Renewing the U.S. Commitment to a Strong Manufacturing Base

Expanding the Reach of the Manufacturing Extension Partnership

July 2010

STONE & ASSOCIATES

CREC CENTER FOR REGIONAL ECONOMIC COMPETITIVENESS

National Institute of Standards and Technology Manufacturing Extension Partnership

The National Institute of Standards and Technology's Manufacturing Extension Partnership (MEP) is America's #1 resource for helping U.S. manufacturers use innovation to grow their profitability as they compete for customers in the global marketplace. MEP's nationwide network of field staff serve as trusted business advisors focused on solving manufacturers' challenges and identifying opportunities for growth. As a program of the U.S. Department of Commerce's National Institute of Standards and Technology, MEP offers manufacturers a wealth of unique and effective resources. As a result, MEP clients achieve higher profits, save time and money, invest in physical and human capital, and create and retain thousands of jobs.

As the catalyst for strengthening American manufacturing, MEP recognizes that innovation driven economic development requires a multi-faceted approach. In addition to providing services to manufacturers focused on everything from process improvements to strategies for growth to green manufacturing, MEP works with state and federal partners to accelerate manufacturing's ongoing transformation into a more efficient and powerful engine of innovation that drives economic growth and job creation. Through a framework focused on five critical areas – technology acceleration, supplier development, sustainability, workforce as well as continuous improvement – MEP is positioning manufacturers to develop new customers, expand into new markets and create new products with the end goal of increasing profitability and competitiveness.

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Report Summary and Policy Brief

Prepared for the NIST Manufacturing Extension Partnership by Stone & Associates and the Center for Regional Economic Competitiveness (CREC)

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Letter from the NIST MEP Director

Since 1989, the Hollings Manufacturing Extension Partnership (MEP) program has been working to improve the competitiveness of U.S. manufacturers. The MEP centers serve as trusted advisors to their small and medium sized manufacturing clients, helping them to strategically implement business growth opportunities and to improve their competitive position in the market. Our program has helped clients obtain significant and measurable economic impacts, and these results have been recognized at all levels of government. Recent legislation proposing MEP support for issues facing many industries ranging from the nuclear industry to construction suggests that the MEP system is highly regarded and valued.

However, today with manufacturing industry markets both contracting and expanding and business success factors changing, manufacturers must establish competitive niches to capture new business opportunities. MEP must refocus on addressing these new challenges and opportunities facing U.S. manufacturers. Through the MEP next generation strategy, we are working with manufacturers to harness technology and innovation that results in new business opportunities. We have outlined a framework of five critical areas – supplier development, technology acceleration, sustainability, workforce and continuous improvement – in which MEP is working not only to help manufacturers' problem-solve to survive, but also to grow by developing new sales, new markets and new products.

In order for MEP to remain on our own continuous improvement path and continue facilitating the long-term economic prosperity of the U.S. manufacturing industry, we must consider changes to the way we operate in order to reach more firms, quickly respond to the changing needs of manufacturers and foster the partnerships that allow us to provide the tools and services needed by our clients. Now more than ever, we need to assess our current operating model and consider changes to ensure that the MEP system remains flexible to not only address today's challenges but also ensure that the MEP program is positioned to address emerging opportunities which support manufacturers' continuous growth and competitive position.

Sincerely,

Roger D. Kilmer
Director
Hollings Manufacturing Extension Partnership (MEP)
National Institute of Standards and Technology

Report Summary

Introduction

Over the last two decades, the economic landscape has changed dramatically, featuring the most significant downturn since the Great Depression, the rapid decline of manufacturing employment, the emergence of the internet and advanced information technology and the beginning of the sustainability revolution. As a result of these trends, the challenges faced by manufacturers have also changed. Innovation has become an imperative for survival and growth. The demand for environmental stewardship and energy efficiency has dramatically increased, and even the smallest firms must navigate global markets and supply chains.

At the same time, the Manufacturing Extension Partnership (MEP) has now been in existence for over 20 years, and has accumulated a solid base of experience with thousands of manufacturing clients. During this time, MEP has established 60 regional centers throughout the country, employing over 1,500 nonfederal staff in 370 locations. In FY 2009, these centers and their 2,300 third party service partners provided in-depth assistance to over 7,100 manufacturers and served 33,000 when all training, workshops and other less intensive interactions are included.[1]

The system that has emerged is highly effective in generating significant and measurable impact for clients. In the most recent published client survey data, 7,648 companies that received in-depth assistance – mainly during FY 2008 – reported the following results from MEP center services: $3.6 billion in new sales (despite the recession), $5.5 billion in retained sales, and $1.4 billion in cost and investment savings.[2] Those clients also reported that they made $1.7 billion in new investments in their companies, and created or retained 53,000 jobs. Most of these results were generated by assisting companies with manufacturing process and quality improvements.

MEP Next Generation Strategy

While this model has generated significant impact, NIST MEP leadership perceived that the scope and scale of today's challenges faced by the manufacturing sector demanded a change in approach. Several issues in particular sparked a change in program strategy to have a more dramatic impact on the manufacturing sector's performance and its contribution to economic prosperity:

1. **The Innovation Imperative** – Innovation has become critical to the long-term success and growth of manufacturing companies. U.S. firms cannot survive against intensified global competition without continually developing new products, processes and technologies, entering new markets, and adopting new strategies and practices. The MEP network's traditional focus had been on assisting firms to adopt improvements in manufacturing processes, but the system has placed less emphasis on other forms of innovation related to new products, markets and technologies.

2. **Companies Need to Utilize Capacity that Becomes Available from Process Improvements** – MEP's current process improvement services, particularly assistance with lean manufacturing, often free up production capacity. However without new product and market opportunities, firms cannot leverage this capacity to generate sales and income for owners, employees and the broader economy. A wider range of services are required to assist firms to sell and utilize the capacity generated from process improvements.

3. **Many Manufacturing Firms Remain Un-served** – Currently MEP serves 10% of U.S. manufacturers, and provides only 2% with in-depth assistance. For

many small firms, MEP is the best or only option for substantive outside assistance. Without an expanded reach, MEP cannot have a significant impact on overall manufacturing performance.

In response to these challenges, NIST MEP released a new strategy (in December 2008) that re-defined its vision for the program.[3] The vision positions MEP as a catalyst for accelerating manufacturing's transformation into a "more efficient and powerful engine of innovation driving economic growth and job creation." MEP's mission is defined as "to act as a strategic advisor to promote business growth and connect manufacturers to public and private resources essential for increased competitiveness and profitability."

This new vision and mission shifts the program from focusing only on efforts to enhance productivity through process improvement, to include those that generate growth and innovation. This new vision also shifts the focus of MEP to being a strategic advisor and connector to resources and skills, as well as a deliverer of technical assistance. This shift attempts to engage clients at a more strategic level to understand their critical needs and provide assistance in those areas, rather than delivering services in which MEP has capabilities, but which may not match the future direction and strategic priorities of the companies. It also recognizes the importance of more actively engaging in partnerships with other organizations that can provide additional capabilities needed by manufacturers.

The plan expands MEP's scope to cover a broader range of services, focused around five service categories, all under the overarching objective of helping companies achieve profitable growth (see Figure 1). The five service categories include Continuous Improvement, Technology Acceleration, Supplier Development, Sustainability, and Workforce.

Figure 1: MEP Next Generation Strategy Framework

Re-Examining the Business and Service Model

This report is the next step in defining MEP's Next Generation strategy. The objective of this effort is to make recommendations about how the MEP program business and service model should change to reach more firms, offer the wider range of services required, and have a more significant impact on manufacturing sector performance – particularly smaller firms.

Manufacturing Performance

The first step in re-examining MEP's model is to recognize the special role that manufacturing plays in the economy, and identify how MEP can favorably impact its performance.

Manufacturing is Critical to U.S. Productivity and Innovation – The manufacturing sector plays a special role in the economy because it is critical to U.S. productivity and innovation. Manufacturing sector productivity has grown nearly twice as fast as the rest of the economy[4] – raising the overall average – and is responsible for 70% of U.S. business research and development.[5] Further, manufacturing generates innovations, such as machinery and equipment, which drive productivity growth in many other sectors.

Growing Sectors are Losing Ground – While manufacturing employment has declined over the last decade, underneath the aggregate data is a more dynamic sector. Over the past decade, real manufacturing value added grew by 18%,[6] and some companies and segments are growing and adding employment. The growing component of manufacturing created 300-900 K jobs per quarter over the last decade.[7] But since 2000, the *growing segment is losing its ability to keep up with job losses* in the declining segment. Since 2000 job losses have intensified, due to the recessions, the heightened intensity of competition from China and low cost countries, and the migration of manufacturing overseas.[8]

MEP's Objective Should be Growth as well as Productivity Improvement in Manufacturing – The need to nurture the growing sector of manufacturing reinforces the idea that MEP's goal should be growth in manufacturing value added and output, as well as productivity improvement. This two-pronged objective will ensure that MEP is contributing to a manufacturing sector that produces the greatest income per person, and expands the growing portion so that it *exceeds the pace of declining sectors*. This must be the "yardstick" by which MEP measures its success.

Challenges for Small and Mid-Size Manufacturers

Given that MEP's primary focus is small and mid-size manufacturers, an understanding of the key challenges they need to overcome is critical for re-examining the MEP system. At a high level, this project identified three broad challenges faced by SMEs:

1. **Lagging Productivity and Business Practices** – Small and mid-size manufacturers (SMEs) are lagging behind large firms in terms of productivity and adopting best practices.[9] For example labor productivity for large establishments (with over 500 employees) is nearly double that of establishments with less than 100 employees.

2. **Unrealized Growth Potential and Missed Opportunities in Emerging Technologies** – Many small firms are missing opportunities for growth – which creates U.S. value added and jobs – partly due to a lack of innovation, i.e., an inability or unwillingness to exploit new product and market opportunities.[10] As an example, a number of observers are concerned that U.S. firms have not been able to seize emerging opportunities in the production of clean/renewable energy products.[11]

3. **Leadership Challenges** – The leaders of small and mid-size manufacturing firms face extraordinary competitive and management challenges. Unlike large companies which can afford larger teams of managers, leadership in small firms "wears many hats" and is often challenged to extract itself from day-to-day operations and "fire-fighting." This results in insufficient time spent planning for and investing in the future. Most small manufacturing companies are family businesses,[12] and succession from one family generation to the next, or one leadership team to the next, can put the company's existence at risk. Intense global competition, particularly from low cost countries, magnifies the importance of leadership being innovative and adaptive to market changes. Finally, firm leadership has limited access to outside expertise, as it is generally not economic for private consultants to serve small manufacturers at reasonable rates.[13]

Section 5 identifies the specific services required by small and mid-sized manufacturers as they work to improve productivity and grow their businesses. However at a high level, a revised MEP model must overcome these three sets of challenges.

The challenges discussed above represent a market failure since the extraordinary capabilities and potential of small U.S. firms, that have been able to survive intense global competition in recent years, are not fully realized. These challenges also represent an opportunity for government to invest in existing manufacturing companies to maximize their potential for growth and productivity improvement.

MEP Uniquely Positioned to Respond

MEP is uniquely positioned to respond to the gaps (and market failures) identified above. **First, MEP's focus on established manufacturing firms is critical, as they are an under-valued source of innovation.** There are thousands of established manufacturing firms that represent opportunities for growth, with much less risk than start-ups.[14] The leadership of these firms, often in mature industries, needs help to transform their companies, re-ignite innovation, enter new markets, and accelerate growth. The market by itself is unable to fully exploit the growth potential of these small and mid-size manufacturers. Yet, limited public investment has been made to foster innovation for these established manufacturing companies. Federal and state government efforts to assist companies with technology commercialization and innovation often focus on start-up and early stage companies.[15]

Second, MEP is positioning itself to assist manufacturing companies holistically, i.e., help them to grow, change and transform themselves. Other organizations either offer more narrowly focused assistance in specific areas, such as export (U.S. Foreign & Commercial Service) or energy efficiency (the Department of Energy's Industrial Assessment Centers), or tend to focus on start-ups, early stage or very small companies (e.g., SBDCs/SBTDCs and technology commercialization programs). MEP is the only organization offering to assist established manufacturing firms with overall improvement and growth.

Third, MEP is the only organization with a focus on manufacturing businesses, combined with the technical and executive experience that can build credibility with manufacturers.[16] Manufacturers deal with a complex set of management issues that are much different than other types of companies. Other organizations generally do not have the technical skills or manufacturing background that is required to assist established manufacturers – particularly those over 20 employees.

Fourth, MEP and its partners provide in-depth, intensive implementation assistance. This "hands on" assistance is critical for MEP to be an effective catalyst of change for companies and their leadership. The government's investment in MEP reduces the cost of sales (reaching smaller manufacturers) and reduces the cost of change for these manufacturers.

Fifth, MEP's field network is well positioned to be a connection point between manufacturing firm *demand* for technologies that can differentiate their products and improve manufacturing processes, and sources of *supply* of those technologies.

Assessment of the Current Model

MEP's current model has been highly effective in generating results for clients, but the model also has disadvantages that constrain the program's ability to have greater impact on the manufacturing sector. The two most important issues related to the current model are:

1. **MEP Must Reach Additional Clients** – As indicated above, it was already recognized that MEP can only reach a limited percentage of the manufacturing base. However realistically, only a portion of the manufacturing base is willing and able to invest in improvement and growth, and to seek outside assistance. This project explored the definition of the available market in more depth, and estimates that currently the MEP national network only provides in-depth assistance to 9% of the available market of companies with 20-499 employees that are willing to seek out and invest in outside support. Thus, much of the relevant market remains un-served.

2. **Manufacturers Require a Broader Range of Services** – Manufacturers require assistance beyond MEP's core services in process improvement, quality, and cost reduction. Firms also need services that foster growth, innovation and sustainability. Without assistance in these areas, the U.S. economy will miss opportunities for growth in manufacturing value added and jobs.

In addition, other constraints have emerged which further limit reach and performance:

>> The current cost-share requirement for MEP centers is positive in that it produces market-driven services and generates additional resources for centers, however the resulting emphasis on client fee revenue has also produced counterproductive behavior that constrains the centers ability to reach more clients and expand their service offerings.

>> Centers have a unique business model relative to other economic development organizations, and as a result have had difficulty building or sustaining partnerships; these partnerships would allow centers to provide additional capabilities and resources to clients, and to be more efficient in outreach.

>> The measurement and evaluation system for the MEP program does not measure or provide incentives for strong center performance, but focuses on whether centers meet minimum performance thresholds. Combined with cost-share and revenue requirements, the evaluation system also contributes to centers' reluctance to invest in new service offerings. Finally, the system also fails to capture important measures – such as those related to productivity and innovation – that are required to evaluate the success of the program.

>> The system's structure of 60 autonomous centers does not fully realize national economies of scale and results in some duplication of effort.

Changing the MEP Model

To significantly impact manufacturing performance, and respond to the issues described above, the MEP program must change in four ways, as summarized in Figure 2. These changes taken as a whole define a future state model for MEP in 3-5 years.

1. **Expand the scale of the program, in order to reach a much larger percentage of the available market** – If MEP could expand its reach, from its current level of providing in-depth assistance to 7,000-8,500 firms annually, to about 30,000, it could increase its impact on total SME manufacturing sales/output from 0.3% to as much as 2.0% annually. Based on our "future state" model this would require a federal investment of $406M, leveraging state and private funds to build a national system of $875M. MEP could then have a meaningful and measurable impact – i.e. cause the "needle to move" – on the manufacturing sector and the broader national economy.

2. **Leverage and maximize the federal investment** – Several measures are required to better leverage the federal investment:

   >> Reduce the cost-share requirement: to retain market focus, but discourage counterproductive behaviors that result from the emphasis on fee revenue; to encourage investment in new services; and to allow for expansion of the program;

   >> Measure and provide rewards for high performing centers;

   >> Require an in-depth *strategic review* of each center cooperative agreement every five years (so that 20% of centers would be reviewed each year), while at the same time simplifying interim review processes;

   >> In the context of strategic review, MEP should *target*[17] a state cash cost-share of at least 1/2 of the federal contribution, implemented once state budgetary situations improve; this target could be achieved through state funds that support training or offset the costs of assistance projects, as well as a direct contribution to a center's operating budget;

   >> Create an "SME Fund" to make services more affordable to smaller firms with less than 20 employees;

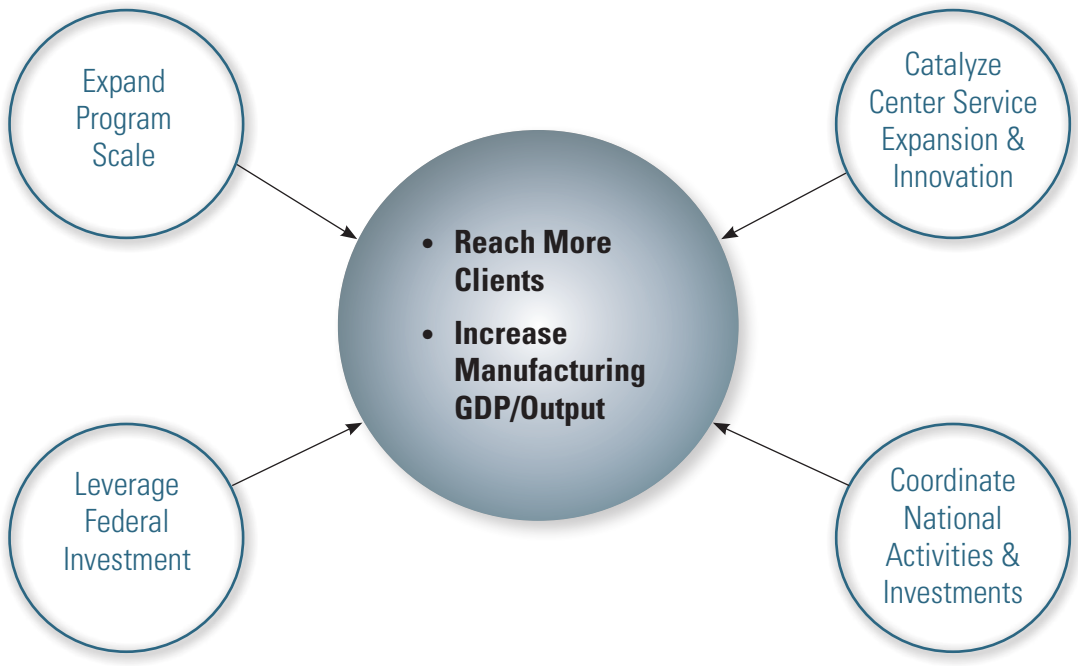
   >> Re-examine and revise the measurement system to gauge center performance beyond minimum thresholds, and capture client impacts related to growth in value added, productivity, and innovation.

3. **Catalyze service expansion and innovation at centers** – NIST MEP must work in several areas to drive innovation at centers:

   >> Encourage centers to expand the range of services to include new offerings in growth, innovation and green/sustainability:

   - A significant percentage of new funding increments should be specifically designated for investment in new growth, innovation and

Figure 2: Changes to the MEP Model



sustainability service offerings; the goal over the long-term is to have these offerings become a significant portion of MEP network activity.

>> Systematically employ all the resources and incentives at its disposal to catalyze change and innovation in center service and business models:

- Encourage innovation in service models that generate impact in an efficient manner, such as hybrid models that combine group education and one-on-one implementation/coaching, peer-to-peer learning models that assist SME management to improve their leadership skills, and investment in web-based tools to supplement hands on in-person assistance services;
- Offer a series of incentives to enhance center collaborations and partnerships with other public sector and non-profit entities;
- Create national service delivery and rapid response teams to assist centers with start-up of new services or respond quickly to immediate opportunities;
- Organize national teams to coordinate product development and deployment, composed of representatives from centers, NIST MEP, and outside experts.
- Encourage centers to consider expanded use of outside service delivery partners, to gain flexibility in service capabilities and capacity, and to reach more companies.

4. **Coordinate specific national activities and investments to achieve economies of scale and reduce duplication of effort at centers** – The specific functions or activities that should be led, and in some cases expanded, at the national level include the following:

>> Expand national level coordination and investment in product development, market research, program impact analysis, and identification of best practices;

>> Increase national investment in skills training and development for center and partner staff, eventually leading to certification efforts in key areas;

- Training related to outreach and client relationship development is of particular importance, as improvement in these areas leads directly to better utilized and thus more efficient centers.

>> Spearhead the development of national partnerships that benefit the entire network. National partnership development should include efforts to position the MEP national network as the field implementation force that helps other programs achieve their objectives in manufacturing[18] (e.g., energy efficiency for DOE, hazardous waste reduction for EPA); NIST MEP should also expand its regional presence to facilitate state and regional level partnerships.

These recommendations taken together define a future state model for MEP in 3-5 years. **The recommendations are integrated and reinforce each other, and should not be taken individually**. The impact of each recommendation is either magnified, or made more efficient, by the others. The result will be an MEP network that assists more than 4 times as many firms as it does today, and delivers services in a highly efficient manner that provides a high return to the federal investment.

Nothing short of the future of manufacturing is at stake. With a modest federal investment that leverages state and private sector funds, we can renew our commitment to a strong manufacturing base – where growing sectors are outpacing declining ones, where thousands of firms are not only improving their manufacturing processes, but are developing innovative new products, entering global markets and capturing a greater share of green market opportunities, and where MEP is providing indispensable assistance to the thousands of small and mid-size manufacturing firms that make a major contribution to U.S. economic prosperity.

Endnotes

1 NIST MEP Overview Presentation, February 2010, and NIST MEP provided client data. MEP tracks two categories of clients: 1) those who received in-depth or substantive services that are likely to generate measurable impact on performance, including sales growth or retention, cost reduction, employment increase or retention, or new investment; and 2) clients that received less intensive services, such as training and workshops.

2 NIST MEP, *Delivering Measurable Results to Its Clients,* Fiscal Year 2008 Results, January 2010.

3 *The Future of the Hollings Manufacturing Extension Partnership, Next Generation MEP Strategy,* December 2008.

4 Bureau of Labor Statistics.

5 National Science Foundation, Division of Science Resources Statistics, *National Patterns of R&D Resources: 2007 Data Update,* NSF 08-318, 2008; and National Science Foundation, Directorate for Social, Behavioral, and Economic Sciences, *U.S. Business R&D Expenditures Increase in 2007, Small Companies Performed 19% of Nation's Business R&D,* NSF 09-316, July 2009.

6 Bureau of Economic Analysis, Gross Domestic Product by Industry Accounts.

7 Bureau of Labor Statistics, Business Employment Dynamics.

8 Bureau of Labor Statistics, Business Employment Dynamics; and Stone & Associates, *Competing Against Manufacturing in Low Cost Regions: Focus on China,* Final Report, March 2004, prepared for NIST-MEP.

9 U.S. Economic Census 2002; and Manufacturing Performance Institute, *Next Generation Manufacturing Study: Overview and Findings,* prepared for the American Small Manufacturers Coalition, June 2009.

10 SME leadership and innovation is discussed in section 2, based on a variety of sources cited there.

11 Report entitled, *Rising Tigers Sleeping Giant,* by the Breakthrough Institute and Information Technology and Innovation Foundation, quoted in Manufacturing News, December 15, 2009; and Press Release from U.S. Senator Sherrod Brown's office, November 4, 2009, summarizing report from Blue Green Alliance entitled *Building a Clean Energy Assembly Line: How Renewable Energy Can Revitalize U.S. Manufacturing and the American Middle Class.*

12 Census Bureau, Survey of Business Owners, 2002; and Stone & Associates, *NIST-MEP Market Research and Analysis Project,* 1997.

13 See citations in Section 2. Interviews with centers, along with results from the Georgia Manufacturing Survey 2008, indicate that private consultants have a limited presence in the small firm market. *(Innovation in Manufacturing: Needs, Practices and Performance in Georgia, 2005-2008, Jan Youtie et al; Georgia Tech Program in Science, Technology, and Innovation Policy, October 2008).*

14 The Business Dynamics Statistics series from the US Census Bureau indicates that manufacturing establishment "exit rates" for firms of 1-2 years of age (start-ups/early stage) are significantly higher than established firms. As an example, for the year 2005 (the most recent year available) establishment exit rates for establishments within firms that are 1-2 years old are 2 to 6 times the average exit rate for firms of all ages in each size category.

15 Conclusions based on study teams' knowledge of programs, plus a review of various National Governors Association (NGA) and SSTI reports on science and technology based economic development, and interviews with SSTI. Studies include: NGA, *Innovation America: A Final Report, 2007;* SSTI, *A Resource Guide for Technology-Based Economic Development,* August 2006; NGA Center for Best Practices Issue Brief, *Enhancing Competitiveness: A Review of Recent State Economic Development Initiatives*—2005, published May 2006.

16 See discussion and citations in Section 3.

17 While this state investment would not be a strict requirement, centers that lack state funds may be disadvantaged in terms of performance, which could in turn lead to missed opportunities for new increments of funding and other resources.

18 As long as these objectives are consistent with MEP's mission and metrics.