adopt more advanced technologies and processes. Rather, it seeks to better leverage the existing programs available through the City of Chicago, Cook County, and the State of Illinois, among others.

IMEC will lead this effort by working with the Plan for Economic Growth and Jobs partners to create a central hub for manufacturers to access resources and services. IMEC will essentially man the front door of this hub—working directly with manufacturers to identify their most pressing problems and directing them to appropriate resources.

In some cases, the underlying problems may not be entirely clear to the manufacturers themselves. Using its knowledge of manufacturing issues, IMEC can help participating companies identify critical issues and pain points, and then direct client manufacturers to a network of trusted and vetted service providers. For instance, if a firm needs help with export assistance or business development, IMEC might refer it to the Illinois Small Business Development Center. If a business needs help with market intelligence, IMEC may refer it to a trusted private consultant.

The key in creating this gateway is to help identify company pain points, and then have a referral network of trusted and vetted service providers that can provide assistance. IMEC will sit at the center of this referral network. It will not just build the network but also will monitor the quality of the services

[25] http://www.worldbusinesschicago.com/files/downloads/Plan-for-Economic-Growth-and-Jobs.pdf

delivered. This system will enable IMEC to leverage the power of multiple networks, creating a brokered model for service delivery for manufacturers within the Chicago region and the State of Illinois.

Expanding Networks into the World of Workforce

In addition to the two partnerships mentioned above, IMEC is also looking for partnerships that will help strengthen the Chicago region's manufacturing workforce. There are many regional workforce efforts currently underway; since 2013, IMEC has been participating in an initiative funded through a grant from the Chicagoland Workforce Funders Alliance (CWFA)—an alliance of 11 different funders. Through the project, CWFA is supporting an effort that envisions employers as more than just customers of the workforce system, but rather as partners in the process of building the right workforce.

The current workforce system is basically a "pull model" that focuses on the workforce supply. CWFA, however, is more interested in a model that addresses workforce demand by working with employers. After reviewing requests for qualifications, IMEC was selected to lead this manufacturing-focused effort.[26] This effort has enabled IMEC to pilot an initiative that applies many of the principles used in process improvements to the human resources functions of manufacturers.

Essentially, IMEC is working with companies to help strengthen their hiring and training practices. IMEC has piloted projects with manufacturers. These pilot projects draw on a mix of employers ranging from those that pay higher than average wages and have no difficulty finding skilled workers, to those employers struggling to find the skilled employees they need.

IMEC has applied many of the same principles used for value-stream mapping a firm's production process to their talent acquisition and development processes. After working with this variety of employers, IMEC will be able to consider what activities proved successful, measurable, and scalable. The organization will be moving into a Phase II, where it can begin to roll out its program to help area manufacturers improve their human resources functions.

During the Phase I meetings with manufacturers, IMEC noted other workforce needs and tried to make sure that these employers had their immediate and short-term needs addressed as much as their long-term needs. Much like the partnership with DHED, these efforts to help manufacturers are not just about delivering IMEC services, or services from partnering organizations. Rather, they are meant to connect client companies with the services or resources necessary to address their requirements. In this situation, IMEC can, for instance, refer a specific manufacturer to partners like ManufacturingWorks[27] that will meet those short-term training needs.

Bringing Clarity to the Landscape of Manufacturing Service Providers

IMEC participates in several Chicago-area partnerships—the Sustainable Industries Plan with DHED, the multi-service-area WBC, and the workforce initiative with CWFA. In all three, IMEC acts as a metaphorical air traffic controller that serves as a hub for information or brokers relationships between

[26] http://www.cct.org/impact/partnerships-initiatives/shaping-our-region/cwfa
[27] http://www.chicagomfgworks.org/

manufacturers and service providers. IMEC helps manufacturers navigate Chicago's rich landscape of available manufacturing assistance and directs them to the right resource whether provided by the City of Chicago, Cook County, DCEO, CMAC, the Chicagoland Chamber, or others.

By collaborating with these organizations, IMEC is able to clarify the process for manufacturers seeking support and assistance. IMEC's ability to speak the language of manufacturers allows them to diagnose problems and connect manufacturers to the right services and service providers. In some instances, IMEC can provide the services but, often, a service provider in the network is better positioned to help. IMEC can also translate the needs of manufacturers to service providers help client companies get the most out of existing services and to adjust those existing services to the needs of participating manufacturers.

Key Takeaways

- The role of service broker is a promising model for effectively connecting manufacturers to resources—rather than the promotion of specific programs or providers.
    - A suite or menu of services from multiple providers is more attractive to companies than any one individual program.
    - The organization filling the broker role must speak the language of manufacturers and understand the problems from the manufacturer's point of view.

- Helping companies navigate application procedures can increase use of support programs.

- Connecting to the nodes of multiple networks can extend MEP reach and impact.
    - MEP centers can help map out and bring coherence to a complicated landscape of service providers.

Kansas City, Kansas, pilot energy efficiency program

The Initiative and Its Partners

U.S. manufacturers are striving to control costs and improve their bottom line, while also pressing hard for top-line growth through increased sales and revenues. Such growth trajectories are urgent when company executives set them against the backdrop of a highly competitive global marketplace. For their part, communities and regions across the country are searching for strategies to strengthen the manufacturing climate for both established employers and new prospects, in order to maintain jobs and a good quality of life.

One area of potential cost savings for manufacturers is more efficient energy use. Manufacturing operations are energy-intensive, consuming power as fuel for factory production operations, heating, cooling, and lighting. Industrial use accounts for nearly one-third (31 percent) of total U.S. energy consumption, which is the largest proportion of any of the major economic sectors. Manufacturers who recognize energy as a variable cost to control, rather than regard it as a fixed expense, are in a better position to improve both their operating costs and revenues. Communities and regions seeking to preserve their industrial bases can also benefit from the same kind of thinking in their business retention and expansion efforts.

The pilot energy efficiency program in Kansas City, Kansas, is an example of this new variable thinking about energy use as well as the innovative partnerships and programs that can emerge from it. The idea for the partnership grew out of a 2011-2012 National Governors Association (NGA) Manufacturing Policy Academy. This policy academy—sponsored by the National Institute of Standards and Technology (NIST) MEP and the U.S. Economic Development Administration—provided a forum for community leaders in Kansas and seven other states to talk about manufacturing strategies.[28]

These discussions turned into tangible action when Wyandotte County Economic Development Council (WYEDC) conducted a survey of local manufacturers to identify areas of concern. The survey showed that one of these concerns was energy management. In 2012, WYEDC began to work with the Mid-America Manufacturing Technology Center (MAMTC) to explore options for addressing this concern on a specific retention case which arose subsequent to the workshops.[29] MAMTC is the Kansas-based NIST Manufacturing Extension Partnership (MEP) center. The Kansas City Board of Public Utilities (BPU) joined the discussion. The result was a partnership between the three organizations that pooled funds to offset energy saving measures for Wyandotte County manufacturers located within the BPU service area. Operated as a rebate program, the fund pool pays for up to 50 percent of the total project costs for county manufacturers to implement energy saving projects.

[28] http://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-ehsw-publications/col2-content/main-content-list/making-our-future.html
[29] http://www.mamtc.com/

The key partners in this initiative include:

- Mid-America Manufacturing Technology Center (MAMTC).
- Kansas City Board of Public Utilities (BPU).
- Wyandotte County Kansas Economic Development Council (WYEDC).

About the Initiative

The pilot energy efficiency program is a partnership between BPU, MAMTC, and WYEDC, designed to help Wyandotte County, Kansas, manufacturers lower operating costs by adopting a variety of energy efficiency improvements. The three partners had long-existing, but mostly informal, relationships. Participation in the NIST-sponsored NGA Manufacturing Policy Academy helped them develop a more thorough understanding of how assisting firms to reduce their energy costs might aid in retaining manufacturing business in state.

The partners were able to work together more formally when one Wyandotte County-based manufacturer began to seriously consider moving across the border to Missouri. One of Missouri's attractions for this manufacturer was an energy rebate program. The three partners responded to this challenge by launching their own energy-efficiency rebate program. This program addressed the immediate need of retaining that particular manufacturer, but also served the needs of other local manufacturers.

The program structure negotiated by the key players met their interests, resource realities, and needs. At the heart of the program is a matching grant package set up by pledged funds from BPU and MAMTC to offset up to 50 percent of the costs of energy improvements made by Wyandotte County manufacturers. (Manufacturers must be in the BPU service area to qualify.) Eligible costs include an energy assessment, identification of energy efficiency project(s), and project management.

In practical terms, nearly anything using electricity could potentially qualify as a project (e.g., air compressors, lighting, equipment, heating, and cooling, etc.). Collaboration between MAMTC and the manufacturer's leadership to identify specific needs in light of the required energy assessment dictate final project selection. In order to receive funding, the energy assessment and overall project work must be managed by MAMTC. The energy assessment must be completed prior to beginning the work on any energy efficiency project.

The maximum dollar amount awarded to a project by the energy efficiency program depends on the manufacturer's utility rate class. BPU commits a maximum grant per manufacturer of from 25 percent to 100 percent of costs ($15,000, $25,000, or $50,000 depending on their Rate Class as determined by firm size and energy usage). MAMTC commits a maximum of 25 percent (up to $15,000 or $25,000, also depending on Rate Class). The fee for MAMTC's energy assessment and project management costs is 15 percent of the project costs, not to exceed $25,000. The fee is added to the overall costs and can be paid through grant funds.

To begin the process, the manufacturer gives a $5,000 deposit to MAMTC. Once the assessment is complete and a specific project (or projects) identified, the deposit is credited to the project. The manufacturer's investment must be equal to or exceed the combined BPU and MAMTC investment. The funds for the pilot program are limited so only a small number of manufacturers (12-15) are being targeted to participate. Funds are available on a first-come, first-served basis.

MAMTC's project management and engineering fee is 15 percent of the project costs; this amount goes to offset some of the money expended for its portion of the shared pool of funds. The initial assessment identifies additional projects for potential implementation going forward.

Building on Early Outcomes

The Kansas City region's energy efficiency program is showing early signs of success. In the first nine months, seven manufacturers accessed program funds to implement energy-saving projects. The partners attribute much of this success to the program's structure, which makes sure that each partner organization and participating manufacturer have "skin in the game," as well as giving them strong reasons to take part. For instance, the program's value to a manufacturer may mean a 50 percent cut in the cost for making energy improvements at the factory level, and future cost savings as well. The manufacturer must also invest funds, providing motivation to select a project that offers clear benefits to the firm. Another advantage to the program is that the energy assessment identifies a list of potential future projects.

The program also gives MAMTC opportunities to more broadly put into practice a variety of center-developed sustainability innovation principles, encouraging participating companies to strategically apply the resources saved on energy and use them to grow the top line. In addition, by partnering with other area groups, MAMTC can strengthen its partnerships within the regional manufacturing community while helping companies in the area find and leverage available resources.

Through their networks, the partner organizations are actively marketing these benefits to manufacturers in the Kansas City, Kansas, region. The partners note considerable enthusiasm for the program, which seems to serve everyone's goals.

For BPU, the program allows the utility to provide a new service to their customers. Although BPU itself may not have the funds to compete with offers from across the state line in Missouri, the utility can leverage this grant program on the Kansas side by partnering regionally.

BPU was especially motivated to participate since manufacturers are major utility customers. The program helps BPU fulfill company goals by being a valued partner with local groups within its service area, and promote energy-efficiency efforts. Ways to reduce "peak loads" are particularly attractive, since tightening regulations are limiting the ability of utilities to build new-generation facilities.

Finally, for WYEDC, this project serves as a valuable tool for business retention. It provides a valuable lesson in how regional economic development groups can think differently about how to reduce costs

and retain manufacturers. Working with partners like BPU and MAMTC strengthens the ability of WYEDC to help companies in the area find and leverage available resources.

The total impact from this pilot effort will be close to $2 million of energy improvement upgrades to Wyandotte County businesses. The program has proven itself as an effective tool for business retention in the area.

The partners in the pilot effort are now looking to grow the initiative through second generation funding. There are approximately 400 manufacturers in Wyandotte County alone, giving ample room to expand within the county. In addition, the initiative hopes to serve other communities, especially those with city or publicly owned utilities.

To help market and spread the word about the program to other county manufacturers, the partners are considering an idea to foster an "Energy Leadership Community" comprised of the initial seven manufacturers in the program. The initiative also looks to expand the partnership to include Kansas City Community College. The partners are working to identify mutual interests by recruiting students to assist with computer-generated design and drafting and to undertake other paid learning experiences on program-generated projects.

Key Takeaways

- Clarifying the underlying problem can point towards a new solution.
    - The problem first presented itself as one of retaining businesses—keeping them from migrating across the state line. Identifying the core problem as one of holding down manufacturer energy costs provided a new direction.
    - Regional partners should be creative in solving problems and flexible concerning the final project design.

- Look for common ground among the partners in seeking solutions.
    - Consider the initiative partners as "customers" and find overlapping goals (in this case, the energy efficiency program served everyone's goals).

- Identify first steps, find something to do no matter how small in scale, and then execute.
    - Innovation is about execution as well as ideas.
    - New regional partnerships should start with something doable, while continuing to focus on innovation.
    - Look for natural next steps.
        - For instance, if companies are successful in reducing energy costs then they will likely be more open to adopting crucial innovations throughout the production process.

Southwest Pennsylvania's "New App for Making it in America" initiative

The Initiative and Its Partners

The current manufacturing landscape of a global marketplace places high value on innovation, customization, and change. These pressures are redefining the roles of many traditional actors within the manufacturing sector. Few actors have been as affected by these tremendous shifts as organized labor; it remains to be seen where labor unions fit in this new manufacturing landscape. The growing focus on innovation also places great pressure on regions to leverage large research universities. Yet, while university researchers are producing many new and innovative technologies, only a small proportion of those technologies become actual products. Since many potential technologies end up being licensed and manufactured offshore at the encouragement of venture capitalists, fewer still become products that are manufactured locally.

In southwest Pennsylvania, an innovative partnership that includes organized labor is being formed to address these issues. Funded in part by a Workforce Innovation Fund Grant from the U.S. Employment and Training Administration, the "New App for Making it in America" initiative[30] seeks to connect start-up companies emerging from Carnegie Mellon University (CMU) and skilled workers available through the Pennsylvania AFL-CIO. This partnership seeks to grow the number of new, high-tech start-up companies that are manufacturing their products domestically and, more specifically, in southwest Pennsylvania and the Pittsburgh region.

The core partners in this initiative include:

- Carnegie Mellon University (CMU).
- Pennsylvania AFL-CIO.
- Three Rivers Workforce Development Board (Pittsburgh).
- Keystone Development Partnership (nonprofit created by Pennsylvania AFL-CIO).
- Keystone Research Center.
- StartUptown Nucleus Corporation.
- Strategic Development Solutions.

About the Initiative

Efforts to build these partnerships began several years before the major grant award. A $3 million Workforce Innovation Fund grant in 2012 enabled the partners to significantly ramp up their activities.

Activities began with seemingly disparate partners—CMU and organized labor—finding creative ways to overcome a perceived regional skills gap. In partnership with several other core stakeholders, these partners sought to find common interests and identify the specific problems facing start-up companies in the region. The plan they devised addressed both identifying ways of helping start-up companies secure the manufacturing skills they need and providing job opportunities for union workers.

[30] http://usabuildsit.com/

RedZone Robotics, a company that emerged out of CMU's Robotics Engineering Consortium, became an early project. RedZone makes robots that remotely inspect water and sewer infrastructure. As the company became established, serious inquiries about these systems came from nearly a dozen different cities across several states, starting to exceed the company's ability to meet the demand. RedZone Robotics faced the challenge of hiring and training workers capable of operating and maintaining their robots in each client city, and within a relatively short period. The young company did not possess the resources and capacity in each city to get workers on board quickly and efficiently.

The solution to this challenge was found in partnering with organized labor. Not only could organized labor provide RedZone with high-quality, skilled workers, but through its nationwide reach, the AFL-CIO could deliver training specifically designed for the workers in each city where the new systems were being adopted. In a sense, the unions became the national deployment tool for RedZone technology.

For the participating unions, this partnership not only provided jobs for its workers, but also enabled them to broaden their knowledge of robotics. This partnership proved successful and President Obama even highlighted RedZone Robotics—and their work with unions—in a 2011 weekly address. [31]

The goal of the "New App for Making it in America" initiative is to build these kinds of partnerships in a systematic manner. For unions, these partnerships offer opportunities to expand their membership in a broader pool of companies. For the start-ups, engaging with the unions enables them to ensure that their first few employees are quality hires, both in terms of their manufacturing skills and their knowledge. Unlike larger companies, start-ups need workers with real manufacturing skills and workers who are capable of mentoring businesses about the practical shop-floor challenges involved in getting production off the ground. The union can also assure start-ups that their new hires will not present soft skill issues, such as punctuality, passing drug tests, etc. If issues such as these arise, the union can help address them.

The partners have undertaken several activities to advance this initiative. One of the early efforts was to organize "start-up boot camps" where CMU professors and inventors exhibit their newly developed technologies. At the boot camp, union workers can gain a better understanding of technologies in the pipeline and get a better idea of the types of skills required to work in these fields. Similarly, the boot camps give union members a chance to show CMU inventors what kinds of skills they possess, as well as to share their knowledge about the practical, shop-floor challenges that might arise when manufacturing begins. These entrepreneurial boot camps have continued as a way to provide counseling and mentorship to new manufacturers concerning issues such as financing equipment and finding manufacturing talent. CMU also put on "Windows on Innovation" working sessions. At these sessions experts shared their insights to a select group of researchers and union leaders about the technologies that are likely to affect manufacturing work and manufacturing industries over the next decade.

Similarly, the other partners are seeking to create tools that can facilitate additional partnerships. One project is a kind of "Angie's List" of contract manufacturing workers. This list will help start-ups select

[31] http://www.whitehouse.gov/the-press-office/2011/06/25/weekly-address-strengthening-america-investing-home

the unions with which to partner, and also enable them to better gauge which unions are more start-up friendly than others. There are also plans to create a "Virtual Hiring Hall" to better connect start-ups to available workers with the specific production-oriented skills and experience they need.

The partners have also launched an apprenticeship program and training system, designed to provide manufacturers with a pipeline of talent to continually grow and innovate. Known as the MAKERSHiP™ Program, this effort trains workers, particularly dislocated workers, helping them to find careers in digital making and manufacturing.[32]

The workers will receive training in key manufacturing skills such as Computer Numerical Control (CNC), machining, additive manufacturing, and welding. A number of partner organizations deliver this training and also provide some training through participating labor unions. This program will also seek to incorporate modular certifications and stackable credentials for workers. The goal is to enable workers to continue lifelong learning, while equipping them with transferable skills that they can use in a variety of workplace settings. Efforts are also being made to actively place these workers with start-up companies involved in advanced manufacturing.

Looking Ahead

As these efforts progress, the partners are continually looking to leverage pre-existing efforts while avoiding any duplication of effort. Establishing mutually reinforcing activities requires awareness of programs underway within the region's broader stakeholder group. For instance, the designers of these efforts sought to avoid replicating any of the already established portfolio of services offered by Catalyst Connection—the MEP center in Southwest Pennsylvania. Rather, if needed services are available through Catalyst Connection, the New App partners will provide a direct referral.

Having this clear line of communication and understanding the strengths of other stakeholders allows the initiative designers to create a set of mutually-reinforcing activities. The overall goal is to support continual services to the region's manufacturers no matter what the manufacturers' age, size, or growth trajectory. Working with the broader stakeholder community enables the project partners to leverage the expertise of other organizations that may lie outside the initiative.

The core partners in this initiative are working to create a business model to sustain the effort after the initial grant expires. For instance, the partners are attempting to be deliberate in expanding partnerships and in clearly defining partner roles. This requires partners to articulate who they are, what they bring to the initiative, and how their efforts fit within the partnership. Another aspect of sustaining this initiative is developing a realistic fee structure to support these efforts going forward, as well as searching for alternate funding sources to support start-ups and training programs. Some parts of union pension funds, for instance, may be used to provide more long-term capital for Pittsburgh-area start-up companies, rather than investment seeking a quick return.

[32] http://www.makership.us/

As part of the Workforce Innovation Fund the partners are working to monitor and track their own activities. Metrics include the number of start-ups, start-ups using union labor, the number of participants in apprenticeships, and other measures. The partners are also working on some less easily measurable outcomes, such as developing a more entrepreneurial culture in southwest Pennsylvania, and raising the profile of manufacturing enterprises and careers.

Many of these efforts are just now moving toward full implementation. Connections with companies are being made and several of the training programs have begun. The partners will also work to have their model tested outside the region. The best candidate regions for applying this model will have a major research university, a sufficient number of spin-off companies that are producing "manufacturable" products, and a strong, forward-thinking, union presence.

Key Takeaways

- Do not wait for funding opportunities to start your regional initiative.
  - Identify short-term actions that can begin without significant funding.
  - The availability of funding should determine the scale and scope of the activities, but should not stop actions from going forward.

- Continually explore the potential for starting partnerships with people or organizations that are not just the "usual suspects."
  - Look for groups with common or complementary needs and capabilities as a first step toward finding new partners.
  - Just because organizations are not "natural partners" does not mean that there are not potential partnership opportunities.

- Partners should be clear about what they want out of the effort and what they bring to it.
  - Being open about motivations is important not only for setting expectations, but also for finding an effective role in the initiative.

- Know the landscape of similar efforts.
  - Avoid replicating existing services, instead seek to complement and connect to them.

FuzeHub: Making Connections for Manufacturers in New York State's Regions

The Initiative and Its Partners

New York has long identified the revitalization of manufacturing as the key to a successful economy. New York State has made progress in support of advanced manufacturing and the acceleration of innovation-based growth. Initiatives such as Start-Up NY and certified State Business Incubators ("Innovation Hot Spots") have strengthened the State's portfolio of programs that support technology R&D investment and commercialization efforts. The state also has numerous efforts to address problems faced by small and medium manufacturers, through its investments in Empire State Development's Division of Science Technology and Innovation (NYSTAR), the ten regional centers that comprise New York's Manufacturing Extension Partnership (MEP), and the university-based Centers of Excellence and Centers of Advanced Technology.

New York State released FuzeHub in Fall 2013 to bring together many of these efforts. FuzeHub provides a platform to better connect New York's small and medium-sized manufacturers to the resources, programs and expertise they need to address technology and business challenges. Developed in partnership with NYSTAR and the National Institute of Standards and Technology (NIST), the FuzeHub portal allows manufacturers to receive assistance identifying specialized equipment and/or facilities, finding local suppliers, or securing engineering, design and prototyping services. Companies can also receive assistance applying for relevant or available state and local economic development programs.

Pulling all these resources and information requires extensive collaboration from stakeholders in each of New York State's regions. The key partners[33] in this initiative therefore include:

- Empire State Development's Division of Science, Technology & Innovation (NYSTAR).
- New York's 10 regional technology development centers (MEP centers).
- New York State's Centers of Excellence.
- Centers for Advanced Technology.

About the Initiative

FuzeHub was originally funded by a NIST T-CAR (Tool Development Cooperative Agreement Recipient) grant[34] as an effort to position New York State's available technology resources under one umbrella. Through the FuzeHub platform small-and medium-sized manufacturing are connected to the state's technology assets, universities, economic development organizations, and other key resources. While there are benefits in connecting companies to the experts and resources within a region, connecting them to the broader pool of resources available throughout the state can prove even more powerful.

[33] A detailed list of FuzeHub partners can be found here: http://fuzehub.com/our-partners/

[34] Tool Development Cooperative Agreement Recipients (T-CAR) grants are designed to aid MEP centers in their efforts to conduct pilot projects that address manufacturers' new and emerging needs.

A virtual "help desk" directs companies to numerous technical experts that can provide them with one-on-one guidance on matters ranging from technology transfer, network referral, or supply-chain management. The data hub provides a quick way for companies to connect directly with the expertise they need, when they need it. Companies submit their requests online at www.fuzehub.com. A core team of technical and manufacturing professionals then respond within 48 hours and work with the companies through live, individual discussions. The discussions seek to identify the specific challenges the business faces and then connect them with the necessary experts and resources.

For instance, through the FuzeHub portal two MEP centers—the Hudson Valley Technology Development Center[35] (HVTDC) and the Center for Economic Growth[36] (CEG)—recently assisted ThermoAura (a start-up company involved in nanotechnology and clean technology) in finding services related to site selection and manufacturing floor design. FuzeHub has also proved to be a useful resource for helping manufacturers find local suppliers. For example, Tech Valley Technologies (TVT) is a small manufacturer located north of Albany that develops and manufactures targets and training equipment for the U.S. military and law enforcement agencies. TVT had been sourcing circuit boards from a California-based contract manufacturer, but through FuzeHub, TVT was connected to HVTDC which in turn helped them find a manufacturer only two hours away in Fishkill, NY. Making this connection allowed TVT to reduce production time and strengthen communication with its supplier.

Solutions forums facilitate additional connections

In collaboration with the New York's regional MEP Centers, FuzeHub also hosts a series of 'Solutions Forums'. Solutions forums are half-day meetings where firms can engage in individual discussions with select regional service providers and companies. These meetings are not trade shows, but instead are intended to allow businesses to meet with technical experts and potential suppliers in their region that can help them solve specific problems. To ensure that these in-person meetings are productive, service providers and experts are vetted beforehand to make sure that they possess the technical aptitude and capability to provide the relevant services needed by the attending companies.

These solutions forums therefore play an important complementary role to the FuzeHub platform. First and foremost, they present a venue for building and strengthening the connections and relationships within a specific region. However, they also create a venue for promoting the FuzeHub platform, and its capacity to build connections with service providers and potential suppliers both in and outside of the region.

One early success demonstrates the power of this platform and the partners that sustain it. Hydrolutions—a Long Island-based company that develops and installs ecological waste water treatment systems—learned about FuzeHub at a 2013 Solutions Forum, hosted by the Long Island Forum for Technology (LIFT, the Long Island regional MEP center).[37] By working through FuzeHub, Hydrolutions was able to find solutions both internal and external to its region. Within the region, it

[35] http://www.hvtdc.org/
[36] http://www.ceg.org/
[37] http://www.lift.org/

found opportunities for installing and beta testing its equipment in Suffolk County, and externally it was connected to experts at the Rochester Institute of Technology's Pollution Prevention Institute in Western New York to do third-party environmental testing.

Looking Ahead

In the future, FuzeHub is looking to broaden its scope to engage the smaller scale designers and 'makers'. In 2014, FuzeHub began a partnership with Etsy, the online marketplace for handcrafted and vintage goods. This partnership is beginning with a pilot project that seeks to connect these designers and makers to local manufacturing partnerships that can produce their products at a greater scale. Similarly, they are also working to educate small and medium-sized manufacturers about what they need to do to take advantage of the new ideas and products developed by these small designers. If successful, this pilot project will offer a new approach for strengthening the connection between manufacturers and the maker movement.

FuzeHub is also planning an additive manufacturing-focused initiative with NYSERDA. Through this partnership with NYSERDA, FuzeHub representatives will utilize their networks to help convene a leadership workshop with leading industry and academic partners in late 2014 or early 2015. This workshop will assess the range of available opportunities and recommend actions to keep New York manufacturers at the forefront of additive manufacturing technologies.

Through the work of its many partners, FuzeHub has provided assistance to more than 400 New York State companies.[38] The FuzeHub model continues to prove its effectiveness and refine its capabilities by working in partnership with ESD/NYSTAR and New York's regional MEP centers. The FuzeHub team has also spoken with a number of other state MEP centers about this kind of collaborative model might work in their states.

[38] Several successful case studies are available at: http://fuzehub.com/portfolio_category/successful-connections/

Key Takeaways

- A centralized portal like FuzeHub, supported by a wide array of partnering organizations, can effectively connect companies to resources and experts beyond those found within their region.

- The in-person solutions forums are important for connecting companies to potential suppliers and service providers, but they also important venues for making companies more aware of the FuzeHub platform's many available resources.
    - Pre-vetting the service providers who attend the solutions forums increases the likelihood that manufacturers will find the technical expertise they need.

- Web-based systems promote wider access to services, but company enthusiasm and buy-in are forged by solving very specific problems.
    - Promoting individual successes can build credibility for the platform and program.
    - Ensuring that the information, resources, and connections are valuable, high-quality, and up to date are vital for maintaining credibility.

South Texas' North American Advanced Manufacturing Research and Education Initiative (NAAMREI)

The Initiative and Its Partners

Many regions target advanced manufacturing as an economic sector that will foster high-quality jobs. Attracting and growing these manufacturers necessitates creating an environment that enables them to be globally competitive. Perhaps more than any single factor, companies need workers that can quickly adopt and implement the latest advanced manufacturing techniques. The Rio South Texas Region—a seven-county region[39] along the Texas-Mexico border—started a number of workforce development efforts to support the manufacturing sector since the 1990s.

In 2007, the region's efforts to establish itself as a center for advanced manufacturing were aided significantly by a three-year, $5 million U.S. Department of Labor Workforce Innovation in Regional Economic Development (WIRED) grant. The region has sought to use the WIRED grant to realize the vision of turning the region into a center for innovative advanced manufacturing and accelerated product development (rapid response manufacturing).

The Rio South Texas' WIRED grant was the creation of the North American Advanced Manufacturing Research and Education Initiative (NAAMREI).[40] The NAAMREI effort seeks to establish the region as leading center for advanced manufacturing, in large part by developing a manufacturing workforce capable of supporting the most advanced manufacturing activities.

While many similar initiatives lose momentum once the grant period expires, the NAAMREI effort is notable for having continued to live on and thrive long after the grant expired. The effort's longevity is due in large part to the strength of its partnerships and the trust built among the many workforce groups, economic development organizations and educational institutions involved in the effort.

As a result, South Texas now sustains a multi-faceted, coordinated effort to support the region's manufacturers and train its workers. For the partners, these efforts have also yielded ancillary benefits, such as the creation of an extensive referral network. This network—built on years of trust and interaction—directs companies to the right resources, while also opening up opportunities for the service providers and educational institutions.

NAAMREI draws upon the support and work of a wide array of partners including (but not limited to):

- University centers (including the University of Texas–Pan American, University of Texas at Brownsville).
- Community colleges (including South Texas College, Laredo Community College, Texas State Technical College, Texas Southmost College).
- K-12 School districts (37 school districts and ten charter school systems).
- Region One Education Service Center.

[39] The region includes Cameron, Hidalgo, Jim Hogg, Starr, Webb, Willacy and Zapata counties.
[40] http://www.naamrei.org/

- Workforce Solutions of South Texas, Lower Rio Grande, and Cameron (the region's three workforce development boards).
- The Texas Manufacturing Assistance Center (TMAC, an affiliate of the Manufacturing Extension Partnership based at University of Texas-Pan American (UT-PA).
- Economic Development Organizations (including McAllen Economic Development Corporation, Edinburg Economic Development Corporation, Laredo Development Foundation, Mission Economic Development Corporation, Harlingen Economic Development Corporation, Rio South Texas Economic Development Council).
- City of McAllen.
- Community based nonprofit organizations (such as Valley Initiative for Development and Advancement).
- Area manufacturing associations (such as South Texas Manufacturing Association, Laredo Manufacturing Association).

About the Initiative

NAAMREI is attempting to establish itself as a center for advanced manufacturing, in large part by creating a manufacturing talent pipeline that touches all aspects of the workforce—from students to engineers and executives. For instance, community based organizations such as the Valley Initiative for Development and Advancement (VIDA) helps high school drop outs, especially those who left school because of economic or social difficulties, to continue their education and eventually join the workforce. University of Texas–Pan American (UT-PA) and TMAC (Texas Manufacturing Assistance Center) [41] on the other hand, focus on the higher end of the pipeline, supplying the manufacturers with highly skilled engineers and innovators.

To create this manufacturing talent pipeline, NAAMREI is structured around three regional alliances, each with its own focus areas:

- The T-STEM (Science, Technology, Engineering, and Math) Alliance, which focuses on aligning K-12, post-secondary school, and economic development activities.
- The Rio South Texas Manufacturing College Alliance Network, which seeks to expand and strengthen the region's customized manufacturing training programs.
- The North American Technology and Innovation Alliance, which promotes state of the art production processes.

South Texas College (STC) provides a home for NAAMREI at its Technology Campus in McAllen. A representative from STC serves as the Executive Director, who in collaboration with the NAAMREI management team (which includes the lead agencies for the three alliances), ensures the coordination of NAAMREI activities. As discussed below, these alliances each have a different focus but they engage an often overlapping set of partners. Moreover, while individual institutions or organizations do much of

[41] http://portal.utpa.edu/utpa_main/daa_home/tmac_home

the work on the different activities, they are often willing to position those activities under the NAAMREI umbrella.

The T-STEM Alliance focuses on encouraging students and workers to consider manufacturing careers. This effort, led by the Region One Education Service Center, is one of 20 organizations throughout the State of Texas providing support for the 37 school districts and ten charter school systems in the seven-county region. The T-STEM Alliance's efforts are aimed at the K-12 level, informing students about career opportunities available to them within the manufacturing sector. The region is working to ensure that students are adequately prepared in STEM fields early in high school. Then, in grades 11 and 12, students have dual enrollment opportunities with the region's community colleges.

Other NAAMREI partners support these efforts as well. The McAllen Economic Development Corporation (MEDC), for example, has helped to set up internships for area students with manufacturers in the region. In fact, MEDC has made offering internships a condition for some of its incentive offerings to manufacturers. UT-PA and TMAC have also collaborated with the T-STEM Alliance by working with UT-PA student groups to hold STEM camps for K-12 students. They have also worked with area K-12 STEM teachers, offering professional development training programs that cover topics from a project-based learning module, to robotics, and introducing instructors the kinds of tools that can be used for teaching engineering.

The Rio South Texas Manufacturing College Alliance is a partnership of the region's four community colleges—Laredo Community College, South Texas College, Texas Southmost College, and Texas State Technical College. The alliance supports area manufacturers, not only through providing customized training, but also by developing a recognized manufacturing credentialing system.

Since the inception of NAAMREI, the private sector has played an important role in curriculum development at the community colleges, so that their training programs can adapt to the specific and fast-changing needs of businesses. Colleges in the alliance offer training programs such as Six Sigma efficiency management, leadership, precision manufacturing, industrial maintenance, tool and die, welding, and robotics processes. Through this alliance, the colleges share curricula and work collaboratively.

The colleges have also made significant investments in advanced manufacturing equipment, such as robotics programming, Computer Numerical Control (CNC), etc. They also have established training labs that support the customized training needs of manufacturers in the region. STC's Institute for Advanced Manufacturing, for example, recently opened the Festo Technology and Automation Lab, providing a facility where students and workers can learn about the latest in robotic automation. In addition to investing in facilities and equipment, the College Alliance uses national occupation standards to certify those who complete the training programs. For instance, through a grant funded by the Texas Workforce Commission, the College Alliance established the National Institute of Metalworking Standards (NIMS) certification program.[42]

[42] https://www.nims-skills.org/web/nims/6

In addition to the customized training efforts, the colleges also offer numerous two-year degree programs, which can serve as a foundation for graduates to pursue post-secondary degrees. The efforts of the region's community colleges are vital to achieving NAAMREI's goal of developing a workforce capable of supporting the most advanced manufacturing processes.

The North American Technology & Innovation Alliance works to strengthen the competitiveness of the region's manufacturers. UT-PA's Rapid Response Manufacturing (RRM) Center leads the effort. UT-PA is the main supplier of the region's engineering talent, graduating several hundred engineering students each year. In addition, it is the home of the region's TMAC affiliate (the region's MEP center).

While the alliance initially focused on developing a 280-acre education and research park for Rio South Texas region, work on the park has lagged. Substantial progress has been made, however, in the delivery of many of the services provided by the TMAC, such as lean-manufacturing training and improvements in innovation processes. TMAC can also refer manufacturing clients to use the facilities of the RRM Center, with facilities to aid with new product development and rapid prototyping.

In support of this alliance, TMAC has also taken the lead in developing the Lean Sigma Academy. Each round of the Lean Sigma Academy introduces 20 to 30 UT-PA engineering students to lean-manufacturing principles and value-stream mapping. The Lean Sigma Academy is not part of the UT-PA Engineering school curriculum, but rather an additional opportunity for students. Participants also have the opportunity to apply what they learn toward on-the-ground projects with local companies.

The NAAMREI network helps identify and recruit companies willing to offer projects for Academy participants. Each student pays $500 to participate, which is refunded if they complete the program. This program began as part of the WIRED grant and continues to give students real advantages when they enter the job market. Currently, 40 to 50 percent of the students who complete the program are hired right out of college by area manufacturers.

Strong Relationships to Foster Sustainability

As noted earlier, the NAAMREI effort has continued to advance the cause of advanced manufacturing, long after the expiration of the region's large WIRED grant. Several factors contributed to this effort's sustainability. For instance, South Texas College commits one staff member's time to serve as the NAAMREI Executive Director. This level of staff support is necessary to coordinate activities and ensure that things are on track and move forward. Few regional initiatives have dedicated staffing, making it easy for participants to become distracted and let activities fall behind. Another factor in the initiative's longevity is the high degree of stability among NAAMREI partners. This continuity helps attract new partners to the NAAMREI efforts. This is particularly true with the region's business community where management turnover is greater. Departing managers will often connect incoming managers to the NAAMREI network.

The NAAMREI partners also hold quarterly meetings to discuss project activities and progress. These meetings provide an "accountability" moment, or deadline, that motivates the partners to make progress on their own NAAMREI projects. The quarterly meetings also let the leadership team track the

overall initiative's progress, identify any gaps that need to addressed, and discuss opportunities that may arise. This regular communication enables NAAMREI partners to respond relatively quickly to any potential opportunities (funding or otherwise) that may arise.

The job of hosting the meetings rotates among the members and efforts are made to use venues in Brownsville, Harlingen, Laredo, and McAllen. This rotation reinforces the notion that this is a regional effort, even though many of the core partners are located within the McAllen metro area. These regular meetings enable NAAMREI's partners to periodically revisit and recommit to their vision and goals, and to lay out their work program for the next year. The meetings help the NAAMREI partners to stay in synch concerning the region's direction.

Well beyond the formal quarterly meetings, the NAAMREI partners interact on a regular basis. This kind of regional interaction occurred well before the WIRED grant and the establishment of NAAMREI, and continues to strengthen and expand the regional network. These relationships have essentially led to the creation of a strong, extensive referral network. The partners know each other and their capabilities. If STC were to visit a company to discuss customized training and the company required a service more appropriately delivered by TMAC, for example, STC would make the referral to TMAC and vice versa. Additionally, it is not uncommon for the NAAMREI partners to make joint company visits with other partners such as MEDC. This network has proven beneficial on many levels, connecting manufacturers in the region to the appropriate service and service provider without too much difficulty.

One instance shows the power and importance of this network. Just prior to the recession of 2007-2009, STC received a $3 million grant from the Texas Workforce Commission's Skills Development Fund. This grant was originally intended to help provide customized training for automotive and plastics manufacturers. However, as the recession hit, many of these manufacturers endured significant layoffs or even went out of business. NAAMREI partners such as MEDC and the South Texas Manufacturers Association helped STC identify other companies that needed customized training. This informal referral system enabled STC to meet the demands of their grant, which was crucial not only for keeping the entire grant but also for making themselves competitive for future rounds of funding. The trust and long-standing relationships between the partners made this possible.

Looking Ahead

The ability to demonstrate their successes and impact promises to enable these regional partners to continue to secure the funds needed to advance NAAMREI-related activities. Because of its proven ability to meet training goals, STC has received competitive funds from the Texas Workforce Commission's Skills Development Fund. In addition, the City of McAllen has allocated $500,000 from its economic development fund (collected from local sales tax) to support customized training programs. It continues to do so in part because STC has been able to demonstrate how its training programs benefit McAllen workers and employers. To increase their competitiveness for other regional, state and federal funding agencies, NAAMREI will be looking to work with TMAC to explore ways to better measure and demonstrate the effects of its activities.

While many activities are carried out under the NAAMREI banner, it is not the only regional effort underway to support the manufacturing sector in the region. For instance, a group of economic development organizations have collaborated to form the Rio South Texas Economic Council (RSTEC) to support external marketing in the area. In 2015, UT-PA and UT-Brownsville will merge to form the University of Texas–Rio Grande Valley (UT–RGV), a new university. Projections suggest that UT-RGV will have over 50,000 students within the next decade. The merger will be important for the region, as the new university, with its new medical school and stronger PhD-level engineering program, will be eligible for additional resources to support innovation. The ongoing collaboration among the NAAMREI partners will help leverage these new resources in support of the region's manufacturing sector.

Key Takeaways

- Providing for dedicated staff support to the initiative can encourage and coordinate activities, as well as build capacity to respond to future funding opportunities.

- Regular communication and meetings can help maintain forward momentum in a regional initiative.
    - Regular meetings provide accountability moments where partners must explain progress to date—what they have, or have not, accomplished.
    - They encourage the sharing of information about current problems or opportunities.
    - They help build familiarity and trust among partners and help maintain consensus around a common vision and set of goals.

- It is vital to track and measure program outcomes in order to inform future funding opportunities.
        - MEP centers have extensive experience in collecting data to measure impact.

- A strong referral network—built on familiarity and trust among partners—can be a powerful tool for effectiveness and sustainability in the delivery of support services throughout a region.
    - Service providers benefit when partners refer companies to them.
    - Years of networking improve the effectiveness of these referral networks and better ensure that businesses receive the help they need to address their critical challenges.

The Advanced Manufacturing and Prototyping Center of East Tennessee (AMP!)

The Initiative and Its Partners

If there is a renaissance in the U.S. manufacturing sector, then much of it has been driven by emerging technologies that have completely transformed production processes. These technologies include advanced robotics, autonomous vehicles, energy storage, and additive manufacturing, among others.[43]

For these newer technologies to be truly transformative, they must become embedded within the production processes of area manufacturers. Moreover, workers must have the right skills to apply them in the production process. Building this kind of technical capacity within a region does not happen by accident. It requires targeted investments and the effective leveraging of available assets.

In East Tennessee regional partners have established the Advanced Manufacturing and Prototyping Center of East Tennessee (AMP!), which is a broad effort to expand the region's use of these technologies among area manufacturers.[44] This effort has two key elements. First, the partners are identifying ways to enable area manufacturers to better leverage the technology and expertise available through Oak Ridge National Laboratory (ORNL) and to utilize (or gain access to) ORNL's Manufacturing Demonstration Facility (MDF). Second, they are constructing a talent pipeline that encourages young people to pursue manufacturing careers and provides them with the skills to utilize these advanced manufacturing technologies. The initiative prepares college students and incumbent workers.

These efforts are being funded in part by a 2012 Advanced Manufacturing Jobs and Innovation Accelerator Challenge (AMJIAC) grant.[45] AMJIAC pools money from several federal agencies including: U.S. Economic Development Administration, National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP), U.S. Department of Energy, U.S. Small Business Administration, U.S. Department of Labor's Employment and Training Administration.

The AMJIAC initiative promotes the growth of advanced manufacturing clusters at the regional (sub-state) level. By receiving this award, East Tennessee's AMP! project obtained almost $2.4 million over three years to grow and develop the additive manufacturing and rapid prototyping capacity of 20 counties in East Tennessee. Through this grant, the partners have been able to facilitate efforts to expand regional use and capacity in additive manufacturing, and do so in a more coordinated and strategic manner.

The key partners in the initiative include:

- Oak Ridge National Laboratory (ORNL).
- Technology 2020 (Tech2020).
- University of Tennessee Center for Industrial Services (UT-CIS).
- Pellissippi State Technical Community College.

[43] For more on these disruptive technologies see: http://www.mckinsey.com/insights/business_technology/disruptive_technologies
[44] http://www.amptn.com/
[45] http://manufacturing.gov/accelerator.html

About the Initiative

Assembling the partners for the AMP! initiative was made easier by the fact that many of the partners had pre-existing relationships. For example ORNL, Technology 2020 (Tech 2020), and University of Tennessee Center for Industrial Services (Tennessee's MEP Center) had previously partnered with several other organizations, including Roane State Community College, on the Advanced Composites Employment Accelerator.[46] This earlier project sought to develop activity around composite materials/carbon fibers in East Tennessee. These existing relationships greatly strengthened the ability of the region to respond to the AMJIAC funding opportunity with a competitive proposal. The partners knew one another, knew each organization's strengths, and understood what they could bring to the project. They also shared a relatively similar vision for what they hoped to accomplish—to continue and intensify the region's advanced manufacturing capacity.

The key component of this effort is launching a new manufacturing network—the Regional Advanced Manufacturing Partnership (RAMP). RAMP encourages networking among the region's manufacturers, regardless of size. This networking, even informal conversations among firms in the region, can lead to supply-chain opportunities and the sharing of best practices. In building the network, AMP! partners worked with the University of Tennessee's Center for Business and Economic Research to better understand the region's manufacturing industry mix and to create a more complete inventory of the region's manufacturers. AMP! partners also met with companies in both individual and group settings to gain a better understanding of the problems they face and assistance they need.

RAMP provides a mechanism for connecting manufacturers—particularly small- and medium-sized firms—to key resources and, importantly, to those available through ORNL. This effort not only makes firms aware of all available services, but also shepherds them through the process of selecting and accessing the appropriate services or resources to address their specific problems. Through the RAMP network, AMP! partners create a gateway for manufacturers to get a broad range of needed assistance.

RAMP efforts are still in the early stages. In the program's first year, 14 companies officially became RAMP members. RAMP meetings, however, have attracted much greater attendance. More than 75 representatives from 45 different companies attended a fall 2013 RAMP meeting. Numbers attending have been relatively consistent over time; the goal is to see a continued rise in attendance.

One of the effort's key goals is to better connect the region's manufacturers to ORNL resources and expertise. For instance, a manufacturer may require the specialized technical support for an additive manufacturing problem that can only be solved by working with the experts at ORNL and/or using the Manufacturing Demonstration Lab's specialized equipment. Firms that need specialized equipment and knowledge in areas—such as metal additive printing or large chamber polymer printing—are referred to ORNL. Typically, these projects do not last longer than three or four weeks.

[46] This project was funded through the 2011 Jobs and Innovation Accelerator Challenge Grant funded by US EDA, ETA, and SBA.

For projects where alternative solutions may exist, such as small chamber polymer printing, the partners may direct the firm to providers that may have a faster turnaround or at less cost. Companies that need assistance in areas such as lean manufacturing or process improvement are better served by connecting with resources such as UT-CIS.[47]

In addition to providing this gateway to services, the partners also serve a broker function. They help manufacturers in the region navigate through the process, working with them to craft the appropriate agreement needed to establish a relationship with the researchers at ORNL. Small firms especially are often reluctant to pay for services, so the grant provides funding to help offset some of the project costs.

In addition, the region has leveraged $200,000 from the Appalachian Regional Commission (ARC) to further offset the cost of these efforts. Firms are expected to pay half of the cost of their projects with ORNL, but ARC funding can provide grants of $500 and $10,000 to defray these manufacturer costs. It is estimated that this ARC funding will help roughly 30 small Tennessee manufacturers over a two-year period. Project partners are also looking to recruit companies to become members of RAMP.

In addition to their general outreach activities, AMP! partners organize tours of ORNL's MDF. These tours give manufacturers in the region a chance to see additive manufacturing technologies and techniques in action. Visitors can also get ideas on how they might apply these techniques in their own the production process, as well as ways they might expand or improve on the additive manufacturing activities they already have underway. Through the first year of the grant, almost 150 companies toured the facility. Not all the companies that visit will find relevance to their own production process, but the tours will help identify some companies that would benefit from adding or expanding additive manufacturing capacities.

Fostering Cutting-edge Workplace Skills

AMP! has a significant workforce development component. It is widely understood that, if the region is to become a center for additive manufacturing activities, it must have a workforce that possesses the skills necessary to maximize these technologies. In addition to connecting manufacturers to key support services, the initiative connects them to a pipeline of talent with a greater manufacturing capacity. Pellissippi State Technical Community College—one of the core AMP! partners—plays the leading role in creating this specialized talent pipeline.

Pellissippi State currently offers an engineering technology degree program. In part through the AMP! Initiative, it now offers a degree concentration that enables students and workers to earn a certificate in additive manufacturing. This program is designed to serve both traditional community college students and incumbent workers looking to update their skills. Currently, about 60 percent of the students are adult learners, while the remaining 40 percent are traditional students in degree programs. This ratio is beginning to shift somewhat, since a number of adult learners are continuing their education beyond

[47] https://cis.tennessee.edu/Pages/default.aspx

the certificate level. A number of these students in the certification program are within reach of and pursuing a two-year degree.

The Pellissippi State program has been able to leverage other resources. For instance, students may undertake laboratory assignments using the equipment available through ORNL's MDF. In addition, the program has partnered with RAMP members on innovation challenge competitions, where companies bring real-world problems to the students to solve. Working as teams, students develop solutions to these real world problems, providing not only real applied learning, but also helping companies solve their problems.

AMP! partners are involved in FIRST Robotics competitions for high school students. The region has formed a 501(c)3 nonprofit—Tennessee FIRST, LLC—which includes many of the region's larger manufacturing interests. For example, Alcoa, ORNL, and Bechtel serve on its board.[48] Through Tennessee FIRST, AMP! partners have provided systematic support and organization, replacing a former *ad hoc* style of arranging sponsorships and helping to increase regional participation in these events. The FIRST Robotics program has not only introduced many students to potential manufacturing careers, but it has also enabled several participants to obtain university scholarships.

To manage this diverse range of activities and multiple funders, the partners have established committees to address major tasks, such as connecting manufacturers to key resources like ORNL, organizing RAMP, and delivering technical education programs. A steering committee of the main AMP! partners provides overall guidance and coordination of activities. While some earlier versions of these activities were already in place, the AMJIAC initiative is facilitating them in a more coordinated and less *ad hoc* manner.

Looking Ahead

Looking forward on efforts to upgrade workforce capacity, Pellissippi State is working to connect its additive manufacturing certificate program to an additive manufacturing concentration available through Austin Peay State University's Department of Engineering Technology. In doing so, the university will help secure a more robust talent pipeline for the region.

As companies perceive greater value in attending RAMP meetings and begin to take advantage of the opportunities it affords, it is hoped that they will assume stronger leadership roles in its operation and future direction. The goal is that, in future, RAMP efforts will be driven largely by the manufacturers themselves and less by the AMP! partners.

If the partners are successful, they will have a track record of completed projects, having helped a significant number of companies. Moreover, they will have established East Tennessee as one of the premier regions for additive manufacturing. In addition, the region will better serve workers seeking to get into additive manufacturing with up-to-date training and numerous career opportunities.

[48] http://tnfirst.org/

UT-CIS is also exploring the possibility of expanding the AMP! model of connecting small- and medium-sized manufacturers to large regional assets in other parts of the state. The hope is to organize manufacturers through regional partnerships that can help manufacturers make better use of the services offered through UT-CIS. Provided the right partners are involved, these kinds of regional organizations also have promise to help regions maximize the innovation potential of large regional assets, such as St. Jude Children's Research Hospital in Memphis.

Key Takeaways

- The mere availability of services and expertise within a region does not mean that local companies will necessarily take advantage of them.
    - Companies often need assistance in finding and connecting to the right services, particularly when resources (such as national labs, universities) often do not present an obvious front door or public explanation of the services they offer.

- Creating a common regional narrative can help bring partners together and connect seemingly disparate efforts into a more coordinated effort (such as establishing a talent pipeline).

- New technologies are not always adopted immediately by firms and workers that could benefit from them.
    - Awareness of how new technologies might be applied to a specific manufacturing process spreads incrementally.

- Longstanding working relationships can prove successful in launching and sustaining new regional initiatives.

- Sustainability should be planned for throughout a regional initiative.
    - An initiative should continually seek additional resources and funding sources.

- What works here may work in other places around the country. Creating a model that is replicable.

New Mexico's Small Business Assistance Program (NMSBA)

The Initiative and Its Partners

Leveraging the economic development potential of large institutions, such as research universities or national labs, is a common challenge for many regions and states. Large manufacturers often have little difficulty accessing the advanced expertise and resources of national labs, but small- and medium–sized manufacturers often do not know where to begin. Smaller manufacturers may not know what might be available to them, or even how to begin asking the right questions. The inability to make these kinds of connections, however, can diminish the economic development potential of these institutions.

In regions that do not have a large and dense manufacturing sector, many small manufacturers experience difficulty accessing needed manufacturing assistance and expertise. This can lead to smaller companies licensing new technologies to be manufactured elsewhere outside the region. This is a key issue for New Mexico, which has approximately 29,000 manufacturing jobs statewide spread throughout almost 1,700 individual manufacturing establishments. With very rare exceptions (such as Intel in Rio Rancho), most of the state's operations are small- and medium-sized manufacturers. If New Mexico's manufacturing sector is to survive, it must retain and grow these companies.

New Mexico has an advantage in being home to two of the largest national laboratories in the country: Sandia National Laboratories (SNL) and Los Alamos National Laboratory (LANL). These national labs are prominent in the New Mexico economy, being among the largest payers of state Gross Receipt Taxes (GRT). For a smaller New Mexico manufacturer, however the idea of working with one of the labs may seem daunting. These companies may not understand how lab-based technology might help their particular business. They may not even know how to frame the questions appropriate to access the economic development capabilities at their disposal.

To address this situation, the New Mexico Small Business Assistance (NMSBA) program provides the means to help New Mexico's smaller manufacturers find the help they need.[49] The NMSBA program provides an excellent example of how one state leveraged its national labs, the state's universities, and the New Mexico Manufacturing Extension Partnership (NMMEP) in support of this underserved group. The New Mexico Legislature initiated the program initiated in 2000 with the purpose of "bringing the technology and expertise of the national laboratories to small businesses in New Mexico to promote economic development in the state, with an emphasis on rural areas."[50]

NMSBA works by providing New Mexico GRT credits to the for-profit companies that operate the national labs in exchange for providing unique services (not available in the private sector) to New Mexico-based companies. Services include enlisting lab scientists and engineers to help solve technical challenges that require testing, design consultation, or access to specialized equipment.

[49] http://www.nmsbaprogram.org/

[50] *NMSBA Annual Report 2012*, p. 2. Available at: http://www.sandia.gov/working_with_sandia/technology_partnerships/_assets/documents/NMSBA_Perspectives-2012-FINAL.pdf

There are set dollar values for each tax credit to the labs depending on the nature of the project: $10,000 for urban counties[51] and $20,000 for rural counties. When the NMSBA program began in 2000 with SNL, operated by Lockheed Martin, this was the only national lab paying GRT in New Mexico. At the program's inception the state provided $1.8 million in GRT credits, annually. The program expanded in 2007 when the management of LANL changed to Los Alamos National Security, LLC (LANS, LLC) and it began paying GRT. With the change in management at LANL, the program expanded to its current levels and both labs are now eligible for up to $2.4 million of GRT credits each year.

Ensuring that companies get the help they need, projects occur in a time frame that works for both companies and the labs, and that the labs can maximize their tax credit opportunities requires the participation of several partners. The key partners in this initiative include:

- Sandia National Laboratories (SNL).
- Los Alamos National Laboratory (LANL).
- New Mexico Manufacturing Extension Partnership (NMMEP).
- University of New Mexico's Management of Technology Program.
- New Mexico State University's Arrowhead Center.
- New Mexico Institute of Mining and Technology.

NMSBA Program Objectives and Engagements

In order to qualify for NMSBA assistance, firms must have a location in New Mexico and be small businesses as defined by the U.S. Small Business Administration (SBA).[52] The SBA size limits vary by the type of business. Most categories for manufacturers must have 500 or fewer employees, making all but a handful of New Mexico firms eligible.[53] When applying, firms can indicate which lab they prefer to work with (if they have a preference) or even identify a Principal Investigator (PI) with whom they would like to work. The NMSBA Program is not intended to compete with the private sector, but rather to use the unique assets and knowledge of the national labs to help solve specific technical problems that New Mexico companies face (such as design, testing, etc.). Therefore, when applicants describe their need, they must explain why this problem cannot be solved, at a reasonable cost, within the private sector.

Given the specialized expertise of the partners, manufacturers are the most common type of small business to take advantage of the program. In 2013, 34.8 percent of NMSBA projects were for New Mexico-based manufacturers. Another large industry served was professional, scientific, and technical services with 27.2 percent of 2013 projects, as were agriculture and natural resources (13.9 percent) and oil and gas, utilities and mining (5.4 percent). Not designed as long-term engagements, NMSBA projects typically last 90 to 120 days. Nevertheless, firms can apply for NMSBA assistance on multiple occasions, with different challenges not a continuation of an earlier project. Firms, however, cannot exceed the $10,000 and $20,000 threshold within a calendar year.

[51] Bernalillo County (Albuquerque) is the only New Mexico County considered to be urban.
[52] http://www.sba.gov/content/guide-size-standards
[53] The 2011 U.S. Census Bureau county Business Patterns showed that only 4 New Mexico-based manufacturers had more than 500 employees.

The NMSBA program has a regional focus. Designed as a rural program, it provides twice the dollar amount in services to firms located in rural counties. A general programmatic goal calls for ensuring that rural companies account for at least 60 percent of NMSBA projects. In fact, rural projects comprised almost two-thirds of all NMSBA projects between 2000 and 2012 (1,329 of 2,036 total projects). In 2013, rural firms accounted for 65 percent of all projects (230 of 354 total projects). In terms of the dollar value of assistance provided, between 2000 and 2012 rural counties received 81.7 percent of the value of assistance provided through the NMSBA program.[54] This disparity is not surprising, given the relatively smaller dollar values available to companies in New Mexico's only urban area, Bernalillo County.

Types of Projects

The NMSBA program allows for three types of company engagements: individual projects, leveraged projects, and contract projects.

Individual projects are the most common, accounting for about 50 percent of all NMSBA funding. Individual engagements involve solving specific problems that may relate to design, testing or any other kind of technical challenge that an individual business has encountered. No matter how much research a client company has done on the NMSBA program, the firm may or may not have a clear idea of exactly how to prepare for getting laboratory assistance. Many companies do not know the entirety of their needs. Some have a good technological background, but need to improve specific products, or they need to evaluate their entire production process and lack the requisite skills to do that. Through the NMSBA program, they will be able to access a project manager (PM) from one of the labs, who will work with the client to assess and clarify the technical challenge.

The PM determines if the proposed project falls within the program guidelines, ensuring that the time frame for each project meets the expectations of the company and Principal Investigator (PI). Some projects have a very short time frame, while others have a longer one in mind. NMSBA accepts individual projects until the funding for the year is exhausted, but generally individual projects must be submitted by July or August.

NMBSA assistance represents good value for smaller, New Mexico-based companies because the labs are able to take advantage of Department of Energy burden waivers (reducing overhead burdens), so that the NMSBA credits go roughly two times further than they might otherwise.

Leveraged projects involve several companies collaborating on a common problem. These companies may or may not be competitors, but they may be connected through their supply chain, share agricultural concerns within a watershed, are linked through an industry association, or have other connections. For example, the New Mexico Chile Association brought several of its members together for a leveraged project aimed at developing better methods for sorting and removing the stems from chilies. Leveraged projects allow firms to pool their funding so that they can tackle larger or more complex problems. If for instance there are three rural companies involved, the project may receive up

[54] http://www.nmsbaprogram.org/userfiles/NMSBA_Perspectives-2012-FINAL.PDF

to $60,000 in support. Overall, leveraged projects account for approximately 30 percent of the total dollar value of NMSBA projects.

Working with multiple companies can create some additional challenges, and the NMSBA program has enlisted a voluntary advisory council to review the leveraged projects and address some of these issues. This advisory council is made up of key stakeholders from the labs and partners, the private sector, and other relevant experts. During the review process, the advisory council considers intellectual property rights, legal and confidentiality issues, and availability of the assistance in the private sector, among other factors. All participating companies share equal ownership of the information generated during the project. Given this additional step to the review process, applications for leveraged projects are only accepted twice a year, with deadlines in September and February. Given the complexity of these leveraged projects, they tend to take longer to complete and to have less immediate, short-term impact.

In some instances, academic institutions may be the best source of expertise. If so, NMSBA will contract for services with NMMEP (the state's MEP center) or one of New Mexico's three research universities: the University of New Mexico, New Mexico State University and New Mexico Tech. These contract projects account for about 20 percent of the total dollar value of NMSBA projects. NMMEP provides the services for the majority of these contract projects. These projects often involve core MEP activities related to lean manufacturing and growth services. NMMEP receives no direct state appropriation, so the revenue generated from the NMSBA program provides an important alternative source of funding.

Each university brings its own strengths to the NMSBA program:

- The University of New Mexico's Management of Technology program helps companies explore new markets and new applications for their projects.
- As the state's public land grant university, New Mexico State University brings expertise to product development primarily through the engineering and agricultural schools.
- New Mexico Tech often helps companies trying to solve particular problems through specialized facilities and faculty expertise, especially in areas related to computer science or rocketry and explosives.

The contracts with the universities make it possible for faculty members to engage students in real-life challenges and provide valuable experience, while solving the problem for a small business. The NMSBA program expects faculty to provide strong supervision of these projects, thereby assuring the quality of services.

MEP's Role in NMBSA

For companies utilizing Sandia's NMSBA, MEP staff serve as the PMs, helping small businesses frame their questions and help them accurately identify the kinds of expertise they need and the time frame for completion. They also connect them to the right PI with the time, interest and expertise to help solve their problem. At Sandia, the PMs also make sure the NMSBA demand fits within the broader Sandia workload.

While many Sandia scientists and engineers relish this kind of company engagement and problem-solving, Sandia strives to limit the amount of NMSBA projects an individual PI can undertake over the course of the year. The goal is to avoid overburdening PIs and to discourage them from viewing the NMSBA program as a funding source for their own research. This means that the NMMEP PMs must balance the NMSBA projects over a wide group of PIs.

Currently about 90 Sandia scientists and researchers serve as PIs over the course of the year, an increase of about 30 percent over the past few years. The LANL NMSBA program has the same process but the PM role is filled with internal lab staff.

PMs must balance the timing and flow of projects over the course of the year. They must manage the workload and also balance the number of projects, assuring that the labs may achieve but not exceed the $2.4 million GRT credit. Since all projects must be closed out by the end of the year, few new projects are taken on at the end of the year unless they can be accomplished quickly. This is particularly challenging for SNL since they do a greater proportion of smaller, urban projects. This means that they have to manage more projects than LANL, which does more rural projects. Leveraged projects are somewhat easier to manage because they are larger and have more fixed application deadlines (January and September). In 2012, NMSBA was able to do $4.6 million of its allotted $4.8 million worth of assistance. When LANL first joined the program they fell short of their target for the first few years, but now both labs come close to reaching their targets.

Labs: Working Collaboratively, but Maintaining Different Cultures

There are distinct differences between the participating labs, reflected in the manner in which they implement the NMSBA program. SNL tends to be more focused on engineering, while Los Alamos is more research-focused. As a result, PIs at LANL often engage their post-docs and grad students in NMSBA projects. Since post-docs and grad students bill at a lower rate than faculty, companies can get more hours for their money.

LANL also has a more rural focus. Over 80 percent of LANL's 2013 NMSBA projects were done for companies in rural counties (130 out of 160 total projects). LANL is particularly engaged with projects in the seven-county Northern New Mexico region (Los Alamos, Mora, Rio Arriba, Sandoval, Santa Fe, San Miguel, and Taos) which is the focus of Los Alamos Connect, the economic development component of the LANS, LLC Community Commitment Plan.[55]

NMSBA is the technical assistance component in a broader suite of services that Los Alamos Connect offers to support the region's economic development. Other services available to companies in the region include market intelligence and networking opportunities through North New Mexico's Regional Development Corporation (RDC), and preference for funding through the region's Venture Acceleration Fund.

[55] https://www.lanl.gov/community-environment/community-commitment/_assets/docs/2014-community-commitment-plan.pdf

Sandia National Laboratories, by contrast, has a more engineering focus and a greater proportion of its NMSBA projects are with companies in Bernalillo County. For instance, 46 percent of SNL's NMSBA projects were done for companies in Bernalillo County (90 out of 196 total projects).[56]

Much like LANL, NMSBA is just one item in Sandia's economic development toolkit. For instance, SNL's Entrepreneurial Separation to Transfer Technology program enables researchers to leave their position with the lab to attempt a start-up company. If they wish, they can return within three years. SNL is also developing a Science and Technology Park next to the lab and Kirtland Air Force Base, which is currently home to a number of start-up and mature companies. The gates and guards, however, often make SNL seem quite inaccessible. This perception is the reason why the Sandia Research and Technology Showcase, an annual event, and especially the NMSBA program are both important to its economic development activities in New Mexico.

As a rule, the labs present a common face for the NMBSA program. There is a shared website, single annual report, and single application for the program. This common face is important for several reasons. First, it makes applying for assistance from the program appear seamless to companies, who do not have to be concerned with identifying the right lab or investigator (although this option is available to them). The united front also helps demonstrate the program's value to legislators and other key stakeholders. An annual report shows aggregate program impacts (as determined by an independent economist) and provides case studies of successful projects, demonstrating the program's impact on the state economy.

With this approach, labs can maintain their autonomy, while at the same time appearing as one seamless program. Coordination and consensus are not only maintained through daily interaction, but the program leaders meet three times per year for strategic planning sessions. As evidence of the value of this approach, companies and legislators continue to be strong supporters of the NMSBA program.

Looking Ahead

There does not appear to be a strong desire to expand the size of the NMSBA program in the future. Although it took LANL a few years, both major labs are now operating at capacity and make use of most of their allotted tax credits. The program's current size generally reflects the number of quality projects available in New Mexico each year. The current level of activity, moreover, fits within the broader mission and responsibilities of the labs and their researchers.

That said, since the program expanded in 2007 to include LANL and added additional tax credits, there has been a shift in the screening of projects. Generally speaking, the quality of NMSBA projects has improved as the criteria for selecting NMSBA projects now takes greater account of the project's potential return-on-investment or opportunities for growth. In doing so, the program can show greater demonstrable impact.

[56] http://www.nmsbaprogram.org/userfiles/NMSBA_Perspectives-2012-FINAL.PDF

Although the consensus appears to be that the program is currently right sized, there is some interest in building onto the program, addressing additional needs. While the NMSBA program works well helping companies solve immediate, shorter-term problems, some believe that many New Mexico manufacturers might benefit from longer-term engagements.

There are ongoing discussions to increase the funding for technological maturity programs and also to help young firms get through the so-called "Valley of Death"—the difficult period between the time when a company develops a product and when it is able to scale up production and take it to market.

Both Sandia and Los Alamos help license new technology. This process aids companies in getting funding for technology maturation. An NMSBA-type program might be able to help address this issue by allowing for larger projects or longer engagements with lab personnel and other experts. The challenge of keeping the company and its manufacturing operations in New Mexico would remain.

Key Takeaways

- Small companies are not likely to be able to access the resources and expertise of large institutions (e.g., national labs, universities) without expert assistance.
    - MEP centers, with their ability to work in both worlds, are well positioned to play the role of connector and translator for small companies looking for this type of assistance.

- If small manufacturers are connected with the right expert or researcher, relatively small dollar and short-term engagements can make a substantial difference to that company's growth trajectory.

- Right-sizing the assistance program is important to its long-term viability.
    - Programs should not overburden the PIs or experts, particularly if the support required is outside their core activities, making experts and managers less willing to participate.
    - Keeping the program focused may allow for greater attention to higher quality, higher impact projects.

- Consistently tracking and measuring project scope and impact are vital for maintaining program support among legislators and other key funders.

Northwest Wisconsin's ExporTech initiative

The Initiative and Its Partners

Finding new markets is a key aspect of a manufacturer's growth strategy. This is particularly true during economic downturns, when many manufacturers may look to expanding their export opportunities. Export markets provide great opportunity for American manufacturers. According to the U.S. Chamber of Commerce, 80 percent of world purchasing power is outside of the United States. The developing world contributed nearly three-quarters of global growth between 2005 and 2009.[57]

For many small- and medium-sized American manufacturer, given their often limited experience in international markets, the idea of taking advantage of export opportunities may seem daunting. Smaller firms may face real and perceived barriers to beginning or expanding export activities. Such constraints may range from language and cultural barriers, to unfamiliarity with foreign regulations, to difficulty in receiving or processing payments, or uncertainty about finding reliable distributors, among others.[58] Yet, even small firms can overcome many of these barriers by finding the right connections, support, or counseling.

Export promotion programs range from those that simply offer encouragement to companies to explore international markets, to those that work intensively with a firm to target specific international markets and to develop and implement strategies for moving into them. The ExporTech program—developed jointly by the National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP) and the U.S. Export Assistance Service and implemented in 25 states—is among the among the most intensive export assistance programs available.

ExporTech is a nine-week program providing intensive counseling for companies that are either new to exporting, or looking to grow their international markets in a more deliberate manner. The program connects firms to experts who help them develop customized export strategies and lay out the steps necessary for them to enter specific markets. They also assist companies in identifying ways to overcome their most pressing obstacles and increase their chance for success.

Northwest Wisconsin is one region that has successfully implemented the ExporTech program. ExporTech requires a regional effort in order to pull together a wide array of resources and experts and provide for the multiple regional partnerships required for effective implementation and delivery. In Northwest Wisconsin, the University of Wisconsin-Stout (UW-Stout) Manufacturing Outreach Center[59] (MOC) in Menomonie has led this initiative since 2012.

The core partners in this initiative include:

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[57] *Developing Successful Exporters—Special Focus on ExporTech*[tm]. Presentation given by Mike Stone at the State Science and Technology Institute Conference, September 17, 2013, Portland, OR.

[58] Stone & Associates, *On the Threshold: refocusing U.S. Export Assistance Strategy for Manufacturers,* June 2013. Available at: http://www.nist.gov/mep/state-of-mfg/upload/US-Export-Assistance-Strategy-for-SMMs-6-20-13-Final-high-res.pdf

[59] http://www.uwstout.edu/moc/

- University of Wisconsin-Stout (UW-Stout) Manufacturing Outreach Center (MOC).
- U.S. Export Assistance Center (USEAC).
- Wisconsin Economic Development Corporation (WEDC), local economic development organizations, and Chambers of Commerce.
- Private sector volunteers and experts.

About the Initiative

The State of Wisconsin is served by two MEP centers—Wisconsin Manufacturing Extension Partnership (WMEP) and UW-Stout MOC. WMEP serves many of the state's larger urban areas and manufacturing centers, covering an area that accounts for about 70 percent of Wisconsin's exports. By contrast, MOC serves the 33 counties of Northwest Wisconsin, a rural region more noted for tourism and agriculture than for manufacturing. The Northwest Wisconsin region, however, is home to more than 3,500 manufacturers. The great majority are small- and medium-sized firms employing fewer than 500 people.[60] This is an important consideration, because MOC has fewer potential companies to draw on and a more limited pool of potential experts and partners to help deliver services

This relatively small footprint has required MOC to build many new relationships in preparing to deliver ExporTech services. MOC had a pre-existing relationship with the Wisconsin Economic Development Corporation (WEDC), but not in the area of international trade. It had not worked with the U.S. Export Assistance Center (USEAC), or with many of the other types of experts (such as international trade experts, bankers, shipping and packaging companies, etc.) needed to help firms plan and implement an export strategy.[61]

MOC, therefore, started almost from scratch in building the necessary network. In some instances, this required "cold calling" potential partners to invite them to participate. In others, MOC was able to leverage the networks and connections of existing partners. A key resource for MOC is Wisconsin's District Export Council (DEC), an organization of business leaders who volunteer to provide companies with knowledge and expertise related to international trade.[62] DEC is uniquely connected to the kinds of people needed to strengthen this network of support. Over time, this network of networks grew to the point where the MOC was able to assemble the experts and resources necessary to implement the ExporTech program.

Counseling of individual firms is a major component of the ExporTech program. The coaches guide firms through a nine-week process, connecting them with necessary resources and helping them draft their firm's export strategies. Since MOC had few initial connections in the international trade community, finding these coaches required significant effort. One of the early program coaches was an international business professor at the University of Wisconsin-Eau Claire (UW-EC). This partnership with UW-EC not only provided coaching, but also created a structure for students to provide market research for participating firms as a part of their course work. In the early days of the program, several independent

[60] http://www.uwstout.edu/moc/about/
[61] A list of USEAC offices can be found here: http://export.gov/usoffices/index.asp
[62] A locator of local DECs can be found here: http://www.districtexportcouncil.org/local-dec-locator

consultants served as coaches for no fee, seeing it as an opportunity to build relationships for potential paid consulting in the future.

Once the partners and experts were in place, MOC began to implement the ExporTech program throughout the northwest region. The first program took place in Wausau, WI. Wausau, located in Marathon County, was selected because the Marathon County Economic Development Corporation (MCEDC) was active in promoting exporting among its members. MCEDC had already developed a network of area manufacturers who were interested in expanding their international presence. The ExporTech program was able to build on this network, illustrating the important role of local partners, such as an economic development corporation or Chamber of Commerce. Starting with Wausau, MOC and its partners delivered additional ExporTech programs in Eau Claire and Rhinelander.

Local partners can be key in identifying potential participating firms. These local organizations can also investigate and gauge the overall interest in exporting within an area. They can ask local firms basic questions about their markets outside of North America, whether or not they have received inquiries from new foreign markets, and what percentage of their current sales are international.

Identifying firms to participate in ExporTech can be a big challenge, especially in more rural locations. Effective participation requires a significant time commitment from upper management, and smaller firms may also find the monetary cost of participating prohibitive. The average cost to deliver ExporTech services is about $5,000 per firm. WEDC, however, offsets some of the cost by using State Trade and Export Promotion (STEP) grants to provide $2,500 scholarships. MOC also works with partners to put together additional incentives, such as free Chamber of Commerce memberships, to minimize the cost burden.

Companies participating in ExporTech complete the program with a detailed plan to export their product. As with any planning exercise, the most critical time period for success comes between the completion of the plan and the time when the firm is able to scale up production and take it to market. This period is often referred to as the planning "Valley of Death."

The ExporTech program makes several efforts to help firms through this vulnerable period. For instance, as part of the plan, ExporTech participants must identify three potential export markets. Preparing for three markets helps prevent firms from getting discouraged if they fail to make progress in one market. In addition, many of the partners continue to work with firms as they work through their export plans. Often this is where USEAC representatives become actively involved by providing trade counseling, matchmaking, and/or market research services. They may also connect firms to other available resources and services.

An important service available to participating firms is the Gold Key matching service, offered by the U.S. Commercial Service (USCS).[63] Once firms have successfully completed ExporTech, USCS will work with them to set up initial meetings in the countries of their choice and guide them through the export process. This service is priced at $700, but FedEx sponsors this program for ExporTech graduates. As part

[63] http://export.gov/salesandmarketing/eg_main_018195.asp

of this sponsorship, FedEx requires companies to set up or have an account with FedEx, but companies are not required to use FedEx for their shipping needs.

Each round of ExporTech requires the participation of six to eight companies. It is sometimes challenging to identify firms willing to participate and whose internal leadership is truly committed to expanding their international presence. MOC had planned to deliver ExporTech in LaCrosse but was forced to postpone due to an insufficient number of participants.

Moving forward, right-sizing the program to the region will be a key to sustaining the program over time. Recruiting firms to participate is time-intensive, requiring multiple conversations. UW-Stout MOC hopes to avoid recruiting firms and then not being able to deliver the program because of a shortage of participants. The program, therefore, strives to have a strong understanding of the strength of local demand. At present, MOC feels that there exists enough demand among the region's manufacturers to offer ExporTech in the spring and in the fall each year.

Delivering the program requires a great deal of time and effort from a wide array of partners. ExporTech partners may be involved in providing expertise to companies, recruiting participating companies or facilitating meetings and these activities can prove time consuming. Since ExporTech is often not the primary job of even the core partners, project organizers need to be careful about how they use the partners' time. If they ask too much, partners may be reluctant to participate in the future. As a result, organizers must be judicious in how often they draw upon their key partners. However by building a deep bench of partners, organizers can alleviate the burden on any one partner.

Looking Ahead

MOC is moving forward with the bi-annual offerings of ExporTech, doing so with their own locally based facilitator. In addition to working with local economic development organizations to identify potential participants, MOC will work with a number of their ExporTech alumni to promote the program to their peers in other companies. They also intend to work with WMEP which has produced a number of marketing materials to promote the program, including video testimonials.

Key Takeaways

- ExporTech initiatives require extensive regional partnerships that often build on networks of networks.

- Local partners are critical to these types of efforts, but initiatives must take care not to overburden their partners.
    - Assume that partners they have allotted a specific amount of time to your effort, and then use their time strategically.
    - A deep bench of partners is vital to sustainability.

- Program sponsors must obtain a realistic sense of the demand among potential participants.
    - Scheduling too many programs can lead to poor participation and reduced perceptions.

  - Local partners such as economic development corporations and Chambers of Commerce can collect the information necessary for gauging demand.

- It is important to prepare firms to survive the planning "Valley of Death," which occurs between the moment when a plan is completed to the time the project is implemented.
  - Identify easy, short-term implementation actions.
  - Direct firms to additional services or make hand-offs to other service providers that can provide more advanced services.

Southwest Virginia Manufacturing Technology Center's E3 (Economy, Energy, Environment) initiative

The Initiative and Its Partners

In most rural areas, existing manufacturers drive employment in the sector. To preserve or expand the regional manufacturing base, it is important to keep those manufacturers local and to ensure their overall competitiveness. Growing markets and expanding exports can help increase manufacturing revenues, just as promoting lean manufacturing, energy conservation, and sustainability can help reduce manufacturing costs.

In Southwest Virginia, the nonprofit Manufacturing Technology Center (MTC)[64] is leading an E3 (Economy, Energy, Environment) initiative to address these issues. MTC serves a 17-county area and the cities of Radford, Galax, Norton, and Bristol.

E3 is a collaborative framework to help companies looking to advance their sustainable manufacturing efforts.[65] This framework is a coordinated federal and local technical assistance initiative with the U.S. Environmental Protection Agency (EPA), the U.S. Departments of Commerce, Department of Labor, Department of Energy, the Small Business Administration, and the U.S. Department of Agriculture.

E3 assessments have three main components: lean manufacturing, pollution prevention (P2), and energy management. Few organizations have expertise in all three areas, so implementation must involve a broad array of local and regional partners. Leading these efforts in Southwest Virginia, MTC can complete many aspects of the E3 assessments and knows many of the region's key manufacturers. The organization has found, however, that maximizing the value of the E3 framework requires leveraging partnerships with other federal, state, and private partners.

The primary partners in the Southwest Virginia E3 initiative include, but are not limited to:

- Manufacturing Technology Center (MTC).
- GENEDGE Alliance (Virginia's MEP Center).
- The Industrial Assessment Center from North Carolina State University (NC State).
- American Electric Power (AEP).
- Virginia's Department of Environment Quality (DEQ).
- The Virginia Community College System (VCCS).
- The U.S. Environmental Protection Agency (EPA).
- The Institute of Energy Professionals.

These partnerships are now promoting sustainable manufacturing in 17 counties in Southwest Virginia through company assessments, networking sessions, and access to expertise and resources.

[64] http://www.mtcofswva.org/
[65] http://www.e3.gov/

About the Initiative

MTC's E3 initiative grew out of its primary mission, to assist the industries of southwest Virginia to become more competitive. MTC has long been active in traditional MEP activities like lean manufacturing. In addition, for the past 15 years, it has also been active in carrying out P2 work. Through this P2 work and its connection with EPA, MTC received an opportunity to lead the State of Virginia's pilot E3 project.

EPA developed the E3 framework funding and provided some initial funding for the project, which works with firms on issues of economy, energy, and environment. Other early funding came from MTCs EPA-related P2 work, funds that were supplemented through support available through two large regional organizations: the Appalachian Regional Commission (ARC),[66] and the Virginia Tobacco Indemnification and Community Revitalization Commission.[67] ARC provided $50,000 as part of its efforts to support sustainability-related projects. The Tobacco Indemnification program, which operates in seven of the 17 counties in the region, provides a match for the ARC funding. MTC's E3 efforts began in the seven counties that are part of both regions.

Implementing the E3 program requires interaction with firms on multiple levels. Company assessments are the most intensive form of interacting with firms. Through the assessment site visits, undertaken free of charge, the partners work with companies to evaluate how they use materials, energy, and water, as well as other issues, such as waste streams and greenhouse gas emissions.

Companies often undertake these assessments because they are interested in one aspect of the assessment (for example, energy management), but through the assessment process, they may become alerted to other issues that need to be addressed (e.g., value-stream mapping or pollution prevention). Following the site visit, the assessment team provides the company with a report laying out recommendations for reducing their facility's environmental impact and for cutting costs to improve the bottom line. MTC and its partners schedule follow-ups several months later to see what recommendations have been implemented and to assess their impact, relative to the company's ongoing challenges.

Recruiting companies to participate has not been difficult. MTC's long work history in the region facilitated the identification of companies likely to want to conduct assessments and apt to follow through on the recommendations. By exercising this kind of selectivity, MTC try to give their limited funding the maximum impact.

To date, 15 assessments have been completed as part of the E3 pilot project. This initiative has received $178,000 in funding and participating companies have recorded over $1.25 million in savings. These companies anticipate another additional $1.3 million in savings over the next year. MTC hopes to have 24 completed assessments by the end of the pilot program, 30 September 2014.

[66] 25 Virginia counties fall within 13 state, 420 county region. For more information go to: www.arc.gov
[67] http://www.tic.virginia.gov/

The Southwest Virginia E3 initiative also has organized peer-to-peer, multi-company events. These events are particularly important in a rural area where manufacturers have fewer natural opportunities to network. As a result, rural company managers are less likely to have the important informal conversations about how other firms are dealing with certain compliance issues, the experiences of other companies with vendors of key services, or other important issues. These events enable manufacturers to learn from their peers, or from honest brokers like MTC. They may learn, for example, how other firms are dealing with issues such as used oil, cardboard, or copper collection. Events like these, which strengthen informal networks, are particularly important, as the regional culture tends to reject hard selling of services.

The one area where MTC lacked necessary capacity was in the area of energy management. In searching for a partner with this expertise, MTC did not limit itself by state borders and found a strong partner in North Carolina State University's Industrial Assessment Center in Raleigh.[68]

This partnership with North Carolina State (NC State) brings substantial expertise for doing energy assessments in the Southwest Virginia region. Although a willing and helpful partner, NC State resources are somewhat limited due to demands elsewhere, as well as the NC State academic calendar. MTC is judicious in how and when they request NC State's support; the university is consequently chosen to help with the assessments for larger companies, where they can have the biggest impact. Even if NC State representatives are not available for on-site consultation, they have also proved willing to answer questions from afar. To further augment MTC's energy management capacity, E3 funding support two staff people to receive specialized training that enables them to undertake energy assessments when NC State representatives are not available for on-site visits.

Another major partner is the local utility provider, American Electric Power (AEP). A relatively new provider, AEP contributes to the E3 effort by meeting with local manufacturers during the assessment process. The utility helps identify opportunities for savings by working with companies to change their rate structure or to improve their metering. Participating in the E3 initiative also benefits AEP, whose local energy infrastructure is quite large for a small-market area and energy demand tends to fluctuate sharply. In order to remain a low-cost energy company, AEP needs to retain its large energy users (like manufacturers). In other words, maintaining a customer base of heavy power consumers is in AEP's best interests.

Finding Mutually Beneficial Partnerships

While MTC has leveraged their partnerships to help deliver its E3 program, initiative partners also benefit. For example, agencies such as U.S. EPA or Virginia DEQ are not always popular in coal country. The general feeling might be summed up as follows: government agencies don't understand manufacturing, they understand regulations. This lack of trust that local companies have in government agencies can sometimes present challenges in working through regulatory issues.

[68] A full list of Industrial Assessment Centers can be found here: http://energy.gov/eere/amo/locations-industrial-assessment-centers

MTC's relationship with the local private sector enables them to work in these areas more effectively than outside agencies. For sensitive issues such as pollution prevention, MTC can step in and work with companies to solve problems or provide clarification about compliance with specific regulations. MTC, therefore, functions as an intermediary between the federal and state regulatory agencies and the region's manufacturers, helping to solve problems. Their relationship with MTC gives these regulatory agencies the confidence that issues are resolved and that there is regulatory compliance, even though they are not directly involved with the local companies.

Looking Ahead

Moving forward, MTC seeks to advance its efforts by continuing its work with companies in the region. MTC is also working with other elements of Virginia's GENEDGE Alliance to expand its footprint. As awareness and demand for this kind of work grows, MTC is considering expanding its E3 activities into the Roanoke and Shenandoah regions. This will happen in part by MTC working in partnership with other elements of the GENEDGE Alliance. For instance, representatives from MTC have lent their experience to E3 projects being led by GENEDGE groups around the City of Danville, Pittsylvania County, City of Martinsville, Henry County, and Patrick County.

The future of these efforts, both within the Southwest region and elsewhere in Virginia, is often driven by the availability of future funding. Since funding is a key constraint, the partners are constantly looking for new funding opportunities. Between MTC and the GENEDGE Alliance, E3 programs have been delivered to only 21 of the 41 Virginia Tobacco Commission counties, suggesting that there may be some growth opportunities there. The Virginia Department of Mines, Minerals, and Energy is another potential source of energy assistance funding in the state for the GENEDGE Alliance (and by extension, MTC), to support elements of future E3 efforts.

Key Takeaways

- Partnerships can provide the capacity for delivering more comprehensive manufacturing support programs.
    - No one organization can possess all the capacities that manufacturers need.
    - Identifying potential partners need not be limited by regional or state boundaries.

- Broad comprehensive assessments can help manufacturers identify problems that they did not know they had.
    - Identifying funding to offset some or all of the assessment costs makes these assessments more affordable.

- Regional organizations (for example, ARC) can be sources of important supplementary funding.

- MEP centers can be effective facilitators between manufacturers and regulatory agencies, and can help address important compliance issues.

Common Themes and Trends

The case studies in this report illustrate a range of what is possible when regions begin to address seriously strengthening their manufacturing sector. The approaches used are diverse, but the initiatives all aim to help individual businesses with specific challenges while strengthening the overall manufacturing ecosystem.

This section summarizes the common themes that are found throughout these case studies and works to identify the characteristics that regularly contribute to initiative success. The goal is to provide regional stakeholders with ideas and starting points to take effective action.

The following key themes were identified:

- **One size does not fit all.**
- **Partnerships are issue dependent.**
- **MEP centers play different roles, but are always a resource.**
- **Successful efforts find ways to build and maintain momentum.**
- **Resources are important, but a lack of resources should not prevent action.**
- **Sustainability must be a forethought, not an afterthought.**

Each theme will be discussed in turn.

One size does not fit all

One of the key takeaways from this group of case studies is that there is no one way for regions to support their manufacturing sector. As Figure 2 in the Introduction detailed, different initiatives have focused on different issues.[69] In some cases, the regional partnerships sought to address multiple issues; in others the efforts were more narrowly focused. SFMade began by establishing a city brand and providing direct business assistance. Over time, San Francisco expanded the scope of its activities to include strategies that strengthen the city's manufacturing infrastructure and workforce. In Northwest Wisconsin, the initiative focused on helping small- and medium-sized manufacturers develop or grow export markets. New Mexico took advantage of the presence of two national research labs, which fostered a focus on technology acceleration. Ultimately, regional initiatives are context dependent and are determined by the specific challenges the region's manufacturers face, the partners' capacity and willingness to serve, and the region's available resources and assets.

Initiatives of different scale and scope come with their own advantages and challenges. For example, broad-based initiatives, such as the IMEC's multiple partnerships within the Chicago region, can address many diverse issues. Such efforts may face greater implementation challenges, however, since they require more resources and necessitate the coordination of a broader coalition of participants. More

[69] Several of these initiatives and organizations may address the other issue areas, but those other issue areas are not central to the featured case study.

narrowly focused initiatives, by contrast, can focus regional energy on specific manufacturing issues, but such a focus may limit the overall impact of an initiative.

The nature of the problem can also dictate the initiative's direction. Too often people may jump directly to implementing solutions without thoroughly considering the underlying problem. As demonstrated by the Kansas City case, energy usage was not the fundamental issue but a means to address the fundamental challenge of preserving Wyandotte County's manufacturing base. By looking at the situation through this new lens, the regional partners were able make it more desirable for companies to remain in Wyandotte County. In other contexts, business retention issues might have been addressed through a regional workforce initiative or by strengthening the local supplier base. This is why regional actors must understand the crux of the issue and then craft strategies that address those issues in a way that is realistic, given the available partners and resources.

Partnerships are issue dependent

A coalition of the willing is necessary to move manufacturing initiatives forward, but simple willingness may not be enough for some efforts. What is important is that the regional efforts engage the *right* partners. Each partner plays a different role or, sometimes, multiple roles. In any case, the partnership capitalizes on the expertise, networks, resources, and constituencies together in a way that achieves key goals.

The case studies explored the many kinds of partners engaged in these initiatives, how partnering relationships evolved, and how partner roles were influenced by the mix of issues and challenges facing the region. Figure 3, based in part on the findings of the case studies, identifies the roles of different types of partners in working on different focus areas.

The figure details 35 different types of potential partners in nine categories and notes the focus areas in which they typically make a contribution. It examines the roles of partners from business assistance providers, to education and training providers, to research and technology organizations, to business networks, to investors, to elected officials, and much more. Potential partners include small business development centers (SBDCs), small business and technology development centers (SBTDCs), National Institutes of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP) centers, etc.

MEP centers and private consultants turn out to be the most versatile of partners, each capable of supporting all six focus areas. Leading employers follow closely behind, supporting five different focus areas. Technical acceleration and firm growth efforts draw the broadest range of assistance (20 types of partners), while a focus on improving the manufacturing ecosystem finds almost that many (18 types of partners).

Figure 3: Potential Initiative Partners by Manufacturer Issue Area

Partner Type	Tech. Accel.	Workforce Development	Firm Growth	Sustain. MFG	Cont. Improv.	MFG Ecosystem
Business Assistance Providers						
MEP Centers	X	X	X	X	X	X
SBDCs/SBTDCs	X	X	X			
Consultants	X	X	X	X	X	X
US Export Assistance Centers			X			
Economic Development. Groups						
State econ. dev. agencies	X		X			X
Regional & local EDCs	X		X			X
County or city dev. agencies			X	X		X
Education & Training Providers						
Workforce development boards		X	X			
University faculty	X	X				
Community colleges	X	X			X	
K-12 school systems		X				
Labor unions	X	X				X
Private training providers		X				
Science, Research, & Technology						
Laboratories	X			X		
Technology development orgs.	X			X		X
Univ. tech transfer & outreach	X		X	X		X
University researchers	X			X		
Energy, Environmental & Regulatory Agencies						
Utility companies	X		X	X		X
Fed. & state environ. agencies	X			X		
State energy agencies	X			X		
DoE Ind. Assessment Centers				X		
Business Networks						
Chambers of Commerce		X	X			X
Leading employers	X	X	X	X	X	X
Technology councils	X	X	X			X
Higher education leadership	X		X			X
Manufacturers associations		X	X	X		X
Entrepreneurial networks	X		X			
Community Development						
Foundations		X	X	X		X
Community-based orgs.		X				
Investors						
Seed & angel investor networks	X		X			
State business finance agencies			X			
Lenders			X			
Elected officials						
Federal congressional delegation						X
State representatives						X
Local elected officials						X

The great diversity of patterns in the figure suggest why, as the case studies also show, different issues may require regional coalitions of different composition. For instance, technology acceleration efforts may benefit from the engagement of science, research and technology organizations, business assistance providers, and other types of partners. Large research institutions can also be valuable sources of expertise if they are utilized and leveraged effectively.

Business assistance providers such as MEP centers, small business development centers, and technology assistance organizations can help to enlist the aid of educational institutions while also providing expertise in their own right. The experience of Southwest Virginia and other regions suggests that energy and environmental agencies can also help advance technology acceleration initiatives and address sustainability issues. Other partners, such as technology councils and entrepreneurial networks, can play important roles in connecting businesses with resources or other businesses. Similarly, seed and angel investor networks can support companies looking to commercialize new technologies and help spur firm growth by both mentoring businesses and raising capital.

For workforce development efforts, the scope of the strategy can strongly influence the nature of the partnerships. The Pittsburgh region's MAKERSHiP™ Program is a focused initiative that seeks to train a specific set of workers. As a result, it draws support from a few key training providers as well as the labor unions. Workforce initiatives that seek to improve flow in the entire talent pipeline—such as those the East Tennessee and South Texas regions—require more extensive partnership networks.

Initiatives to train incumbent workers, future workers, or disadvantaged groups often make partners of the K-12 system as well as community groups that work with the target groups. Workforce development boards and community colleges are instrumental in retraining incumbent workers, especially for more middle-skills jobs. Universities are often core partners in efforts to equip workers with advanced business or engineering skills. Other partners may also pay important roles. For instance, philanthropic foundations are increasingly interested in workforce development initiatives, while some business groups may contribute resources and leadership for engaging key regional actors or getting publicity.

Business assistance providers such as MEP centers and SBDCs play central roles in firm growth programs; they bring expertise, the experience of working directly with firms, and access to broad networks of assistance. For instance, the Northwest Wisconsin case illustrates how a business assistance provider such as the University of Wisconsin-Stout Manufacturing Outreach Center (UW-Stout MOC) led the effort, but relied heavily on the networks and expertise of the U.S. Export Assistance Center and local universities to help deliver the program. State and local economic development organizations further contribute financial support and assist with recruiting program participants.

Sustainability initiatives often draw on the expertise and resources of energy, environmental, and regulatory agencies. At both the federal and state level, these agencies often have programs that can fund programs that promote more sustainable manufacturing practices. The Department of Energy's 24 Industrial Assessment Centers[70] provide additional expertise. Not all states are home to one of these

[70] http://energy.gov/eere/amo/locations-industrial-assessment-centers

centers, but as Southwest Virginia's E3 (Economy, Energy, and Environment) initiative suggests, a partner center might be located out of state.

Utility companies are especially important partners in these initiatives, being strongly motivated to participate in many regions as a strategy to increase energy efficiency and productivity among their largest clients. A few MEP centers have developed capabilities to assist companies to address pollution prevention and/or energy management issues as part of their work to promote continuous improvement and lean manufacturing principles.

Continuous improvement programs of themselves rarely motivate regional action to support manufacturing. That said, these efforts to drive down costs and increase productivity in existing firms are key planks in many manufacturing support strategies. In South Texas, for instance, the North American Advanced Manufacturing Research and Education Initiative (NAAMREI) partners work extensively with MEP to encourage more companies to adopt lean practices. In addition, through efforts like the University of Texas-Pam American's (UT-PA) Lean Sigma Academy, the NAAMREI initiative introduces engineering students to lean principles well before they enter the workforce. In this instance, the region's MEP center and UT-PA's engineering school are the key sources of expertise in the region. Continuous improvement efforts play a key role in the Southwest Virginia and Chicago regions as well.

It is worth noting that MEP centers are not the only sponsors or providers of continuous improvement programs. In an increasing number of regions, area consultants and even community college are moving into this space by delivering similar services. In some instances, leading employers also may drive efforts around continuous improvement, with the intention of strengthening their supplier base.

The initiatives examined in this report ultimately seek to strengthen the array of service providers available and as such strengthen the regional manufacturing ecosystem. Some efforts are relatively narrow in focus, for example, the work of SFMade to increase the supply of industrial space in the City of San Francisco. Other efforts are broader, facilitating access to a wider array of services or seeking to raise the profile of manufacturing's contribution to the local economy.

Participation in these regional initiatives often benefits highly visible local leaders: high-profile private sector leaders, congressional representatives, mayors, and others. Their involvement helps to raise the initiative's profile and engage potential funders. Partners who bring significant networks to an initiative, as illustrated by IMEC's numerous partnerships throughout the Chicago region, can also be extremely important. Organizations like these are well positioned both to gather insights about the needs of manufacturers and to disseminate information about opportunities. MEP centers can be particularly critical as knowledgeable experts as well as key connectors between manufacturers and the resources available to help them.

MEP centers play different roles, but are always a resource

Another common thread running through the case studies is the many different ways that MEP centers support regional manufacturing initiatives. MEP provides direct services to companies as a core competency. The centers, however, may also play a much more holistic role. These efforts may involve collaborations with leading employers, consultants, and others.

MEP centers can comfortably add value to all types of manufacturing initiatives. While they may not necessarily lead every type of manufacturing initiative, they are always a valuable resource. Figure 4 lays out the variety of roles that MEP centers tend to play in addressing key regional manufacturing support issues. It looks at five types of roles: leaders, facilitators-connectors, experts-service providers, investors, and advocates. The figure suggests which roles are more likely to come into play in different initiative focus areas, with the most common roles being facilitators-connectors and experts-service providers.

Our case study research found that leading employers often engage through intermediary networks like

Figure 4: Likely MEP Center Role by Initiative Focus Area

Roles	Technology Acceleration	Workforce Development	Firm Growth	Sustainable MFG	Continuous Improvement	MFG Ecosystem
Leaders			X	X	X	
Facilitators-connectors	X	X	X	X	X	X
Experts-service providers	X	X	X	X	X	X
Investors			X	X	X	
Advocates			X	X	X	X

Chambers of Commerce. When they act independently, however, these companies tend to focus on issues that are directly related to their day-to-day business (such as addressing a supply-chain gap or filling a specific workforce need). Similarly, consultants often take part in these regional initiatives, focusing specific areas or disciplines in which they have expertise

MEP centers often take on one of two key roles in regional technology acceleration efforts: making connections and providing expertise. In the East Tennessee and New Mexico regions, MEP centers were able to connect manufacturers to the highly specialized knowledge and facilities available through the national labs. The centers' ability to understand manufacturer needs and the specialties of researchers contributes to the successful matchmaking. MEP centers also function as expert service providers to help firms access knowledge about improving their production process or about what assets might be available from labs or university researchers to solve a technology problem. In the Chicago and South Texas initiatives, MEP centers were important contributors to regional referral networks.

While other partners such as community colleges or workforce development boards are more likely to lead workforce development initiatives, MEP centers can also make important contributions to these efforts by diagnosing company needs and then directing the firms to appropriate training resources. They also help companies place workforce initiatives in the broader context of enhancing the overall

competitive position of the manufacturer. Since many of the centers employ consultants with executive leadership experience in manufacturing, MEP can often mentor and train business management and executive leadership in the day-to-day challenges they face.

Firm growth, continuous improvement, and sustainability initiatives closely align with the MEP mission. These efforts often, but not always, emphasize providing direct services to a specific set of companies. Several case studies showed MEP centers leading these kinds of initiatives. For instance, UW-Stout MOC led the Northwest Wisconsin's export initiative and MEP centers in the Kansas City, Kansas, region and Southwest Virginia assembled the coalitions required to undertake their sustainability initiatives.

MEP centers are highly adept at filling the roles of connector and facilitator. Their knowledge of the service provider landscape and ability to mediate between manufacturer needs and available services enable MEP to play a service broker role. Initiatives related to firm growth and continuous improvement similarly benefit greatly from MEP expertise.

Many service providers, such as SBDCs, offer different kinds of specific help, such as preparing a business plan or conducting basic market research. MEP centers, however, are uniquely positioned to provide technical expertise to help manufacturers implement key business plan elements or to interpret market conditions for specialized manufacturing sectors. In some areas, private consultants may be available to provide similar services, but there may be few of these available or they may not be affordable to small manufacturers.

MEP centers can also be important investors in initiatives, leveraging resources from other service providers through formal partnerships. Through sub-recipient agreements, many MEP centers are partnering with local organizations that have their own relationships with small manufacturers. For instance, SFMade is a sub-recipient of MEP funds through Manex Consulting. This relationship has helped Manex build a stronger relationship with manufacturers in the city of San Francisco. SFMade provides its own match support and its organizational infrastructure enables Manex to touch many more very small urban firms than MEP could do on its own.

Similarly, Southwest Virginia's Manufacturing Technology Center (MTC) is a sub-recipient of MEP funding from the GENEDGE Alliance. MTC is a partnership of community colleges that has served Southwest Virginia-based manufacturers prior to the formation of the GENEDGE Alliance. MTC's long-standing relationships with Southwest Virginia's manufacturers have facilitated greater delivery of MEP services (e.g., lean manufacturing, pollution prevention) throughout the region. Using MEP funds to establish these partnerships can increase the impact of MEP funding, and this is particularly true if these capable partners have strong connections within a specific community of manufacturers.

Regional initiatives play an important advocacy role, helping to attract greater investment in manufacturing, build support networks, address key challenges, and make the sector more prominent. SFMade plays an ombudsman or advocacy role on zoning and other city regulatory issues. In some regions, MEP centers lead this advocacy effort. In others, high visibility partners have stepped forward to make the case for manufacturing. In San Francisco, the commitment of the mayor and well known community organizations have heightened public awareness of manufacturing issues, large and small.

In other communities, MEP centers may not take as high a profile, but they still serve as effective translators of manufacturer needs in policy circles as well. Through a National Governors Association policy academy on advanced manufacturing, the Mid-America Manufacturing Technology Center (the Kansas MEP center) was able to discuss manufacturer needs with other key Kansas stakeholders. These discussions led directly to the development and implementation of the region's pilot energy efficiency program. These kinds of activities may not directly generate revenue, but they can provide MEP centers with opportunities to assess manufacturer needs and address them – both in individual manufacturers but also in the broader policy context as a constraint on or opportunity to accelerate regional growth.

Successful efforts find ways to build and maintain momentum

Identifying and initiating easy-to-complete tasks—so-called "low hanging fruit"—can help a region get started and provide momentum for greater regional efforts. These start-up activities tend to involve smaller projects requiring limited resources. Yet, initial tasks can demonstrate the proof of an idea about ways to help manufacturers succeed. They can also generate greater interest from current partners and attract new partners.

With these pilot projects, leaders can position the region for bigger opportunities. Many of the case studies described in this report began with a relatively small effort that became the foundation for a later much larger effort, often by attracting funds from a federal or state grant or private sector partners. For instance, the Southwest Pennsylvania region partnership used the successes of their pilot efforts to pursue a grant from the U.S. Employment and Training Administration Workforce Innovation Fund. Similarly, the South Texas partners developed an operational referral network that became the foundation for their WIRED grant, providing the resources to establish the more formal NAAMREI partnership.

Regional challenges and problems not only motivate action and participation, but these issues also can influence area leaders' priorities. Efforts that align with regional priorities are much more likely to gain traction. The mayors of both San Francisco and Chicago have publicly committed to strengthen their city's manufacturing sector. Initiatives should monitor the pulse of the region's leaders—where they see need and value in addressing manufacturing challenges and their willingness to invest time and resources to solve them. Manufacturing strategies can also enlist broader support if they fit within an existing regional economic development plan, especially if the strategy has broad public support.

Every region has multiple sources of leadership. In some instances, motivated stakeholders such the utility company in the Kansas City region, or a small group of leading manufacturers, may drive action that solves problems of direct concern. Acting in their own self-interest may set in motion actions that generate regional impact well beyond the initial group of participating employers. By clearly articulating their motivations, stakeholders may identify areas of common interest that can then lead to mutual benefit. This was certainly the case in the Pittsburgh region, where Carnegie-Mellon University and the AFL-CIO sought to find mutually beneficial ways to help start-up companies overcome specific workforce problems.

Successful regions also learn from the experiences of others when designing their initiatives. When the UW-Stout MOC began its ExporTech initiative, for example, it sought insight from the Wisconsin MEP with its established ExporTech program. Since ExporTech is an MEP program, the initiative was able to draw on the experiences of the entire national MEP network. Regions that have undertaken similar efforts can be critical sources of advice on both what to do and what to avoid. Organizations such as the Urban Manufacturing Alliance provide a venue through which stakeholders can connect to their peers in other regions.

By avoiding early mistakes, regional initiatives can gain early momentum. One common mistake is to create a redundant initiative that may not only be wasteful but also create potential sources of conflict. Redundancy, conflict, and program overlap can actually slow implementation success. Accurate knowledge of the region's existing landscape of service providers and manufacturing initiatives can help avoid this error. Knowledge of the landscape can also identify potential partners who may strengthen the initiative.

For regional efforts, even those that experience a string of continued successes, must take pains to retain forward momentum and not become stale. Stakeholders should always be on the lookout for natural next steps to take. It is helpful to maintain a list of short-, medium-, and long-term projects and work on them continually. Many of these projects will be completed and, if funding or resources become available, some small projects may become larger projects. A good track record makes it easier to attract and maintain participation, and bolsters the region's ability to raise additional dollars.

Resources are important, but a lack of resources should not prevent action

Funding dictates the size and scope of an initiative, but the availability of only a relatively few resources should not prohibit action. Many regions have started small but targeted very important issues. Establishing a regional referral network and a protocol for collaborating requires little new resources. Similarly, pilot projects can spur interest or demonstrate proof-of-concept. Even if the pilot does not accomplish what was initially intended, the act of collaboration can lay the foundation for more expansive future efforts.

A history of working together can be a critical advantage in securing external funding. Continued collaboration, both through small projects as well as large initiatives, helps regional partners build trust and familiarity with the priorities and capabilities of each. When funding opportunities arise, this familiarity speeds the process of developing a regional initiative, especially if the project expands or builds on existing efforts. It is difficult to quickly assemble new coalitions or build consensus around new ideas.

The East Tennessee experience provides an excellent illustration of this point. The shared vision and pre-existing relationships developed as part of earlier projects (and through successful and unsuccessful grant applications), made it relatively easy for the East Tennessee region make a strong response to the AMJIAC funding opportunity. It is easier to move when you are already moving, than it is when beginning from a dead stop.

As individual projects end, successful regions are more likely to continue engaging in an active, ongoing, and comprehensive pursuit of new funds. This pursuit can enable partnering organizations to identify more opportunities, as well as increasing the likelihood that the partnership will find the right project funding, not just the first funding opportunity that arises. In recent years, large multi-agency federal-funding competitions—such as the AMJIAC grants—have provided regions with high-profile funding opportunities. However, the case study research identified regional successes beyond these efforts. Many have looked to federal or state agencies for which manufacturing issues may not traditionally be central to their mission. South Texas' NAAMREI group, for instance, was able to secure state workforce funds to the help provide technical training for the region's manufacturers. Similarly, MTC in Southwest Virginia secured U.S. Environmental Protection Agency funding to support some of the initiative's sustainable manufacturing efforts.

Successful regions find additional government opportunities. Many municipal and local governments support their manufacturing communities through, for example, job training programs. Less common are the San Francisco and Chicago experiences, in which local governments made investments to help manufacturers access and use business support programs. In addition, multistate organizations like the Appalachian Regional Commission (ARC) and the Delta Regional Authority occasionally offer funding opportunities with direct relevance to manufacturing. In the East Tennessee region, ARC funding helped lower the costs of manufacturers seeking help from Oak Ridge National Laboratory. Similarly, MTC obtained funding from ARC and the Virginia Tobacco Indemnification and Community Revitalization Commission to support the E3 initiatives in Southwest Virginia.

Philanthropic foundations are another potential funding source for regional manufacturing support initiatives. These opportunities will be quite region-specific since only selected foundations see manufacturing-related issues as a fit with their particular mission and interests. Foundations may be more amenable to provide funds for testing pilot programs. Some foundations have demonstrated an increasing interest in the challenges facing dislocated workers, as well as strengthening industry-driven career and technical education initiatives. Others are interested in efforts to foster entrepreneurship, which could be directed to foster the development of new companies in the manufacturing sector.

Finally, utility companies also sometimes have resources that can help advance sustainable manufacturing initiatives. This was the case in Kansas City, Kansas, and Southwest Virginia. Additionally, if an initiative speaks directly to one of their needs or challenges, large companies may contribute funds, staff time, or other resources to regional manufacturing initiatives.

Sustainability must be a forethought, not be an afterthought

Many of the manufacturing initiatives discussed in this report seek to address long-term goals. Sustaining these initiatives over time, therefore, requires continued responsiveness to changing conditions in order to remain relevant. Too often, regional initiatives quickly lose momentum after the initial grant expires. Successful regions address sustainability concerns as the initiative is being developed, not just after it has been launched.

The case studies offer several lessons in this area. The NAAMREI effort in South Texas was one of the longest ongoing efforts examined for this report. The emphasis the initiative placed on post-grant sustainability during the WIRED grant paved the way for ongoing efforts. For instance, even though their WIRED grant expired years ago, the NAAMREI partners continue to hold quarterly stakeholder meetings. These regular meetings help maintain and strengthen trust and communication among the partners. They provide a venue for information sharing, which is vital for operating regional referral networks. Regular face-to-face communication not only keeps partners up to date on each other's interests and capabilities, it can also provide early intelligence about potential opportunities as they arise. Regular meetings also reaffirm consensus about the direction the partners want to take the region's manufacturing sector. The South Texas NAAMREI partners dedicate one meeting per year to revisiting their regional vision so as to ensure consensus among the partners. The regional meetings also present important accountability moments for the partners, providing deadlines for reporting on the status of their agreed upon tasks.

Dedicated staff can be important for sustainability. This was a key element of the South Texas case, as South Texas College committed the partial time of a staff person to plan meetings, work with partners, complete strategies, and help organize regional responses to funding opportunities. It is also important that partners continue to look for new partners to bring into the initiative. New participants and stakeholders bring fresh energy and ideas. Perhaps more important, a broader pool of participants allows for a more balanced distribution of work among the partners. Given that so many of these manufacturing initiatives are ancillary to the core mission of partnering organizations, it is important not to overburden any one partner.

Another key sustainability issue is finding the right size for the initiative. If an initiative is too small, it will have a relatively minimal impact; if it is too ambitious then it might overextend the partners. As a result, initiative leaders need to accurately gauge demand for the program offerings in light of their own resources. The Northwest Wisconsin initiative limited the frequency with which they offered the ExporTech program, in part to avoid overburdening key partners and to make sure there are enough participants for each round of the program. In New Mexico, the NMSBA program is generally considered to be right-sized, as the labs are able to use the majority of their tax credits and can serve the companies that bring the highest quality projects.

Publicizing successes is another important ingredient in sustaining efforts, helping to maintain the support of the key stakeholders, funders, and the general public. As one illustration, NMSBA's annual report not only highlights successful company engagements with the national labs, but it also shows measurable impacts on company jobs and sales. Demonstrating the measurable impact of regional manufacturing strategies is important. This kind of reporting assures funders that their resources are being well spent and, therefore, should be continued. Successes can inform future activities. To this end, initiative partners should consider seeking the assistance of their state or region's MEP center. Among partners typically involved in a regional initiative, MEP centers have a particular strength in providing the skills for sound data collection, analysis, and reporting initiative impacts because of the robust third-party survey process they have used for years to gather impact data from manufacturing clients.

Action Steps

The stakeholders featured in these cases studies all identified core challenges facing manufacturers in their regions (such as technology acceleration, workforce development, sustainability) and then found ways to address them. Responses took many shapes, ranging from providing direct services to manufacturers, to connecting manufacturers to other resources, to improving the general environment for manufacturing. Whatever the effort, the ultimate outcome was to improve the overall manufacturing ecosystem in their respective regions. This case study analysis is designed to prompt concerned stakeholders to consider new and better ways to support the manufacturing sector.

The central question is, of course, how can regional actors turn those ideas into action? Here are some specific steps to consider.

Do your homework

A first step is to do your homework. Before committing to a program, make sure that you fully understand the driving concerns of your region's manufacturers. Researching and analyzing regional manufacturing trends can provide some answers, but it is imperative to speak directly with regional manufacturers about their pain points and their ideas about what the region can do to address those issues.

You should also consult with knowledgeable experts—such as MEP center staff, SBDCs, or Community College personnel—that work directly with manufacturers. These experts may help identify potential partners with shared interests and concerns and provide a sense of different organizations' activities and core expertise. They will not only understand challenges at the individual manufacturer level, but they will also have some grasp of issues that affect the competitive landscape of the region's manufacturing sector overall. Conducting a thorough regional assessment can prevent redundancy and avoid conflicts over perceived turf.

Identify a range of responses

Once a problem has been identified, begin to map out the range of potential responses. Many of the case studies presented here testify to the importance of learning from others. One source of ideas may be professional networks or groups, such as the Urban Manufacturing Alliance, a national collaborative organization. MEP centers can play a pivotal role. NIST MEP's 60 centers and 1,200 experts are likely to be aware of (and involved in) many regional manufacturing initiatives all over the United States. This network constitutes an important knowledge base about what efforts are underway elsewhere, although these ideas must be fit with the local context.

Do not try to act alone

Another key takeaway is this: do not try to launch manufacturing initiatives alone. The common theme running throughout all of the case studies is that successful initiatives are built on a strong collaborative

foundation. One first step is to find potential partners that have similar or overlapping concerns; they, too, may be looking to take action.

Identify potential partners

You must also consider who might have the required expertise and be able to fill the roles necessary to address the core manufacturing challenges in the region. Figure 3 provided a framework for considering potential regional partners. If you have no direct connection to an important potential partner, perhaps someone else in your existing network has and can make the introduction. This is another area where MEP can be a vital resource.

Engage the right partners

Successful implementation, however, requires more than just finding partners who might fill the necessary roles and bring the requisite expertise. It requires finding the *right* partners who are capable working together effectively. It makes this task much easier if potential partners articulate what they have to offer and are upfront about what they want from their participation in the initiative. This kind of open communication is important for successful implementation. Everyone has self-interest, but regional relationships are stronger if organizational self-interests are understood openly, rather than hidden. Openness enables the partners to have honest discussions about how they can all mutually benefit from an initiative.

Do not let a lack of resources stop action

There are small, short-term actions that not only can address specific problems, but also provide opportunities to build and strengthen partner relationships. Smaller actions or pilot projects can demonstrate proof-of-concept and reveal potential implementation challenges that may need to be addressed before the initiative is scaled up or expanded. Efforts should also be made to track the impact of the effort, and to promote its successes. All of these actions can improve your regional partnership's ability to take advantage of future funding opportunities as they arise.

Keep the future in mind

Moving forward, these activities should aim to create a regional environment that enables existing manufacturers to grow and new manufacturers to emerge. Collaborative regional efforts can lead to a virtuous cycle for manufacturers and stakeholders alike. For manufacturers, this kind of support can provide help and quickly and effectively address pain points that diminish their global competitiveness. For regional stakeholders, these regional initiatives facilitate more efficient use of existing resources and improved access to a wide array of expertise and resources. They also open up new opportunities to promote overall economic development in the region.