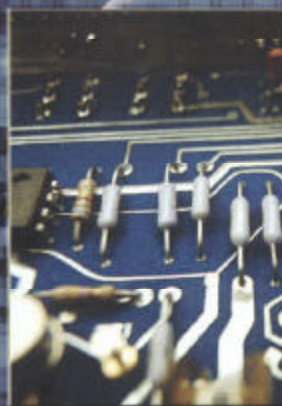


A Report by a Panel of the

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

for the U.S. Department of Commerce and the National Institute of Standards and Technology

The Manufacturing Extension Partnership Program



Report 2
Alternative Business Models

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The Manufacturing Extension Partnership Program

**Report 2
Alternative Business Models**

Panel

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FOREWORD

The Manufacturing Extension Partnership (MEP) program in the Department of Commerce's National Institute for Standards and Technology (NIST) was established to meet a critical need: to increase the competitiveness of small manufacturers throughout the United States. Small manufacturing firms face enormous challenges to remain competitive in today's global economy. They face constant challenges to cut costs, improve quality, meet environmental and international standards, and get new and improved products to market faster. Competition also has become fierce resulting in tremendous downward pricing pressures, and substantial job losses in the United States.

For the last 15 years, the MEP has operated as a partnership between federal, state and local organizations and the private sector. In 2002, NIST asked the National Academy of Public Administration to research several issues: barriers to productivity improvement that small manufacturers face; whether MEP is positioned to help reduce these barriers; and alternative business models for operating the program. Our first phase report, which focused on the first two issues, was issued in September 2003. This report focuses on alternative business models.

The Academy was pleased to undertake this study. I want to thank the Academy Fellows and other experts who served on the Panel overseeing this project. Their insights and guidance have been excellent and their contributions very valuable. My appreciation goes to NIST executives and manufacturing and other stakeholders for their time and cooperation. Finally, I extend my thanks to the project team for its hard work and diligence in producing this important report.



C. Morgan Kinghorn, Jr.
President
National Academy of Public Administration

TABLE OF CONTENTS

FOREWORD	iii
EXECUTIVE SUMMARY	vii
CHAPTER 1: ORGANIZATIONAL ALIGNMENT WITHIN THE DEPARTMENT OF COMMERCE	1
Technology Administration.....	1
National Institute of Standards and Technology	2
Manufacturing Extension Partnership Program	2
CHAPTER 2: CURRENT MEP BUSINESS MODEL	7
Management System.....	7
Operating System.....	8
Funding Systems.....	11
CHAPTER 3: BASIS FOR A NEW BUSINESS MODEL	15
Background—State of Manufacturing	15
Underlying Need to Expand Services	16
Center Performance	17
Improving Center Performance	18
Conclusion.....	19
CHAPTER 4: PROPOSED MEP BUSINESS MODEL	21
MEP Service Mix	22
Management System.....	29
Operating System.....	35
Funding System	38
CHAPTER 5: WHAT MEP CAN LEARN FROM OTHER BUSINESS MODELS	41
Recommendations Based on Other Models	46

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS..... 49

Recommendations..... 50

FIGURES AND TABLES

Figure 1-1: MEP Program Management Staff Office Organization Chart 3

Figure 2-1: Current MEP Business Model..... 7

Table 2-1: Manufacturing Extension Partnership Services..... 10

Table 2-2: Breakdown of Technical Assistance in FY 2003 by Substance Codes 10

Figure 4-1: Proposed MEP Business Model 22

Figure 4-2: Manufacturing Extension Partnership Planning Model and Schedule 31

Table 5-1: Federal Agency Model Matrix 47

APPENDICES

Appendix A: Executive Summary and Methodology: Report 1—Re-Examining the
Core Premise of the MEP Program..... 53

Appendix B: Other Federal Agency Models with State-Based Operations 57

Appendix C: Organizations with Whom MEP Could Enhance its Partnering and
Collaborating Relationships 83

Appendix D: MEP Center Performance Assessment 93

Appendix E: Statistical Analysis of Performance and Center Profiles 101

Appendix F: Communities of Practice 105

Appendix G: Panel and Staff..... 109

Appendix H: Glossary..... 113

EXECUTIVE SUMMARY

Phase I of the Study

The first phase of this study¹ found that small manufacturing firms, which account for 7 percent of the U.S. Gross Domestic Product, face enormous challenges in their efforts to remain competitive in today's global economy. For the last 15 years, the Manufacturing Extension Partnership (MEP) Program has operated as a partnership among federal, state, and local organizations and institutions (including the private sector) to help small manufacturers improve their performance.

The initial phase of this study found that although there are still barriers to improving small manufacturers' productivity that were identified in earlier studies, their relative impacts have changed. These barriers include: the regulatory environment creating a disproportionate burden for smaller firms; the relative unfamiliarity of smaller manufacturers with changing technology, production techniques and business management practices; the general isolation of small manufacturers which allows for little interaction with other companies in similar situations; small company owners and manager's difficulty in finding high quality, unbiased advice and assistance; and, the difficulty small and medium-sized manufacturing firms have obtaining operating capital and investment funds to modernize.

Additionally, several other factors have grown in importance. They include rapidly increasing competition from low cost countries in terms of the number of competitors and the quality of that competitive output; the explosion in the availability of information and information technology; small manufacturers' insufficient access to knowledge workers, and the high cost of providing employee health insurance,

On balance the Panel found that the MEP Program performs capably and effectively, and that the core premise of the Program remains viable as it is fulfilling its mission by leveraging both public and private resources to assist the nation's small manufacturers.

There were two principal findings in the first phase of this study:

- Barriers to productivity and performance improvement continue to challenge small manufacturers.
- The small manufacturing market is underserved in terms of assistance with productivity and performance improvement efforts.

¹ See Appendix A: *The National Institute of Standards and Technology's Manufacturing Extension Partnership Program. Report 1: Re-examining the Core Premise of the MEP Program.* A Report by a Panel of the National Academy of Public Administration for the U.S. Department of Commerce and the National Institute of Standards and Technology. September 2003.

The Panel also noted that given the wide range of performance and capabilities among MEP centers, there are opportunities to improve the Program's service delivery, organizational structure, and outcome and performance measures. This observation provided the focus for the second phase of the study, which considers alternative business models for the Program.

The Panel believes that the National Institute of Standards and Technology (NIST) leadership made the right decision in the early years of the Program to change its focus from technology transfer to providing technical and business assistance to small manufacturers. Data collected from clients supports the fact that MEP centers have had a positive impact on companies that have availed themselves of the Program's services.

Perhaps the most important aspect of the current MEP Program is its recent efforts to provide a holistic approach to services, offering help with process improvements, quality control systems, business and management systems, human resources, and market and product development. A second aspect, and perhaps the Program's greatest strength, is the trust that small firms have in the advice they receive from the experienced shop floor engineers who work for MEP. According to one Academy Panel member, "There are only two (federal) programs that work well with the states—FEMA and MEP."²

Phase II of the Study

As Phase I of this study concluded, the needs of U.S. small manufacturing enterprises (SMEs) have changed. The Panel believes the MEP Program has evolved to the point where it needs to consider how it can have a much broader impact on an industry that has suffered significant losses in jobs and business to foreign competitors. While the Program has performed well delivering the services in its current model, the Panel believes a fundamental change in the mix of the types of services it provides as well as the structures for delivering them needs to be considered.

As the only federal program designed specifically to help small manufacturers, MEP is uniquely positioned to help create an infrastructure for supporting these firms as the U.S. economy undergoes an enormous economic transition. The Panel finds that the time is right for a change to the basic services and approach employed, including: an expansion of technology diffusion as a basic function of the Program; the expansion of product development and supply chain integrations services; increasing the brokering of business and technical services through contracts with private sector consultants and training organizations; and, building an integrated national network of assistance with deeper technology and industry knowledge to support small manufacturer's competitiveness.

The Panel also finds that aspects of the Program which have contributed to its achievements including its funding formula, performance measurement system and structural changes should be revised to put the Program in a better position for a new approach to its mission. The MEP headquarters' role also needs to shift as these changes are undertaken. The revised role needs to

² Raymond Scheppach, Executive Director, National Governor's Association.

include serving as a facilitator of the new integrated network; developing nation-wide technology and service provider partnerships; supporting supply chain and industry-wide initiatives; developing strong knowledge management capabilities; and providing firm direction to state centers on Program requirements.

The findings from this phase of the study have led to the following Panel recommendations:

1. ***Emphasize technology diffusion, product development, and supply chain integration services as basic services of the Program in addition to providing technical and business assistance to small manufacturers.*** The mission to improve the performance of small manufacturers would remain the same, but the mechanisms for doing so would take a significantly different shape.
2. ***Build an integrated national network of assistance for small manufacturers.*** The Program has done a good job of establishing the basic framework for a national system; however performance can be significantly improved by better integrating the efforts of state centers, by increasing partnering activities at the national level, and by collaborating on specific industry needs as well as technology trends.
3. ***Improve the coordination and partnering by MEP headquarters with other organizations that assist small manufacturers.*** Several organizations provide similar or complementary services to the manufacturing industry. While there are numerous examples of partnering at the state center level, there needs to be a more centralized linkage with the efforts of these other organizations.
4. ***Adopt some of the business practices used by other programs that operate federal and state/local partnerships.*** The Panel found no program that could serve as an “off-the-shelf” model for the MEP Program. However, important aspects of other federal programs could be of benefit to the Program.
5. ***Improve the system-wide sharing of knowledge and information and the systems for measuring performance.*** The MEP Program has developed several innovative approaches to managing information and measuring performance, but changes to existing systems and alternative approaches should be considered.
6. ***The Department of Commerce should consider aligning and integrating the various organizations within the Department that have manufacturing assistance responsibilities.*** With the creation of a new “manufacturing czar”³ position within DOC, consideration should be given to manufacturing assistance organizational realignments and responsibilities to improve coordination and efficiency.

³ President Bush Creates New Assistant Secretary to Aid Manufacturing Industry. “...the new Assistant Secretary will help address the competitive challenges and opportunities facing the U.S. manufacturing sector.” Department of Commerce Press Release, September 1, 2003.

7. ***MEP Program officials should consider several structural and operational changes*** including reestablishing a strategic planning process and seeking authority for more flexible Program funding.

Adopting these recommendations will be both an important and difficult undertaking. It will require the full support and commitment not only of the people who work within the MEP Program but also those who have management and oversight responsibilities for the Program. Such changes will also take time and should be approached in an evolutionary fashion. Building the organizational and human capabilities envisioned in the recommendations of this study will take a great deal of skill and patience.

The extraordinary changes occurring in the manufacturing industry coupled with the tremendous opportunity presented by the profusion of technological innovations in the United States provide the bases for these findings. A national, integrated network which provides technological solutions to the performance challenges facing small manufacturers would be a tremendous national asset.

The report is organized as follows:

Chapter 1: provides a brief overview of the organizational structure of the Department of Commerce, the Technology Administration (TA), NIST and the MEP Program

Chapter 2: describes the current MEP business model

Chapter 3: discusses the changing environment in the manufacturing sector and rationale for the changes in the MEP model which could enhance the impact of the Program

Chapter 4: describes the alternative business model recommended by the Panel

Chapter 5: describes what the MEP Program can learn from other government organizations' business models

Chapter 6: summarizes the conclusions and recommendations of the Panel

CHAPTER 1

ORGANIZATIONAL ALIGNMENT WITHIN THE DEPARTMENT OF COMMERCE

The mission of the Department of Commerce is “to foster, promote, and develop the foreign and domestic commerce” of the United States. Over its one hundred-plus year history as a Department, the mission has evolved to encompass the responsibility for fostering, serving, and promoting U.S. economic development and technological advancement. Among the methods it employs are:

- promoting progressive domestic business policies and growth
- ensuring effective use and growth of the Nation’s scientific and technical resources
- acquiring, analyzing and disseminating information regarding the nation and the economy to help achieve increased social and economic benefit
- assisting states, communities and individuals with economic progress

Technology Administration

As one of the elements of the Department of Commerce, the Technology Administration includes the National Institute of Standards and Technology (NIST), the Office of Technology Policy (OTP), and the National Technical Information Service (NTIS). The mission of the Technology Administration is “to maximize technology’s contribution to economic growth, high-wage job creation, and the social well being of the United States.”

Congress established the Technology Administration in 1988. Its functions include:

- advocating technological innovation in the government policy arena and other key national and international organizations
- analyzing factors that affect U.S. technological innovation and competitiveness, including R&D investment, business climate, technology infrastructure, and workforce technical skills
- developing and promoting measurements, standards, and technology to enhance productivity, trade, and the quality of life. This includes conducting research to advance the U.S. technology infrastructure, promoting excellence and quality achievement in U.S. business and other organizations, providing technical and business assistance to the nation’s smaller manufacturers, and supporting the development of technologies for broad national benefit
- providing access to information that stimulates innovation and discovery. This includes serving as the largest central resource for government-funded scientific, technical, engineering, and business related information⁴

⁴ Department of Commerce, Technology Administration Web Site <http://www.technology.gov/>

National Institute of Standards and Technology

The National Institute of Standards and Technology (NIST), which is one of the three major sub-elements within the Technology Administration, is responsible for providing U.S. industry with measurements, standards and information services which increase competitiveness and facilitate trade. Through the Advanced Technology Program, NIST stimulates economic growth by providing grants for the development of high risk and enabling technologies.

NIST operates the following national laboratories:

- Electronics and Electrical Engineering Lab
- Manufacturing Engineering Lab
- Chemical and Science Technology Lab
- Physics Lab
- Materials Science and Engineering Lab
- Building and Fire Research Lab
- Information and Technology Lab

Each National Laboratory has the mission to conduct state of the art research, maintain national physical standards, provide a focus for research and development, and develop and provide the results of these activities to the scientific community, the consumer and industry.

NIST administers the National Quality Program which helps industry develop technology and new procedures that improve both the quality of the products and services companies provide as well as their competitiveness. As part of the National Quality Program, NIST manages the Malcolm Baldrige National Quality Award Program.

Manufacturing Extension Partnership Program

NIST is also responsible for the Manufacturing Extension Partnership (MEP) Program. The mission of the MEP Program is to strengthen the global competitiveness of U.S. based manufacturing by providing information, decision support, and implementation assistance to smaller manufacturing firms in adopting new, more advanced manufacturing technologies, techniques, and business best practices. The Program is also tasked with helping state governments plan for the development of statewide industrial extension. It was also envisioned that MEP would create and maintain partnerships across the federal government and within industry to develop and integrate new and existing resources which support a national delivery system of manufacturing consulting services. The intent of the national system is to make these services readily accessible to small manufacturing firms at an affordable cost. The MEP Program is also expected to develop strategies and execute programs which explore innovative, alternative approaches for improving small manufacturers' competitiveness.

The current structure of the MEP Program offers both distinct advantages and disadvantages in terms of Program performance. One strong advantage is that it provides services in partnership with state governments and others. The federal government provides a one-third share of operating resources to the

centers as well as policy and program guidance. By law the other two-thirds must be generated by centers through a combination of public and private sources.

MEP Program Management

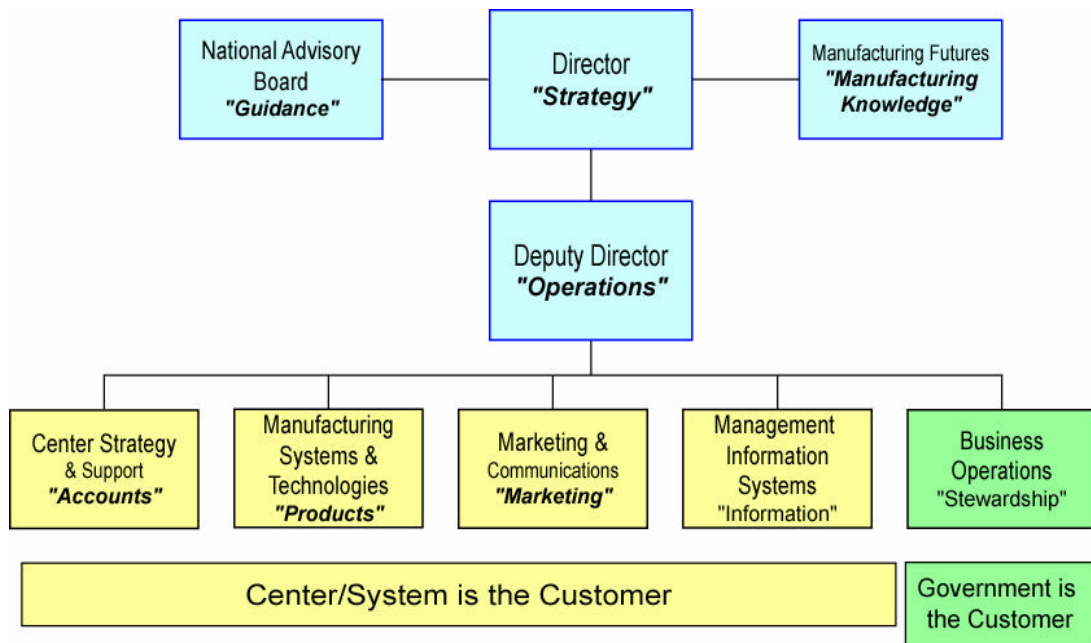
The MEP national program management functions are performed by a staff of approximately 53 employees in Gaithersburg, Maryland. The establishment of an MEP center in a state requires negotiations with the program management staff. Each state must develop a written agreement encompassing a mutual understanding of priorities and respective roles and responsibilities.

Recently, the MEP program management staff was restructured. Currently, it consists of five staff offices and the Office of the Director. The Director’s office is responsible for planning, directing, and implementing the program, and for the evaluation of the state centers. The five staff offices that report to the Director are:

- Center Strategies and Support Office
- Manufacturing Systems and Technology Office
- Management Information Systems Office
- Marketing and Communications Office
- Business Operations Office

The current organizational chart for the MEP program management staff offices and a description of the functions performed by each are provided below.

Figure 1-1. MEP Program Management Staff Office Organizational Chart



The Center *Strategies and Support Office* designs strategies and provides support for the continuous improvement of MEP centers. It promotes the adoption of extension service best practices and is tasked with taking corrective action on “problematic” centers which are not effectively providing services to SMEs. The office also deploys universal solutions, including tools, techniques and training to address common center problems and opportunities. It also has a research and analysis function that focuses on local and national market needs.

Through the *Manufacturing Systems and Technologies Office*, the MEP staff identifies, develops, and deploys business knowledge and supporting technologies and related products, as well as services and information to assist the centers in helping transform SMEs into high performance enterprises. It is in this office where new pilots, initiatives, and products are developed for eventual adoption by centers. Its goal is to transform SME production by analyzing technological bottlenecks, identifying opportunities for learning, assessing the potential impact of technology, increasing the rate of technology adoption, and thereby stimulating innovation. This office also maintains the MEP nationwide learning system which includes the MEP University. The objective of the MEP University is to address the learning needs of those engaged in providing manufacturing extension services at the MEP centers. Its stated purpose is to increase the capabilities of staff in the MEP system by transferring knowledge and skills that increase firm competitiveness. The MEP University provides learning opportunities organized around four programs of study:

- Lean Enterprise
- Consulting
- Center Operations
- Strategic Consulting

Both new and experienced specialists comprise the target audience.

The *Marketing and Communications Office* is responsible for developing and implementing system-wide marketing and communications strategies. These efforts focus on promoting awareness of the MEP network among small and medium sized manufacturers. The office serves as the MEP liaison to the NIST Public and Business Affairs Division

The *Management Information Systems Office* develops the architecture and manages the information infrastructure for the MEP systems.

The *Business Operations Office* manages the legislatively mandated review process and administers all MEP Program business processes with respect to cooperative agreements and contracts. The office performs legislatively mandated reviews of MEP centers, evaluates performance, and serves as the contracting officer’s technical representative (COTR) for cooperative agreements, contracts, and interagency agreements and joint project agreements. It is also the office that provides the primary interface between the MEP Program and center financial managers.

Although formally organized into the five staff offices described above, the MEP Program management staff leadership team stated that the program in reality is focused on three functional areas: center support, ensuring operational integrity, and developing future US small manufacturing scenarios.

There is also a Manufacturing Extension Partnership National Advisory Board. It was established in October of 1996 by the Secretary of Commerce to provide guidance to the Program. The Board has nine members who are industrial extension customers, partners and service providers. The Board provides advice and feedback on MEP programs, plans, and policies. The nine members each serve three year terms.

State and Local Management

The MEP Program links 59 centers with more than 400 satellite offices serving 50 states and Puerto Rico. Each state has at least one center. Pennsylvania, Georgia, California, Wisconsin, and Illinois have multiple centers. There is also a center in Puerto Rico. For the most part centers operate as semi-autonomous state-based business units with an office director. In two instances, however, offices from different states report to a single director. While the program management staff is responsible for funding, evaluating and providing strategic direction to state centers, several of the directors interviewed indicated that they did not view the Gaithersburg office as headquarters but rather as one of several funding sources for center operations.

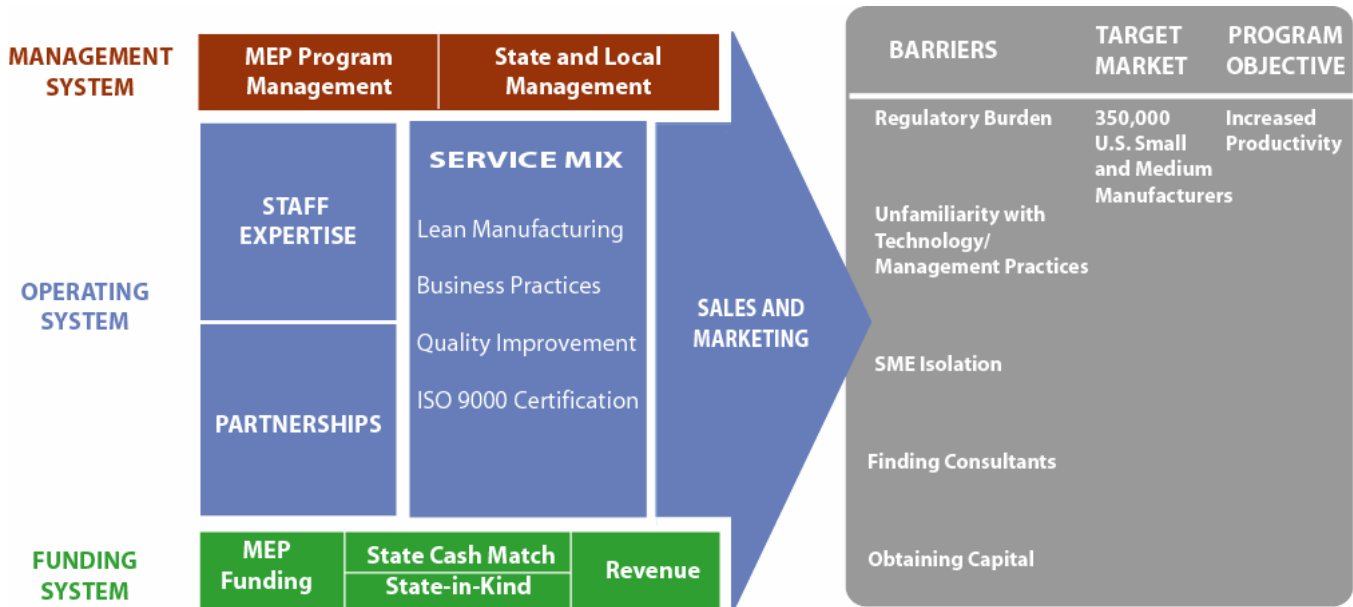
CHAPTER 2

CURRENT MEP BUSINESS MODEL

A business model considers an enterprise in terms of its products and services as well as its markets and the resources that contribute to its value. It also considers how the enterprise operates and performs as well as its strategy, culture and structure. The current MEP business model can be described at the strategic level as three primary systems. The *operating system* encompasses the service mix and delivery system; the *management system* includes the overlap of the federal MEP Program with the state and local requirements; and the *funding system* is the balance of federal contributions, state contributions and earned fees. In reality, these three systems are made up of many sub-systems that often result in conflicting parts.

The current MEP business model is depicted in the following chart, followed by a narrative description of the primary systems:

Figure 2-1: Current MEP Business Model



Management System

The management system is driven by the goals and objectives of the federal governments as well the goals and objectives of 50 states (plus Puerto Rico), numerous local governments, and 59 fiduciary and advisory center boards.

The primary activities of the federal component include selection and evaluation of participating state-based centers; maintaining and evaluating overall system performance with respect to the federal goals and objectives; and providing strategic direction for continuous improvement.

State and local management systems are focused on state level economic development and firm-level manufacturing competitiveness. Local management systems are driven by fiduciary and advisory boards that focus on the financial viability of their respective center and customer satisfaction.

These varying systems with potentially different goals and objectives can result in tension between a state's economic development mission and the MEP national competitiveness mission and center business sustainability mission. The most significant federal component of the management system is the outcome-based metrics used to evaluate the centers' ongoing funding on a semi-annual basis.

Operating System

The operating system has 59 different models. They range from a broker model in which center staffs predominately provide project management services and partnering organizations provide direct services, to consulting models where project management and service delivery is provided primarily by center staff. Centers are free to determine how to market the services of the center, which clients to target, which services to provide, how long to work with each client, and what to charge the client. They are also free to determine what type and how many staff to hire. However, the decision of how much service to provide is driven predominately by the federal funding level and its 2 to 1 matching requirement.

Center Staff Expertise

Centers are staffed with employees who are knowledgeable and experienced in manufacturing process improvements and business practices. The employees who work at the centers are not federal employees. They are employees of either a "501 (c) (3)" non-profit organizations, an educational institution, or the state, depending on the organizational structure of the center.

Where gaps exist in center staff expertise or availability, centers can call upon private consultants, state university or college staffs, as well as other federal and state agencies to assist small manufacturers. Centers work directly with area manufacturers to provide expertise and services that are tailored to meet their critical needs. These needs range from process improvement and worker training to business practices and applications of information technology. Specific product offerings include: Lean Enterprise, Strategic Management, Quality Systems, Industrial Marketing, Environmental Health and Safety, Human Resources/Organizational Development, workshops and events, and business tools. Centers provide solutions to manufacturers' needs through a variety of methods either through direct assistance from center staff or through brokered agreements with outside consultants.

Partnerships

The MEP program management staff does a good job of encouraging centers to partner with other organizations. Centers are required to develop and report on a quarterly basis new and ongoing formal relationships with other organizations. These partnerships are defined as ones where organizations contribute or align resources (human and/or monetary) through a long-term formal agreement and participate in the management of a portion of the efforts to achieve common objectives with the center. The importance of these partnerships is demonstrated by centers that can reach beyond their own resources to obtain additional resources to help SMEs become more productive.

Current Service Mix Provided by MEP Centers to Clients

MEP headquarters requires centers to report on the types of activities that they engage in with manufacturing firms in their region. The MEP staff is primarily concerned with substantive interactions that result in measurable impact. A “measurable interaction” is defined as an interaction in which the primary objective of the center’s service is to facilitate measurable changes in a firm’s operations, which in turn affect the firm’s bottom line performance.⁵ “Projects” are defined as a set of interactions with a single client and “events” are defined as a set of interactions undertaken with a group of clients that pertain to the same type and substance.

There are three broad categories (Activity Types) of projects and events:

- Assessment—an interaction or set of interactions in which a structured diagnostic analysis is performed on a client and feedback is provided to the client
- Training/Education—an interaction or set of interactions in which a client learns how to employ general or industry—specific business tools or methods to build skills
- Technical Assistance—an interaction which involves technical services and /or information to help a client improve a specific aspect of its business

These projects or events are further segmented into the areas (described as Substance Codes) of the business that the project is designed to improve. The six most frequently targeted areas are defined in the following chart from the MEP Management Information Reporting Procedures Manual.

⁵ MEP Management Information Reporting Procedures, 2003, Section 4.1-1.

Table 2-1: Manufacturing Extension Partnership Services

Title	Definition
Business Services	Includes services delivered to business owners, executives and managers in the areas of strategic and long range planning, business development, company financing, market research, industrial marketing, product development, sales planning and sales/distribution management.
Quality Systems	Assistance in assuring that manufacturers have repeatable, error-free processes. This service area includes the development of management systems, teaching companies how to use statistics to measure variability, and cause and effect thinking.
Manufacturing Systems	Includes services delivered to identify and eliminate waste (non-value-added activities) through continuous improvement by flowing the product and information at the pull of the customer.
Information Technology	Assistance in selection, assessment or implementation of information systems, communications networks, or computer-based technology related to design engineering, or automated manufacturing.
Human Resources and Organization Development	Includes work organization, employee involvement and empowerment, compensation and benefits, management methods, and organizational culture.
Engineering/ Technical Services	Includes technical services delivered to solve specific manufacturing process or R&D challenges

In FY 2003 the centers reported 5,705 Technical Assistance projects, 4,350 Training/Education projects⁶, and 992 Assessment projects. The technical assistance projects were further broken down into the following types of services (substance codes):

Table 2-2. Breakdown of Technical Assistance in FY 2003 by Substance Codes

Substance Code	Count	% Total Technical Assistance Activities
Business Services (11)	546	9.6
Quality systems (12)	954	16.7
Manufacturing Systems (13)	2172	38.1
Information Technology	240	4.2
Human Resources and Organizational Development (15)	227	4.0
Engineering/Tech Services (16)	622	10.9
General/Other (20)	339	5.9
Business Services and or Information Technology (C)	559	9.8
Manufacturing Systems, Information Technology , and/or Engineering/Tech Services (G)	48	0.8

⁶ Fifty-six percent of all reported Training/Education hours are conducted by the centers, and 44 percent by a third party.

The data indicate that in FY 2003, 39 percent of centers activities involved training, while 46 percent of the “technical assistance” activities involved business services, quality systems, human resource and organizational development, general activities, or information technology related to business services.

The NAPA study team also reviewed 115 of the 1300 “success stories” that the centers have posted on the MEP intranet site (<http://www.mep.nist.gov/>) to see how many involved training and business support services as opposed to technology related solutions. These stories provide a short description of successful projects with clients and are arrayed by state and center. The team reviewed the narratives to determine the type of service that was provided. Only 12 (10.4 percent) of the 115 stories reviewed involved improving product engineering or technical services. Lean training accounted for 51 (44.3 percent) of the projects, and quality training accounted for 26 projects (22.6 percent). Six (5.2 percent) of the projects involved training in automation, and the remaining 20 dealt with various miscellaneous issues.

Changing the Current Service Mix

While the MEP Program performs well in areas in which it currently focuses, these services are overwhelmingly devoted to technical and business assistance. These services can be, and often are, provided by third parties. Currently 46 percent of MEP services are brokered through third parties. The Panel recommends an increase in the use of brokered services so the Program can focus on new services. The following chapters will discuss shifting the current service mix to one which also provides services for technology diffusion, product development, and supply chain integration services as basic Program elements. Such a change also has broad implications for the current structure, organization, and strategic management—i.e., the business model—of the Program.

Funding Systems

MEP provides services in partnership with state governments and other partners. The federal government provides a one-third share of operating resources to the centers along with policy and program guidance. By law, the remaining two-thirds must be generated by centers through a combination of public and private sources.

The states provide one of the public revenue sources, and, in some cases, more than half of a center’s costs. In three states the MEP centers are part of a state agency. However, most centers are non-profit organizations and a smaller number are university-based. The amount of resources contributed by the states varies significantly from state to state. Support from most of the states include what is referred to as “in-kind” services which cover the costs for office space and equipment as well as shared employees. The cost of these “in-kind” services can be used to help meet the federal matching requirements. This type of funding obviously does not afford center managers with the same flexibility that they have in using unencumbered real dollars to meet the centers’ program priorities. In some instances, state contributions are minimal or non-existent, a circumstance which can be an important predictor of center performance.

Centers also generate revenue from service fees charged to small manufacturers and work in partnership with a variety of public and private organizations to deliver these services. Almost half (46 percent) of the services provided in FY 2002 were contracted to these other providers. The in-house staff of centers provided the remaining services.

Advantages and Disadvantages of the Current Model

This state and locality-based model has a close-to-the-customer structure that allows for a great deal of service delivery flexibility and adaptability. It also provides strong support and buy-in for the program at the state and local levels. Performance measures have been developed which focus on important outputs and outcomes as they relate to the services provided to small manufacturers by state centers.

With a locally-based structure that encourages centers to operate as small businesses (that is, with balance sheets, cash flows and receivables and other characteristically private sector features), aggressive performance measures and the requirement to leverage two dollars for each federal dollar invested, the MEP Program seems to adhere closely to the key principles of the President's Management Agenda⁷ which calls for organizations to be:

- citizen-centered, not bureaucracy-centered
- results-oriented
- market-based, actively promoting rather than stifling innovation through competition

The disadvantages of this system stem from some of the same factors that make it strong. For example, the decentralized nature of operations makes it difficult to consistently apply best practices nationwide. Correspondingly, there is a considerable amount of "reinventing the wheel" in each of the centers and often, higher management and administrative costs, given the need for each center to be able to operate as a "stand-alone" entity.

The ability to capitalize on the strengths of one center to improve the performance of other centers is limited. Also constrained is the ability of MEP to function as a network, a critical need in a time when manufacturing supply chains work across geographic and political boundaries. Creating a nationwide market identity and the marketing of the program beyond individual localities also become problematic.

Of particular importance is the need to systematically and comprehensively exploit the knowledge and capabilities within the MEP network. With limited mechanisms to link-up and build on the knowledge, skills and capabilities that reside in the state centers, the ability of the Program to perform at an optimum level is seriously constrained.

The result is a system which performs well at one level but has significant opportunities to improve at another. Thus, the challenge is to design an organizational model which can continue

⁷ The Office of Management and Budget is responsible for evaluating agency efforts regarding the implementation of the President's Management Agenda. See: <http://www.whitehouse.gov/omb/budget/fy2002/mgmt.pdf>

to capitalize on its existing strengths while developing new capabilities. This is no small task and will take a significant commitment of time and resources to make this difficult, yet necessary, transition.

The barriers that the current model was designed to address are discussed in the next chapter along with a brief discussion of the state of manufacturing.

CHAPTER 3

BASIS FOR A NEW BUSINESS MODEL

In the Phase 1 Report, “Re-examining the Core Premise of the MEP Program”, the Panel found that the barriers facing small manufacturers in their efforts to improve productivity and performance that existed when the MEP Program was established continue to exist today. Three new barriers were added to the list namely, extreme pricing pressures from “low cost” countries, finding enough skilled knowledge workers, and rising health care costs. The study also concluded that SMEs face an explosion in the availability of information and information technology which could be both a barrier as well as an opportunity for improvement. The report also found that the MEP Program is uniquely positioned to create the national network and infrastructure that can provide systematic and comprehensive assistance to small manufacturers.

BARRIERS

- Regulatory burdens
- Unfamiliarity with technology and management practice
- SME isolation
- Finding consultants
- Obtaining capital
- Low cost global competition
- Skilled knowledge workers
- Health care costs

However, the Panel has concluded that global competition and pricing pressures bring into question the sufficiency of the current MEP services. The Panel believes the MEP should expand their service offerings beyond providing technical and business assistance and emphasize technology diffusion, product development, and supply chain integration services as basic services of the Program. The productivity and cost improvement focus of the current services should continue but should be brokered-out to third party providers whenever possible in order to incorporate new services into the Program’s portfolio. Such a change represents a significant strategic shift for the MEP Program that will challenge the current business model.

Moreover, the Panel believes that the current MEP business model should be challenged to improve operating efficiencies at the center level. Center level performance data indicates significant variation in performance among participating centers. The Panel attributes much of this to funding, staffing, and partnership variations at the local center level.

The rest of this chapter includes a brief overview of the changes taking place in manufacturing; a discussion on the underlying needs to expand services; and a discussion of the opportunities for center level performance improvement.

Background—State of Manufacturing

The manufacturing sector of the U.S. economy has experienced tremendous changes in the past few years. Global competition has become fierce resulting in tremendous downward pricing pressures and most recently substantial job losses in the United States. In January 2004, there were 14.3 million manufacturing jobs, 3 million (17.5 percent) less than in July 2000 and 5.2

million less than the historical peak in 1979. In that same month (January 2004) employment in manufacturing was its lowest since July 1950. In a recent report,⁸ the Congressional Budget Office said that much of the decline in manufacturing employment since 2000 reflects the recession that began in 2001 and the relatively weak recovery in demand that followed. The recession was particularly hard on the manufacturing sector, as the demand for goods weakened in both the United States and the rest of the world. Other contributing factors include productivity increases in the manufacturing sector, as well as competition from foreign producers with lower compensation costs. It is also due to what the CBO refers to as a statistical artifact in that manufacturers are increasingly using contract and temporary labor. In the past these jobs would have shown up in the statistics as manufacturing employment but they are no longer included in the computation of manufacturing employment.

The dramatic downturn in manufacturing output, profits, and employment has been under the national spotlight. Economists and industry experts may debate the reasons for the decline as well as the pros and cons of outsourcing, free trade agreements, and competition from “low cost countries.” In undertaking this study, however, the Panel accepted the fundamental premise that maintaining a healthy manufacturing sector is essential to the nation’s overall economic performance and defense capabilities.⁹ Consequently, its primary considerations were whether the current MEP services and corresponding business model are meeting not only the needs of individual companies, but also broader national needs.

Underlying Need to Expand Services

As stated earlier, the MEP Program provides a breadth of services that help SMEs reduce operating costs and increase product quality. These improvements help increase their clients’ productivity by reducing the input or denominator component of the productivity equation (Productivity = Output/Input). If the MEP Program continues to focus the preponderance of their services on the input component, it would make a positive contribution to manufacturing competitiveness. However, the Panel believes that the health of U.S based small manufacturers is dependent on increasing the output component of the productivity equation, as well as decreasing the input component.

Additionally, two new barriers identified in Part 1 of this study—extreme price competition from “low cost countries” and a shortage of skilled knowledge workers—suggests that SMEs will continue to struggle to increase their overall productivity. The barriers of SME isolation and their unfamiliarity with new technologies practices compound the productivity improvement problem. For these reason the Panel believes that MEP should broaden the services provided to SMEs to specifically address product development and supply chain integration, both of which

⁸ Congressional Budget Office, Economic and Budget Issue Brief, *What Accounts for the Decline in Manufacturing Employment*, February 18, 2004.

⁹ See Attachment A: *The National Institute of Standards and Technology’s Manufacturing Extension Partnership Program. Report 1: Re-examining the Core Premise of the MEP Program*. A Report by a Panel of the National Academy of Public Administration for the U.S. Department of Commerce and the National Institute of Standards and Technology. September 2003, p. 5-6.

focus on increasing output, and technology diffusion services, which address increasing output as well as decreasing costs.

Chapter 4 covers the recommended services in more detail. However, it is important to understand the ramifications of broadening the service offerings with respect to the business model as a precursor to evaluating the recommendations. For the most part, current MEP services are delivered by a MEP center independent of other centers or NIST/MEP involvement. The current business model supports the autonomous operations of each center where product development, staff selection, training, partner selection, and marketing are executed to optimize the output and revenue of the local center.

The proposed services are different in several respects. First, technology diffusion services will require more in-depth industry specific knowledge and broader connection to technology providers and will necessarily include national partners. Likewise, supply chain integration will require in-depth industry knowledge and broader geographic connectivity. Product development services can be delivered via center-centric processes; however, product development is driven by innovation that is typically fueled by broad multi-disciplinary involvement as well as technology infusion. Because of the limited resources of most MEP centers it is unlikely that product development services can be effectively delivered independently. In short, these new services cannot be effectively delivered to local companies using predominantly local service providers.

Therefore, the Panel believes that these new services will need to be developed and delivered through an integrated interdependent business model rather than the current center autonomous business model. New partners at the local and national levels will need to be developed and maintained on behalf of the entire MEP system. This will place new demands on the NIST/MEP staff as well as the centers. Information and knowledge management systems as well as staff training systems will also need to be managed on a system-wide basis.

Center Performance

The Panel also believes that there are sufficient opportunities for efficiency improvements that warrant examination of the business model. This conclusion reflects an analysis of center based performance data. The MEP Program has developed a robust evaluation system that is far advanced compared to the outcome measures used by the other federal programs that the study team examined. The Program has developed a comprehensive set of metrics that are results (outcome) oriented and which estimate the impact of the centers' engagements on the bottom lines of SMEs. While it is virtually impossible to isolate the impact of an MEP engagement from the multitude of other economic, management, employee expertise, and business related variables that have an impact on a company's performance, the MEP Program has used an independent survey to develop a "best available methodology" for assessing the program's impact as envisioned by the Government Performance and Results Act.

An analysis of the MEP centers' performance, based on the program's measurement system, indicates that changes are needed in the business model to improve the performance of several

centers. The study team found a significant gap between the top and low end performers. An explanation of the MEP performance assessment system and the Performance Management Index that was used by the study team to evaluate the centers performance is provided in Appendix D.

The study team also found a wide variation among the centers in the way they were organized, their funding levels, the use of third party consultants, market penetration, and several other indicators. Before looking at alternative business models in other organizations, the study team worked with the MEP staff to see what, if any, correlation existed between the high and low performers. The objective was to determine whether there were patterns that suggested organizational and business practices that were consistently present in high performing centers and absent in low performing centers. The statistical analysis of these variations among high and low performing centers is provided in Appendix E.

Improving Center Performance

The current system for evaluating center performance can also be improved by making it more exact. One of the limitations of the current measurement system is that it does not allow for meaningful distinctions in center performance. If a center achieves the minimum score for one of the indicators, they receive all of the points allocated for that measure, while a center that far exceeds the minimum level receives the same number of points. The MEP staff is developing a revised system that would allocate points based on a graduated scale. This proposed system would begin to make the kind of distinctions that the Panel believes are necessary to adequately distinguish among the various performance levels that exist throughout the 59 centers today.

The wide performance variation among state centers offers an opportunity for raising system-wide performance by focusing on improvements in the lower performing centers. This will require changes in the management system of the business model that will involve a broader national management role in analyzing the reasons for excellent and poor performance. Based on this analysis the national program management staff will need to be more active in providing advice, guidance, mentoring, action plans and or training to low performing centers on what they need to do to improve their performance. Under the current business model, the national program management evaluation function is primarily focused on determining eligibility for continued funding of each center based on a pass/fail system tied to achieving at least a minimum performance standard. Providing assistance to poor performing centers also has implications for the funding system in that it will require more flexibility in the availability and use of centralized funds to provide the resources needed to help centers improve performance.

Current state budget difficulties notwithstanding, the state funding level issue is an area MEP program managers should focus on as an important driver of performance. This is not only an important predictor of performance, it also may be an indicator of the amount of state and local support individual centers have. The reasons for funding shortfalls and the potential measures for dealing with them should be explored. Determining optimal staffing levels for centers would also provide helpful guidance to centers in developing their staffing plans. Also, while the leadership and management capabilities of state directors and other managers undoubtedly are

major drivers of center performance, the MEP program management staff does not currently assess these skills. The Panel encourages the development of a mechanism for measuring these skills and a training program designed to improve management and leadership skills throughout the system. These training programs are widely available through both public and private sources.

Conclusion

The current MEP business model is no longer sufficient to address the barriers that were discussed in Report 1, which now include intense global competition from low cost countries. Manufacturers can no longer concentrate on cost reductions alone to remain competitive, which has been the primary focus of the type of services provided by MEP centers. Companies must be able to increase their output by offering new products, or by applying new technologies; or by expanding their markets. The Panel believes that the MEP Program should address this need to improve the output side by offering new services to support new product development and entrance into supply chain markets. To help facilitate and accomplish this, the program must become more involved in technology diffusion and infusion activities. The significant differences in center performance based on the program's own measurement system also point to a need for changes in the business model's management, operating (staff expertise) and funding systems. While the program has a very good performance evaluation system, the national program management staff needs to play a more active role in helping centers identify weaknesses and develop improvement plans and by providing the resources (e.g. training, mentors, products and tools) necessary to improve the performance of individual centers and ultimately the entire network.

CHAPTER 4

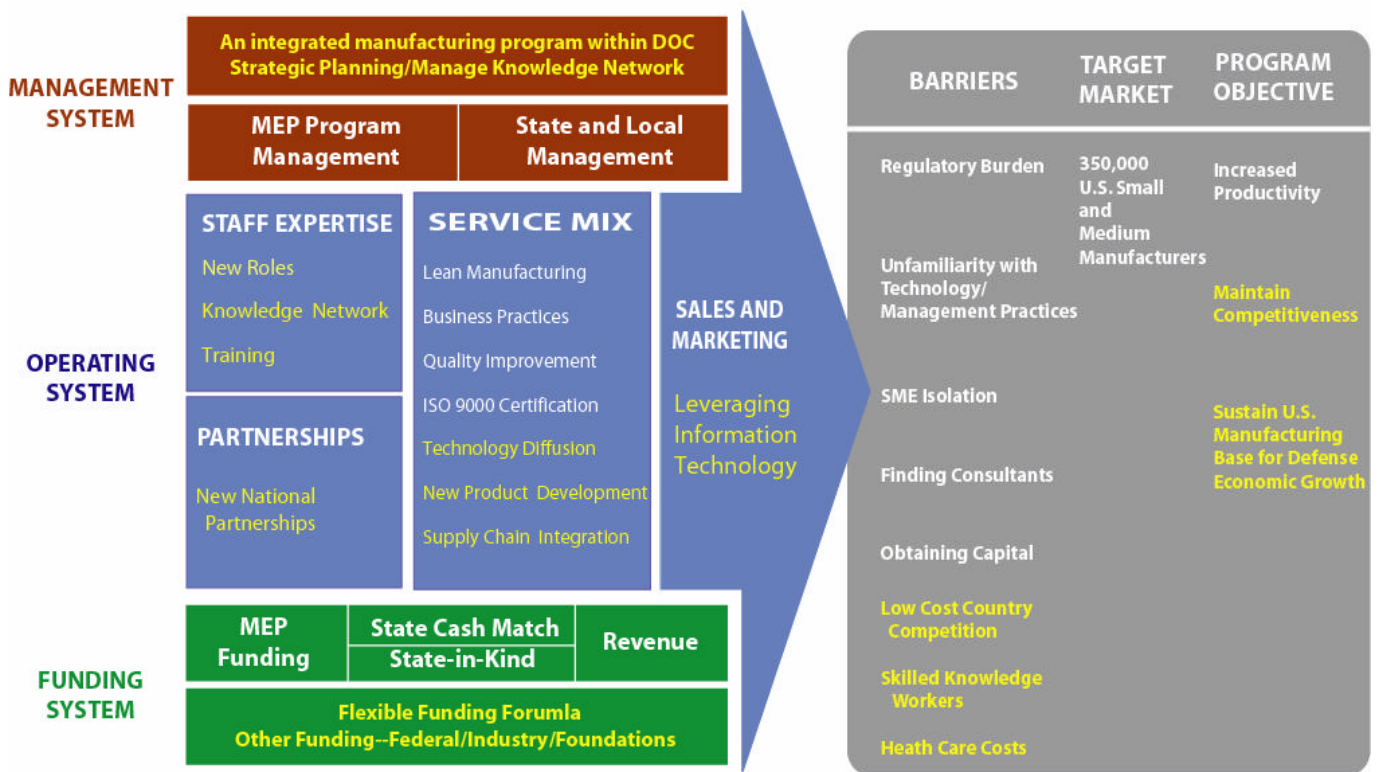
PROPOSED MEP BUSINESS MODEL

The Panel has proposed a business model which involves fundamental changes in the services provided by the MEP Program to help them remain competitive in the changing global manufacturing market. While the Academy Panel believes that many small manufacturers still need the current services provided by MEP centers, they see an ever increasing need to provide SMEs with assistance in learning about and implementing new and existing technologies; in developing new products; and in becoming part of integrated supply chain networks.

The transition to the Panel's proposed business model will require several structural changes including changes in the organizational alignment of the program, the funding formula and the collaborative relationships of the national program with other organizations that support the manufacturing sector. There are also changes proposed for the role that the program management staff will have to play in developing a strategic plan for the program; strengthening the national network; building a more robust knowledge management system; and providing training for new skill sets that center staffs will need to provide diffusion and infusion support that leads to new products and work as part of integrated supply chains. The implementation of this model will require time and resources and a commitment from MEP leaders in the headquarters and in the centers. It will also require legislation to provide more flexibility in the allocation of the program's funds, as well as the organizational alignment and integration of complementary manufacturing support programs within the Department of Commerce.

Below is a depiction of the proposed MEP business model. The new dimensions of the model are highlighted in yellow text and are described in the narrative that follows the illustration of the model. The enhanced service mix is discussed first since those changes drive the need for changes in management, operating, and funding systems in order to support the development and delivery of the new services.

Figure 4-1. Proposed MEP Business Model



MEP Service Mix

The discussion begins with recommendations for changing the MEP service mix because the services provided represent the program’s contribution to overcoming the barriers SMEs face in today’s market place. The MEP Program could continue to add value to small manufacturers’ ability to increase their competitiveness if it continued with the current strategy, i.e., by focusing primarily on training, helping companies implement lean manufacturing, and quality assurance. The potential, however, for having a broader and more fundamental impact on manufacturing in the United States lies in expanding its services and emphasizing technology diffusion, supply chain development and new product development.

While most MEP centers have effectively addressed the needs of clients who seek help with business management practices and production process and quality improvements, a gap still exists for many SME’s between the availability of new technologies and the application of those technologies to improve production and develop new products.

Dr. Philip Shapira, who has studied and written extensively on the MEP Program and manufacturing extension programs in other countries, recommended that the Program adopt a new strategic orientation that would require it, “... to adjust its service mix to offer assistance

that goes well beyond short-term problem solving for individual firms.”¹⁰ Specifically, Dr. Shapira recommended that MEP:

- increase services that focus on new product design and development and forge even stronger links to R & D centers.
- support more initiatives that help suppliers and buyers talk to one another; and expand pilot projects that offer specialized expertise in cross-cutting fields to stimulate the adoption of emerging technologies and practices, the exploitation of new materials and the use of new communication technologies.
- put greater emphasis on promoting local networks of small firms to speed the dissemination of information and encourage collaborative problem solving, technology absorption, training, product development, and marketing.

The MEP Program can have a greater national impact on the small manufacturing sector by facilitating the accelerated diffusion of technology to small manufacturers, by providing support for new product development and by actively supporting supply chain integration. Several Panel members, however, stressed the importance of continuing to assist manufacturers improve their business practices in the areas of marketing, human resource management, capital formation and other organizational issues. The Panel believes that one of the strengths of the program is that it takes a holistic approach in assessing how companies can improve their bottom line and become more competitive.

Technology Diffusion

To maintain the U.S. manufacturing industry’s position as a leader in new product development and in the application of advanced technologies in production techniques, the Panel believes that the MEP Program needs to be more engaged in technology diffusion activities.

According to the Department of Commerce report, *Manufacturing in America*: “Robust research and development activities are essential steps in reinforcing the process that has provided U.S. manufacturing with its competitive edge. These activities, however, should be matched with an equally vigorous effort to ensure that the technology developed is diffused broadly throughout the manufacturing sector, particularly to small and medium-sized manufacturers, which will benefit most because of their own limited capacity for independent research and development.”¹¹

Similarly, an Organization for Economic Cooperation and Development paper quoted a report by the Congressional Office of Technology Assessment which stated that, “In the context of rapid international flows of information and capital and increased global competition, it has also been argued that strategic national and regional efforts to maintain industrial competitiveness depend not only on innovativeness per se, but more than ever on the diffusion, effective

¹⁰ *Extending Manufacturing Extension*. Issues in Science and Technology, Philip Shapira, Spring 1998, pp. 47-48.

¹¹ *Manufacturing In America. A Comprehensive Strategy to Address the Challenges to US Manufacturing*, Department of Commerce, 2004, p. 68.

application and further incremental improvement of known technologies.”¹² Although that report was published in 1990, it is just as relevant if not more relevant today. Technology diffusion in this context involves the dissemination of technical information on the availability, cost, and potential impact of new and existing technologies to SMEs. Technologies include both hard technologies that involve tangible physical components and materials, as well as soft technologies that involve new manufacturing processes. The technology diffusion role is a subset of the more complex technology transfer process.

The National Coalition for Advanced Manufacturing (NACFAM) released a White Paper in May of 2003 in which it said, “Manufacturing has the potential to take a great leap forward in being able to provide the products we want or need, when we want them and at an affordable price. There are various technologies currently in various stages of development that can dramatically alter the way products are designed and made.”¹³ The report cites technology examples that involve: solid free form fabrication, micro-fabrication, advanced sensors, modeling, simulation, visualization, smart systems, and designer materials. If the MEP Program was appropriately organized with the right skill sets in the centers and the program management staff, it could help facilitate the industrial transformation or “great leap forward,” alluded to by the NACFAM, through an active role in technology diffusion.

As noted in the first report of this study: “Over the last decade, the importance of leveraging technology has become even more critical to improving the performance of small manufacturers. The MEP Program needs to better focus its corporate strategy on facilitating technology implementation, technology integration and technology transfer for small manufacturers.”

The Panel is not suggesting that the MEP Program begin a technology transfer program (as the original legislation intended) by trying to take advanced technology developed in the labs and implementing it on the shop floor. As Gerald Eldering, Director of the Technology Transfer Office for the MITRE Corporation pointed out, the problem or challenge of getting technology from labs to manufacturers is finding a way to fill the gap between the raw state of the technology and the stage at which it is ready to be implemented on the shop floor.¹⁴ That is not a role that the MEP Program is currently positioned to fill. Rather the Panel believes that the Program can make a significant contribution to U.S. manufacturing by diffusing information to SMEs about new and existing technologies which have already been or are ready to be adopted for commercial use. The Panel also believes the MEP Program should have a stronger role in the

¹² *An Overview of Technology Diffusion Policies and Programs to Enhance the Technological Absorptive Capabilities of Small and Medium Enterprises*. Background paper prepared for the Organization for Economic Cooperation and Development Directorate for Science, Technology and Industry, Philip Shapira School of Public Policy, Georgia Institute of Technology Atlanta, GA and Stuart Rosenfeld Regional Technology Strategies, Inc. Chapel Hill, NC, August 1996. Original Source – U.S. Congress, Office of Technology Assessment, *Making Things Better: Competing in Manufacturing*, Washington, DC: USGPO, 1990.

¹³ *Industrial Transformation: Key to Sustaining the Productivity Boom, A White Paper*, National Coalition for Advanced Manufacturing, May 30, 2003, p. 4.

¹⁴ NAPA Study Team Interview with Gerald Eldering, Director, Technology Transfer Office, MITRE Corporation, October 30, 2003.

infusion of technology, which includes all of the activities necessary to successfully implement and integrate new technology into a company's manufacturing processes.¹⁵

The technology infusion function includes the follow up support needed to implement the technologies such as providing assistance in locating financing for necessary capital investments; training for SME employees; and technical assistance at the shop floor level in integrating the new technology into companies' manufacturing processes. These implementation support activities are already an integral part of the services provided by most MEP centers.

The role the Panel envisions for the MEP centers also encompasses capturing information about SME needs and manufacturing problems and channeling that information to the technology development communities in the federal labs, universities, and private sector. The MEP agents in the field would play a key role in collecting and reporting this information to the program management staff. A Panel member noted, however, that it is unlikely that simply providing information to federal and university labs on the technology needs of small manufacturers will produce positive results. Experience suggests that it is unlikely to occur unless there is a contractual commitment by those organizations.¹⁶

In the paper on *Technology Diffusion Policies and Programs* cited above, technology diffusion is contrasted with technological innovation. The later emphasizes the development of new knowledge, products, or processes, and government oriented technology transfer, which frequently seeks to shift advanced technology from the laboratories to commercial use. Furthermore, the authors state that in many cases, diffused technologies are neither new nor necessarily advanced "although they are often new to the user, and they may be acquired from a variety of sources...."¹⁷

Knowing both the technology needs of SMEs and the kinds of technologies that are available from labs, universities, and other technology producing entities would create a system with enormous potential for improving SME performance. An example of this type of support is the case of a company in Maine which with the help of MEP staff, developed smart pipes that used fiber optic technology to alert customers about leaks and the specific location of those leaks.¹⁸ While this type of technology implementation assistance is occasionally provided by the MEP centers, it does not represent a significant part of their work as indicated in the analysis in Chapter 2 of current services that centers provide.

¹⁵ The various definitions of what organizations mean when they use the term "Technology Transfer" and a comparison of the meanings of "technology transfer" and "technology diffusion/infusion" is in the glossary of the report.

¹⁶ J. Brandinger, Academy Panel Member.

¹⁷ *An Overview of Technology Diffusion Policies and Programs to Enhance the Technological Absorptive Capabilities of Small and Medium Enterprises*. Background paper prepared for the Organization for Economic Cooperation and Development Directorate for Science, Technology and Industry, Philip Shapira School of Public Policy, Georgia Institute of Technology Atlanta, GA, and Stuart Rosenfeld, Regional Technology Strategies, Inc. Chapel Hill, NC, August 1996. p. 2. Original Source cited as P. Shapira, J. Roessner, and R. Barke, *Federal-State Collaboration in Industrial Modernization*, Atlanta, GA: School of Public Policy, Georgia Institute of Technology, Atlanta, 1992.

¹⁸ Made in the USA, Inc, January 2002, p. 81.

Clearly, an emphasis on technology diffusion/infusion will require a significant change in the types of projects and events which the centers undertake in the future as well as the skill sets of their staff. It also will require establishing relationships with many of the organizations described in Appendix C of this report which offer commercially viable technology and the means to export it to SMEs. This type of fundamental change also has implications for systems that provide information on existing and emerging technologies, and the industries in a region that could benefit from the infusion of new technology. The MEP program management staff and the MEP centers will also need to be very familiar with the grant and loan programs available from other federal, state, and private sector programs which can help finance the capital goods usually required when SMEs decide to implement new technologies.

New Product Development

One of the strengths of manufacturing in the United States has been the leading role it has taken in innovation and the development of new products. However, it is becoming more difficult for U.S. manufacturing to maintain this competitive edge with the worldwide spread of information technology. The Department of Commerce report on U.S. manufacturing stated that “From the perspective of manufacturers, there is a need for continuing investment in research and development of new products so that manufacturers remain one step ahead of the competition.”¹⁹

In his testimony before the House Committee on Science, Larry Rhoades, President and CEO, of Extrude Hone Corporation, and an Academy Panel member provided an analogy of how the United States was able to build the world’s largest and most productive agricultural industry: “Agriculture which was once a very labor intensive activity changed in America to become highly automated and highly scientific. The technology of the equipment used in agriculture today, combined with an infrastructure of technical support in the most modern methods, made this so. We can do the same in manufacturing. But we must find new methods, new approaches, new technologies, and we must understand how those new manufacturing technologies can be used to make new and better products that deliver more value to their buyers. We must drive the ‘manual’ out of ‘manufacturing’ and capture America’s innovative spirit to transform it into ‘innofacturing.’”²⁰

The Panel believes the MEP should consider developing and implementing services that are specifically designed to help SMEs develop new products. This will require new skill sets and new partnerships. The Panel also recommends that this should be undertaken through an integrated service network which leverages current knowledge and information management tools. The MEP successfully developed and implemented a national program to help SMEs overcome Y2K problems. (See Chapter 5 for a fuller discussion of this development effort.) The methodologies, training tools, project management process and integrated networks of the Y2K project should serve as a model for the development of SME-focused product development services.

¹⁹ *Manufacturing in America. A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers.* U.S. Department of Commerce Washington, D.C. January 2004.

²⁰ *Building a U.S. Manufacturing Technology Infrastructure.* Testimony by Lawrence Rhoades before the House Committee on Science. June 5, 2003, p. 2.

Active Participation in Supply Chain Management

Through stronger ties with regional and national supply chains, the program management staff would be positioned to provide current information to centers and their clients on the emerging needs for parts, assemblies and new finished products that larger manufacturers require from their supply chains. According to a National Academy of Sciences (NAS) study, not all Manufacturing Extension Centers (i.e. MEP Centers) are fully capable of helping SMEs compete successfully in a rapidly changing integrated supply chain environment, and not all of them are consistently proficient at guiding SMEs that want to integrate their own supply chains.²¹ The NAS study also says that the MEP services must be of uniformly high quality because supply chain integration typically involves multiple companies in scattered locations; and inconsistencies among local programs and levels of support can make integration efforts difficult. The MEP program management staff could lead the development of a standard set of supply chain best practices for SMEs and supply chain support programs at each center.

The MEP program management staff could also assist centers in three other specific areas—supply chain collaboration, supply chain integration and supply chain management. The NAS report stated that supply chains are typically composed of geographically dispersed facilities that provide a wide variety of services. Once again the national staff can play an important coordination role in working with Original Equipment Manufacturers (OEMs) with geographically dispersed companies in their supply chain and with the MEP centers in helping their clients enter and participate in these supply chains. One tool which the National Academy of Sciences suggests could be used by MEP centers to help SME's become more competitive in supply chains is "mapping." Specifically, the report states that MEP centers should help SME's map critical segments of the supply chain in terms of organizations, capabilities, and functions, paying special attention to critical and sole-source capabilities. Ideally, these maps should extend to every key capability and function required to design, manufacture, distribute, sell, and support the product line.²²

According to an article on "Supply Chain Collaboration,"²³ large corporations like Ingersol Rand, Dell and Proctor & Gamble, leverage the internet by employing specialized web-based applications to improve communications with their supplier companies. The goal is to work together to build new mutually beneficial business processes that can be changed on the fly to smooth out kinks across the supply chain. MEP centers can support OEM/SME collaboration by helping small companies access OEM systems and develop their own web-based communication systems. They can also help SMEs develop strategies based on OEM forecasts and demand for specific products.

MEP centers can also support SMEs as OEMs begin to adapt a strategic partnership approach (Supply Chain Integration) by helping both parties recognize that sustainable benefits can accrue

²¹ Surviving Supply Chain Integration: Strategies for Small Manufacturers, the National Academy of Sciences, National Academies Press 2000, p. 103.

²² Ibid. p. 105.

²³ *Supply Chain Collaboration—Modern Materials Handling*, Gary Forger, Supply Chain Management Review March 2002.

from long term relationships, especially when the total life cycle costs are computed. By assisting SMEs in understanding relationships and agreements and negotiating the complex partnerships with OEM's, MEP staff can help overcome barriers that impede integration.

MEP's role in supply chain management can be achieved by helping supply chain managers overcome the traditional inward focus on operational cost control and adopt a more strategic focus on customer service and building relationships based on trust. Web-based applications and E-commerce have accelerated and facilitated exchanges with all participants in supply chain activities. With MEP center assistance, OEMs and SMEs can leverage the scale and coordination inherent in large companies with the potentially low cost and creativity of small companies.

There have been attempts by MEP centers to cross state lines and facilitate supply chain collaboration among SMEs and OEMs. One example is the Manufacturing Supply Chain Consortium (MSCC) sponsored by the six New England Centers, EASTEC. This group along with the Society of Manufacturing Engineers sponsored a May 2003 Advanced Productivity Exposition (Defense Industry Supply Chain Opportunities).

SMEs also require a more through understanding of the complex interrelationships inherent in shared agreements. MEP centers can help them work together, share activities, processes and information. By working with SMEs to overcome the four traditional barriers that impede integration—SME technology that only works for the company that developed it with no regard for efforts of other supply chain participants; poor communications; incompatible communications and/or electronic design techniques; and government procurement policies and regulations—the MEP centers can significantly improve SMEs successful participation in supply chain activities.

Potential Resistance to Adding New Services

The Panel understands that MEP system participants might question where the resources will come from for the development and implementation of these new services. The resources question is beyond the scope of this study; however the Panel has several observations about the issue.

First, while centers would continue to provide technical and business assistance to SMEs, the bulk of this type of work should be brokered out to private sector companies whenever possible. Centers have partnerships with local service providers who are and can be trained to effectively provide many of the services. Increasing this type of activity would free-up center resources to undertake the development of new services.

Secondly, the retention of this work by some centers is directly related to the fact that it represents an important revenue source for meeting their matching requirements. The need for revenue from fees becomes especially critical when state funding drops below the one-third level as it has in many states. Although fee generation is a worthwhile requirement in terms of ensuring that the services provided are market driven, the need to generate fees also discourages centers from spending time on activities like technology diffusion and supply chain

development, which may have broader market enhancement implications for the small manufacturing sector.

Lastly, adding these recommended services will challenge the supporting functions of the current business model—namely the management systems, partnerships, staff skill sets, and funding systems. It is important to note that the proposed services differ from most of the current services in that they will require national partners, more in-depth industry knowledge, and they will have to cross geographic boundaries. The supporting systems of the current model allow centers to operate autonomously. These supporting systems must be augmented to support an integrated national network.

Management System

One of the findings of the first phase of this Study was that:

“The MEP Program is uniquely situated to create the nationwide network and infrastructure that can provide systematic and comprehensive productivity improvement assistance to small manufacturers.”

The study team found, however, that the system has not sufficiently capitalized on the knowledge that exists at the local level, both in terms of identifying the needs of manufacturers as well as in sharing innovative solutions developed by field agents in helping companies solve technological and process related problems.

The MEP Program has demonstrated that it can and does provide services to small and medium sized manufactures that have a positive impact on the companies’ bottom lines. It has done so, however, through a loosely organized collection of semi-autonomous centers rather than through a nationally recognized integrated network of services and expertise. During the study team’s interviews with Center directors, it was clear that several consider the MEP headquarters to be primarily a funding source. Center directors are not even required to attend or send a representative to the MEP National Conferences. The headquarters’ emphasis on its “stewardship” role—overseeing centers’ performance to insure that they meet the minimum performance goals—needs to be supplemented by an effort to build a more cohesive national network of service providers.

The lack of strong network affiliation is reflected to some extent in the fact that “Manufacturing Extension Partnership” appears in the name of less than half of the centers. Some Center directors stated that they purposely avoid being linked to a federal government program, because it could create a negative perception in the minds of some potential clients. The MEP program management staff has attempted to address this lack of national identity by establishing what is referred to as the “360 vu” branding strategy. One objective was to standardize the suite of products and services provided by the centers. It was also intended to ensure that the manufacturing specialists in the field, who are referred to under the 360 vu as “Professional Business Advisors,” have the expertise they need through a training and certification process. Acceptance of participation in “The Brand” is, however, voluntary.

The Panel recognizes that there are many valid reasons for MEP officials to allow great flexibility in center operations that work closely with state and local programs. However, if a nationwide network is built that supports technology diffusion, product development, and supply chain integration services, it will require a stronger emphasis on operational consistency and knowledge and capability sharing. While the type of organization at the center level (non-profit, university based, or part of a state agency) does not appear to be a significant factor in determining center performance, the organizational design and functions performed by the MEP headquarters are critical in determining the future role and impact of the program on the small manufacturing sector. The MEP Program will not have a significant impact on the overall productivity of the small manufacturing sector unless it takes a more direct role in building the organizational infrastructure that is needed to support a consistent integrated national system for the delivery of services to small manufacturers. The current management approach to state centers which relies on persuasion and encouragement needs to be supplemented by an approach which sets specific expectations that are monitored for effectiveness and compliance.

The Panel recommends that two functions, strategic planning and knowledge sharing, be strengthened as key components to the management system.

Strategic Planning

A missing element in the MEP Program that will be needed to drive the proposed changes in MEP's business model is an ongoing strategic planning process. Consequently, the program should reestablish the strategic planning process it developed in 1997 and rolled out in 1998. The plan was developed using a very methodical process that produced a plan that included vision and mission statements, long term goals and strategies for achieving those goals and objectives. A depiction of the planning model and process that was used to develop the 1998 plan follows.

Figure 4-2: Manufacturing Extension Partnership Planning Model and Schedule

Planning Model & Schedule



Activities

- NIST/MEP Managers Planning (Jul-Sept)
- Center Directors Input (Oct-Nov)
- NIST/MEP Staff Input (Nov)
- States Input (Jan)
- Tactical Planning (Jan-Feb)
- Published Plan (Feb)

In retrospect, a missing component in the planning process was input from key external stakeholders including Congressional staffs and the Office of Management and Budget (OMB). One of the first steps that the MEP program management staff should take in the planning process is to develop a shared vision of the mission and goals of the program with all of the principal stakeholders. One of the difficulties the program faces is the lukewarm support that it has received in the budget process. As a result, Program officials have been forced to focus on survival tactics more than on the presentation of annual initiatives that are developed to support the mission and to achieve the programs goals and objectives.

While top program executives can clearly articulate their vision, there is no formal process in place for the development, promulgation, and execution of a strategic plan for the MEP Program that has the support of a broad base of internal and external stakeholders. To be effective the plan must be developed in concert with key program management staff members as well as respected staff members in the field with input from the MEP National Advisory Board, relevant congressional committees, OMB, the Department of Commerce, and the manufacturing community.

A recent series of focus groups conducted with employees from the MEP program management staff points to the need for an integrated strategic planning process that ties all of the operating plans together. The report on the focus groups provided the following well crafted “desired outcome” for the implementation of a strategic planning process:²⁴

“MEP is a more strategy-focused organization. One operating plan drives all the activities of all MEP divisions. This plan ‘translates’ our organization’s near-term and long-term goals into actionable, coordinated strategies and tactics to be implemented by divisions and individuals. All individuals use the plan to track progress toward critical objectives, reinforce accountability, guide priorities, and focus attention on actions that move us toward our goals. MEP uses the plan to make almost all decisions—policy, financial and strategic—and to mobilize change, make strategy a continual process, make strategy everyone’s job, align the entire organization to the strategy and translate strategy into operational terms. The plan enables individuals to:

- Understand and describe the overall strategy of MEP
- Articulate the annual goals of their divisions and their performance plans
- Understand and explain the linkages between strategy, their division goals and their individual goals”

Reestablishing a strategic planning process should begin with an environmental scan of internal and external stakeholders. For example it was clear from discussions with top executives in the Department of Commerce that they want to see the program build stronger ties to other programs like the Trade Adjustment Agency and Small Business Administration to leverage the combined impact of the programs rather than duplicate the services that are provided. This type of input from all of the key stakeholders must to be considered in the development of a strategic plan for the future design of the MEP Program.

Developing consensus on the mission and vision statements for the future role that the national program is expected to play in supporting U.S. manufacturing may be the most difficult aspect of the strategic planning process for the MEP. If consensus on the long term role of the program cannot be reached and clearly articulated, the program will continue to operate with a short term, ad hoc focus that shifts and changes based on the views and pressures that predominate at any one time. Recent Administration budget submissions have a vision for the Program which includes self-supporting state centers and significantly reduced funding. A fully funded federal program with operational standards for service delivery, strong ties to the federal and university technology labs and development community, an integrated information knowledge network, a national training and accreditation program, and a standard suite of products and services would produce a very different vision and mission statement. Which of these two scenarios represent the future of the program is an issue that must be decided through the political process.

Although a strategic plan is never written in stone, a well crafted and vetted plan could provide a focus and some stability in the decision making process about the future of the program. The plan should also provide the proposed initiatives that need to be accomplished in order to achieve

²⁴ *MEP Focus Group Recommendations*, MEP Survey Results Task Force, April 18, 2003, p. 5.

the goals of the organization. The test of any initiative becomes: Is it consistent with the plan and will it help us achieve the program's goals and objectives?

As part of the strategic process, the program also needs to establish appropriate metrics to measure how well they are achieving their goals and objectives. If the goals and objectives of the MEP Program are modified to include an emphasis on technology diffusion, product development and supply chain development an additional set of metrics will be required. These measures may include the number of successful engagements or center activities that resulted in new product development, the application of new or existing technology to a company that resulted in improved performance, and the number of interventions that resulted in a company becoming a part of a large manufacturer's supply chain.

Knowledge Management

Knowledge sharing is a fundamental component of any management system. Indeed, sharing best practices is essential in helping small manufacturers embrace change. SME success stories have appeared in articles, on the MEP web site and in MEP headquarters reports, and there have been several surveys conducted by MEP centers or their contractors on the major challenges facing small manufacturing companies. There is, however, a less than optimal method for consistently collecting this information in a national database that can be used as a research tool for field agents. There is a process that allows field agents to submit questions via e-mail to headquarters about potential solutions to problems they are encountering. The program management staff screens these e-mail questions and sends them out to centers for a potential response. Questions and answers are organized and retained in the system for future reference. While this system represents a good starting point, the tool could be significantly enhanced through a more systematic process for collecting information about successful applications of existing technology as well as information and research on emerging technologies.

An independent contractor is developing a new customer relations management system for the centers that are part of the 360 *vu* Brand. The system is designed to allow professional business advisors to exchange information about clients, deliverables, personal expertise, and information on opportunities for National Accounts. While the description of the system seems to support the objective of an advanced information system to support the network, the rollout plan and access restrictions demonstrate one of the underlying shortcomings of the current business model. Initially, the NIST and MEP staffs will not have access to the data base. The sharing of information across the network will also be limited and will occur only "over time," according to the contractor who is developing the system. During one of the roll-out conference calls, the contractor stated that the cross sharing of knowledge will require a cultural change and to achieve that objective a working group on knowledge transfer was being formed.

That cultural barrier which makes centers reluctant to share information is tied to their view of themselves as independent business units or companies with only a limited role in a nationwide network. Acceptance of the new CRM system was strongly encouraged, but not mandatory. Absent a change in this accepted isolation and autonomy, the potential for taping and leveraging the knowledge of 1,000 + manufacturing specialists in the field will go unrealized.

The Panel recommends that MEP program managers build a network which can capitalize on knowledge and information sharing. This would involve the reestablishment of a strategic planning process as well as the creation of a systematic process for collecting information on successful applications of existing technology as well as information and research about emerging technologies.

Program Management Staff Functions

This broadening of the program's service delivery mix will require the program management staff to be more pro-active as a resource to centers by performing the following functions:

- researching potential technology solutions that manufacturing specialists can provide to clients who have specific process or product development problems or needs
- recruiting or developing subject matter experts for each of the major manufacturing industries who are knowledgeable about the needs of each industry segment and with the existing and emerging technology that is available for commercial application
- establishing stronger ties with federal, university, and commercial labs, and the locator services that exist to link manufacturing needs with potential technology solutions
- establishing and maintaining relationships with large manufacturing supply chains to identify their needs for new parts, assemblies, or products
- developing and maintaining a knowledge network system that links the needs of clients, the knowledge and experience of manufacturing specialists in the field and the knowledge of the industry subject matter experts among the program management staff
- being more active in identifying the training needs of staff at MEP headquarters and the centers throughout the network and becoming more involved in developing and evaluating training programs
- providing information about new product opportunities and the technology needed to produce these products.

In the area of research, there is a new Manufacturing Futures Group which has been tasked with researching the future of U.S. manufacturing. The examples of the issues they will be researching, however, are at a more macro level and include: manufacturing strategies for the future; manufacturing and the rural economy; manufacturing in China and other outsourcing issues; the future of mass customization at the firm level; and the role of supply chains on the national defense system. Presumably, the scope of this group's function could be expanded to include research on specific applications and opportunities for the application of existing and emerging technologies.

Organizational Alignment of MEP within the Department of Commerce

The original placement of the MEP Program within the National Institute for Standards and Technology was consistent with the intent of the enabling legislation (Public Law 100-418) which was to make the advanced technology developed in NIST labs available to small manufacturers. As reported in the first phase of this study, MEP Program managers quickly realized that objective was not realistic since there was too large a gap between the technology developed in the federal labs and the capabilities of small manufacturers to use the technology.

The mission of NIST as stated in their 2010 Draft Strategic Plan is “To develop and promote measurement, standards and technology to enhance productivity, facilitate trade and improve the quality of life.”²⁵ The NIST mission is only loosely aligned with the MEP mission. According to MEP’s most recently published Strategic Plan, its mission is “To strengthen the global competitiveness of U.S.-based manufacturing by providing information, decision support, and implementation assistance to smaller manufacturing firms in adopting new, more advanced manufacturing technologies, techniques, and business best practices.”²⁶

Several organizations within the Department of Commerce (DOC) have manufacturing assistance responsibilities (see Appendix C). With the establishment of an Assistant Secretary for Manufacturing (“manufacturing czar”) position and, presumably, support staff, the potential exists to realign the MEP Program and other manufacturing support programs within DOC into a single organization with a primary focus in manufacturing and a mission that is clearly linked to enhancing the manufacturing sector of the economy. The Panel believes the Department should consider such realignment and integration of these programs as a means of strengthening the program.

Operating System

The Panel recognizes that adding the proposed new services will impact the skill mix and roles of center and MEP Program office staff. The following section focuses on the knowledge sharing and training needs of all staff, and changing roles of the program staff.

Capitalizing on Knowledge Management Capabilities

If efforts are undertaken to build a national network, as recommended above, an important concurrent and reinforcing effort would be to leverage the knowledge and experience of the individuals working in the MEP Program throughout the country. The recommended shared information system would serve as a resource for field agents to help them identify technology solutions and process improvements that have been successful and which can be replicated. To be effective, the Manufacturing Specialists or Profession Business Advisors need to populate the knowledge base with their learnings and experience in helping companies find and implement technology solutions that improve their work processes and develop new products.

The role of the MEP Program Staff needs to expand to help research and identify technology and process solutions that Manufacturing Specialists can apply to help manufacturers improve their competitiveness. This will require reestablishing or building new partnerships with federal laboratories and the technology locator services that the Federal Labs Consortium and labs such as the National Aeronautics and Space Administration provide. It is important to note that many of these organizations have a fundamental mission to support and promote technology transfer

²⁵ The NIST 2010 Strategic Plan—Draft, dated August 2002 which may be found at http://www.nist.gov/director/planning/nist2010_plan.pdf on the NIST Home Page on the Internet.

²⁶ *Looking Ahead: A Vision. A Strategy. The Future.* U.S. Department of Commerce, National Institute of Standards and Technology, Technology Administration, May 1998.

(or diffusion). Therefore, they have strong incentives to work closely with MEP. Information gathered about supply chain needs for new products, parts or assemblies should also be shared on a systematic basis up, and down, and across the network.

Communities of Practice

Having a sophisticated knowledge based information system is not a guarantee that it will be used. One way to improve the effectiveness of such a system would be to integrate it into a network of “Communities of Practice” or similar types of knowledge network. In “Knowledge Networks and Communities of Practice,”²⁷ author Verna Allen quoted John Seely Brown, Vice President and Chief Scientist at Parc Xerox describing communities of practice as “peers in the execution of real work. What holds them together is a common sense of purpose and a real need to know what each other knows.” What sets them apart from other workplace teams is that communities are defined by *knowledge* rather than task. Ms. Allen also notes that there are important distinctions between work groups, teams, communities of practice, and knowledge networks.

The MEP program management staff has attempted to create Communities of Practice but their focus has not been on building a national knowledge network. The Communities of Practice that the Panel recommends would directly link the centers’ manufacturing specialist practitioners and internal as well as external subject matter experts who have knowledge about specific manufacturing sectors, new technologies, process and quality improvements, the development of new products and markets or export and trade issues.

In its research the study team consulted with Dr. William Snyder, an expert in the theory and practical application of Communities of Practice. Dr. Snyder noted that in order to succeed in this era of globalization, where knowledge drives innovation and value creation, companies need to have a strategy that leverages distinctive competencies, and establishes alliances with external partners (e.g., along a supply chain). There is also a need for new structures for ‘smart companies’ and knowledge networks are such structures. The MEP Program and the federal government are positioned to convene this type of network. However, there is much to learn about playing this role well and it is important for MEP to take the time to learn much more about this style of knowledge management. Communities of Practice and Dr. Snyder’s insights on the functions involved in organizing a knowledge network are discussed in more detail in Appendix F.

The study team believes that the greatest potential assets of the MEP Program are the knowledge and capabilities of the people who work within it. By fostering the development of Communities of Practice, MEP could begin to tap the enormous potential of this knowledge base. While the Program has begun to apply community of practice concepts in working with center staffs, the efforts have been limited.

²⁷ “Knowledge Networks and Communities of Practice,” Verna Allen, OD Practitioner, Journal of the Organizational Development Network, Volume 34, No. 4, 2000.

Training and Leadership Development

The MEP Program provides some training for center staff through the MEP University but does not have comprehensive training and certification programs for manufacturing specialists, administrative staff, marketing and sales representatives, or for center managers. The *360 vu* Brand has plans for a certification program for the position of professional business advisor but they have not been implemented yet.

If the recommendation to change the basic emphasis of the Program is adopted, then there will be a need to develop training programs that support the skills necessary for technology diffusion and supply chain participation. Training more than a thousand people will take a considerable commitment in time and money.

In past iterations of their management information reporting procedures, the MEP program management staff provided centers with the ability to report on the training and experience of each member of the center staff. This report was not carried forward in the new reporting requirements.²⁸ The study team believes that the MEP staff should reinstate this report and require periodic input on each employee at each center. Reporting this information would allow the MEP program management staff to identify and manage the training needs and accomplishments of center employees as they transition to the many new skills required in their technology diffusion and infusion roles and responsibilities. In addition, center and MEP Program management staff could use the reported staff skill levels and training as a valuable organizational performance indicator.

The Program also should consider establishing an executive development program for its center managers and a performance evaluation system that would support career development. While there are many factors that contribute to the successful performance of an organization, the leadership skills of the director are a critical element. The Executive Core Qualifications (ECQs) developed by the Office of Personnel Management for Senior Executives²⁹ would provide a sound basis for evaluating the performance for center directors on an annual basis. The Executive Core Qualifications are required for entry to the Senior Executive Service and are used by many departments and agencies in selection, performance management, and leadership development for management and executive positions. The five ECQs are as follows:

- Leading Change
- Leading People
- Results Driven
- Business Acumen
- Building Coalitions/Communications

²⁸ *NIST/MEP Management Information Reporting Procedures*, May 2003.

²⁹ For a fuller discussion see the OPM website: <http://www.opm.gov/ses/ecq.html>

Partnerships

The Panel recommends that MEP leverage its success in developing local partners to build national and industrial partnerships to support the new services. The MEP staff at the national level could do more to improve and expand its own partner relationships with the organizations discussed in Appendix C. The MEP Program at the headquarters level does not work with or has limited interaction and cooperation with the Federal Laboratory Consortium, the NIST SBIR Program, the Small Business Development Centers, or the Trade Adjustment Assistance Centers.

The study team met with several organizations (the National Technology Transfer Center, the Federal Laboratory Consortium, the National Science Foundation's Small Business Innovative Research and Small Business Technology Transfer staffs, the Trade Adjustment Assistance Centers and the Cooperative State Research and Education Extension Service) which were charged with a technology transfer/diffusion mission. All seemed more than willing to have MEP staff partner in their mission to assist SMEs. Program management staff should expand their efforts to establish formal partnerships with other federal programs that support manufacturing. Cooperative relationships with other programs in the Departments of Labor, Energy, and Education, plus the Economic Development Agency, International Trade Administration, and the Small Business Administration should be aggressively pursued. One of the Academy Panel members, Jay Brandinger, pointed out the importance of maintaining and building ties to state technology transfer and diffusion programs. He cited several examples of successful partnerships such as those that have existed between New Jersey Institute of Technology and the MEP center in New Jersey and the Ben Franklin/Advanced Technology programs in Pennsylvania.

Additionally, the MEP system needs to expand its partnerships with industry OEMs and industry associations in order to support supply chain integration services more efficiently. The Panel recognizes developing and maintaining these partnerships is not a trivial undertaking. A critical success factor for the MEP Program, which has a broad national mission, but a relatively small budget is its ability to leverage the resources and expertise of a wide variety of organizations in both the private and public sectors.

The MEP Program management staff can also help address the problem that SME's have in access to skilled knowledge workers by working with American Association of Community Colleges and other training organizations in identifying the type of skill training that is needed in the manufacturing sector.

Funding System

While the MEP Program tries to achieve a 1/3 (fees), 1/3 (state) and 1/3 (federal) funding stream, the authorizing statute calls for a maximum federal contribution of one third of the centers' expenses and 2/3rds from any combination of other sources. In some cases the federal funding represents less than a quarter of a center's funding.

In order to facilitate the recommended changes in the MEP mission and the services it provides, a change in the funding formula will be required. Under the proposed business model described above, centers would be expected to spend more time working with manufacturers in their region to identify their technical needs and research the solutions to them. They would also be more involved in identifying and developing supply chain and new product opportunities. Consequently, it may not be reasonable to expect them to generate as much in revenue from fees. To the greatest extent practicable, they would be expected to broker out or refer clients who need traditional business or technical services (e.g., lean manufacturing training, process improvement training, or ISO 900X certification) to private sector companies which can provide the same training products and services as MEP centers. In FY 2003, 56 percent of all the services were provided by MEP center personnel. The remaining 44 percent was brokered to a third party.

The current funding mechanism for the MEP program also contributes to the limited authority that the program managers have at their disposal. Unless the program management staff has more flexibility concerning center funding, their ability to build effective network capabilities will continue to be limited.

In order to determine a reasonable formula, the Program should consider establishing several pilot centers to demonstrate how a new service mix that focuses on technology diffusion, new product development and supply chain development could benefit small manufacturers in several regions. A new set of metrics would be needed, including ones that measure the number of successful engagements or center activities that resulted in new product development; the application of new or existing technology to a company that resulted in improved performance; or the number of interventions that lead to a company becoming a part of a large manufacturer's supply chain. Legislative authority would be required to provide federal funds to the pilot sites without requiring a matching two thirds amount from fees, the state governments, or other sources. Centers that are not part of the pilot would continue to be funded under the existing formula.

The MEP program staff should analyze what supporting systems the Program could furnish as part of each center's operating agreement. Functions like the development and maintenance of the knowledge management system, training, and marketing could be performed through and paid for by the national program office. This would not only relieve centers of these administrative burdens, but would also support the goal of integration. Federal funds and matching funds received by the centers would be focused on service delivery not administrative functions.

Additionally, the MEP program staff should aggressively explore funding from other federal agencies such as the Departments of Labor, Defense, Education, and Homeland Security, and the International Trade Administration, and Economic Development Agencies.

Summary of the Steps Needed to Transition to the Proposed New MEP Business Model

1. The MEP Program should broaden its service mix to include an emphasis on technology diffusion/infusion activities, supply chain development and new product development.

2. The MEP centers should continue to provide business services, but this work should be brokered out to private sector companies to the greatest extent practicable.
3. The MEP program management staff should more directly establish national policy and initiatives that can forge a national, integrated network of services and expertise.
4. The MEP Program should re-establish its strategic planning process and expand the participation in the process to include input from all stakeholders. As part of the planning process, NIST/MEP should articulate a clear statement of what programs are designed to accomplish and how those accomplishments will be measured.
5. The Department of Commerce should consider aligning and integrating the various programs within the Department that have manufacturing assistance responsibilities under one organization. The establishment of a manufacturing czar position creates an opportunity for this type of reorganization.
6. The MEP program management staff should sponsor the development of an enhanced knowledge management information system that captures and facilitates sharing knowledge and information among all centers.
7. The MEP headquarters staff should consider using Communities of Practice as a mechanism for building a national knowledge network.
8. With an emphasis on technology diffusion and infusion activities, new product development and supply chain development, there will be a need to develop training programs that provide the skills to deliver these services. The MEP headquarters should also consider establishing an executive training program and performance standards for center directors.
9. The MEP headquarters should establish/re-establish relationships and cooperative agreements with other organizations that are involved with supporting small manufacturing or technology diffusion
10. Authorization for a change in the funding allocation should be sought from Congress for several pilot centers.

CHAPTER 5

WHAT MEP CAN LEARN FROM OTHER BUSINESS MODELS

As part of the research for this study, the following six government agencies which partner with state and local entities were reviewed to determine if there were practices they have put in place which could provide a basis for a future MEP model:

- Department of Agriculture
Cooperative State Research, Education, and Extension Service
- Small Business Administration
Small Business Development Centers
- Environmental Protection Agency
- Department of Labor
Unemployment Compensation
- Social Security Administration
Disability Programs
- Department of Veterans Affairs
State Approving Agencies

There are many examples of Federal programs that operate in partnership with state and local governments as well as private entities. To a greater or lesser extent, they all deal with issues concerning the need to balance national requirements that flow from federal law, regulation, policies, and national priorities with the need to provide these other entities with enough autonomy to capitalize on local strengths and address local needs. There is no magic formula for doing this. Practices vary widely and have evolved based on the type of program, the length of the partnership, and the history and organizational culture of the program.

Appendix B has a brief history and a description of the organizational structure and mission for each of the six programs that were reviewed. Clearly, there is no “off-the-shelf” model in these other programs that applies directly to MEP. The histories, cultures, legislative mandates, funding formulas and missions of the respective agencies require them to take some different approaches to business. However, there are aspects of these other program business models that could benefit MEP. (Conversely, certain aspects of the MEP model, such as strong outcome measures, close-to-the-customer structure, and flexible information systems could benefit the other organizations.)

One Program that is worth considering is the Department of Agriculture’s Cooperative State Research, Education, and Extension Service (CSREES). While MEP is fifteen years old, has a \$106 million annual budget (FY '03), and focuses on manufacturing, Agricultural Extension began in the 19th Century, has a budget that is an order of magnitude larger (more than \$1 billion) than MEP and focuses on agriculture. Agricultural Extension provides funds mostly in the form of grants while MEP funds only one-third of the costs of operation and requires its

extension agents—MEP centers—to come up with the remaining two-thirds, much of it the form of fees charged to clients.

Despite these and other differences, the programs have some significant similarities as well. Both are organized around key sectors of the economy—agriculture and manufacturing—and both are focused on the diffusion of information, through an extension program, to the practitioners in those industries to help them improve their performance and productivity.

While much of what CSREES does is not applicable to MEP, the agricultural extension model has two key aspects which are important to its success and which could prove to be just as helpful in a manufacturing setting: a strong link to programs of higher education; and, strong research and development programs.

Linking With Community Colleges

Currently, while individual MEP centers have relationships with colleges and universities, including the handful of MEP centers which are university-based, there is no national partnership between MEP and schools. There is the potential for the MEP Program to forge its own unique relationship with the community college system. An American invention, community colleges provide close-to-home educational opportunities to the maximum number of people. There are 1,171 public and independent community colleges in the United States. When branch campuses of community colleges are included, the total is about 1,600. Flexibility in reacting to changes in the economy is one of the strengths of the community colleges system.

As the American Association of Community Colleges (AACC) notes:

“Historically, there has been little lag time between an economic change or population shift and its impact at community colleges. During their first century, community colleges responded adroitly to the demands of the times. When World War II veterans using the GI Bill packed campuses at the same time industries needed skilled workers to convert from armaments to consumer goods, community colleges added workforce training to their academic repertoire.”³⁰

In his most recent State of the Union speech, President Bush advocated providing additional federal funding to community colleges to help with job training: “I propose increasing our support for America's fine community colleges. I do so, so they can train workers for the industries that are creating the most new jobs.”³¹

The AACC membership represents close to 95 percent of all accredited U.S. two-year community, junior, and technical colleges. Economic and workforce development is one of six AACC strategic action areas.

³⁰ American Association of Community Colleges web site.

[Http://www.aacc.nche.edu/Template.cfm?Section=AboutCommunityColleges](http://www.aacc.nche.edu/Template.cfm?Section=AboutCommunityColleges)

³¹ President George W. Bush. State of the Union Address. January 20, 2004.

AACC is also a member of “The Six” large, presidentially-based associations. It collaborates with a wide range of entities within the higher education community to monitor and influence federal policy and to collaborate on issues of common interest. The association has ongoing interaction with key federal agencies and departments including the National Science Foundation and the Departments of Labor, Education, Energy, Homeland Security, and most importantly for the purposes of this study, Commerce.

Regardless of whether there is additional federal funding of the community college system, the MEP could play an important role in workforce development by helping to facilitate the creation of programs of manufacturing job training. By working with organizations such as AACC, MEP could help design appropriate programs by serving as the collective voice of the needs of small manufacturers. The U.S. Departments of Education and Labor also could be important partners in such an effort. A natural fit appears to exist between the effort to improve small manufacturing and the role of the community college system. MEP officials should strongly consider researching the possibility of fostering a partnership with this important national resource.

Research and Development

Research and Development is the second aspect of agricultural extension that could benefit the MEP Program. During its brief history, the MEP has had experience in developing three significant products for export to small manufacturers: lean manufacturing technology, quality assurance (QA) programs, and the “Y2K Toolkit,” which was used to help SMEs deal with Year 2000 information technology conversion issues.

The first two products “lean” and QA took significant time and resources to develop because they were not approached systematically or in a centralized fashion. Instead, each center was permitted to design its own version or decide which version to adopt. As one MEP manager characterized it, “We reinvented the wheel literally hundreds of times,” with various centers using “their own product.” While these efforts ultimately resulted in a successful product, the same results could have been achieved with less time and expense if they were pursued more systematically.

The development of the Y2K toolkit took a different approach. This was a centralized effort, modeled after agricultural extension research and development and done in partnership with CSREES and the Small Business Development Center Program (SBDC) within the Small Business Administration at Commerce. Driven by firm “drop dead dates” for delivery of the products, it was done well, at a reasonable price and on time. Ultimately, the International Trade Administration (DOC) adopted it for use in other applications and was converted into eight languages and exported to numerous countries as a promotion to increase demand for U.S. manufactured software. Both USDA and SBDC adopted the tool kit, and used it extensively to assist their clients.

The Panel believes the MEP Program should have a limited research and development capacity to develop products for SMEs. It is not recommended that MEP develop a large in-house R&D

program; size, budget constraints and other considerations make this impractical. However, the selected use of this centralized approach should be considered when circumstances allow.

An even more important R&D role MEP could play would be to initiate knowledge groups/communities of practice³² that focus on manufacturing technology issues and capitalize on the R&D efforts of federal labs, universities, and other technology creating entities. For example, the Program could consider sponsoring groups of MEP employees (headquarters and the field) who are organized around specific market segments (e.g. specific technologies, types of manufacturing, business processes, etc.) and who are knowledgeable about their segment and who work with technology creating organizations. This could provide a systematic and deliberate approach to knowledge management in the Program. (Appendix F has a fuller discussion of Communities of Practice.)

Adopting this approach also would have a direct impact on issues of organization, staffing and employee skill sets. Recognizing the difficulty of implementing wholesale change in a complex organization, it is strongly suggested that if the decision is made to change the strategic goals of the Program (the mission would remain the same) to include technology diffusion, then the changes need to be carefully planned through a structured strategic planning process and phased-in over a reasonable time frame. This would have to be an *evolutionary* process.

Funding Mechanisms

An additional consideration in reviewing these other models is how the programs are funded. As noted earlier in the report, MEP provides one-third of funding to state centers with the centers being responsible for generating the other two-thirds, including charging fees to customers. While the SBDC program requires state SBDCs to furnish one-half of their funding, for the most part, other programs do not require such matching efforts.

The MEP funding formula is an important driver of behavior at the state center level because it requires a strong focus on revenue generation. To be successful, centers must closely focus on generating revenues from clients. This is a positive aspect of the current model and helps the program continue to develop new customers and expand efforts with existing customers. The downside is that this approach discourages efforts which may be important but which divert time from revenue generation activities such as researching new technologies or building networks that span across state lines.

The current funding formula also reduces the ability of the Program to have a strong central policy approach. Because federal funding represents only one-third of a center's revenue, the ability to create a more integrated national approach on issues will not approach that of programs where there is full funding of state operations (e.g., SSA, VA). If the MEP Program moves into technology diffusion, tries to create an integrated national network and break down the geographic barriers between centers, it should consider requesting a change in the law to allow it to alter its funding formula.

³² Communities of Practice “share a concern, a set of problems, or a passion about a topic, and...deepen their knowledge and expertise in this area by interacting on an ongoing basis.” *Cultivating Communities of Practice*. Etienne Wenger, Richard McDermott, William M. Snyder, Harvard Business School Press, 2003.

This is not to suggest that the current one-third/two-thirds formula be abandoned. Rather, funding requirements should be supplemented with a provision that allows program officials to allocate “no-match” money to selected entities that are involved in important program activities which do not necessarily generate revenues.

Regionalization

All of the other programs examined during this study have some type of regional field-based structure staffed by federal employees. The officials interviewed uniformly view this structure positively because of its proximity to field offices; its ability to scale down budget, policy, and program implementation issues; and its ability to relate to both the headquarters’ policy and programmatic needs as well as the operational needs of field offices.

Except for some multi-state operations, the MEP structure is comprised of stand alone state centers which have similar administrative and managerial needs. All federal employees work at the MEP headquarters in Gaithersburg, Maryland.

There is an opportunity for the Program to create a more efficient and effective organization by moving towards a regional structure. In light of budget issues and other concerns, this is not a recommendation to duplicate the structures of the other organizations discussed above. Although state centers cannot be required to adopt a regional configuration, the MEP Program can encourage and offer incentives to centers to create regional coalitions that could capitalize on common services agreements, IT platforms, and other opportunities for improving efficiency. Realigning headquarters staff into regional arrangements could also provide some advantages.

Providing More Specific Requirements to Centers

The MEP Program has done a nice job of focusing center efforts and outcomes through a “market pull” strategy which includes well-designed center performance requirements. While some of the other programs studied have much more control over state operations, this is a result of stronger law and regulatory requirements as well as much higher funding levels. Other programs do not have the same degree of success as MEP when it comes to influencing the outcomes of the state offices. However, the MEP Program might achieve more if it took a more directive approach in some areas, including its fundamental contract with the state centers.

In many ways, the SBDC program operates very similarly to the MEP Program. Its fundamental mission, approach to funding centers and relationship with state and local organizations are very similar to those of the MEP Program. SBDC’s mission, however, is broader (i.e., helping *all* small businesses) and the assistance it provides to individual companies is less extensive. SBDCs spend an average of 4.7 hours per client while MEP center projects average about 60-70 hours in length. Nevertheless, the SBDC program offers some examples worth considering.

One is the use of an annual Program Announcement which tells centers what is expected of them in the upcoming year and requires a written proposal from each center which explains how it will meet the Announcement’s requirements. Also worth considering is the use of jointly negotiated

goals between SBA and the SBDCs, based on SBA's Government Performance and Results Act (GPRA) goals. (See also, DOL's use of annual State Quality Service Plans.)

Having specific requirements for SBDCs to acknowledge SBA's support; displaying the SBDC logo in offices and on web sites; and defining how SBDCs will refer to themselves are practices that can build network and brand identity, something that the MEP Program is also trying to accomplish through its *360vu* initiative. (It should be noted that, based on a review of SBDC web sites, several centers do not follow SBA's guidelines). Nonetheless, the practice is one which the MEP Program should consider.

An annual program announcement process could be administratively expensive for both MEP headquarters and state centers. Nevertheless, an annual announcement program, if designed carefully, could help clarify and strengthen headquarters-center roles and responsibilities without undue administrative effort.

Using Cooperative Agreements is also worth considering. These are not grants or contracts but awards which cover a three year period with an initial twelve month budget period and two twelve month option periods. By signifying *provisional intent* to support the center for the award period but creating no legal obligation to do so underpins the need for satisfactory center performance.

Using annual Program Announcements or Cooperative Agreements would require a change in current law that requires a panel review³³ of every center every two years.

Recommendations Based on Other Models

- Build a partnership with the community college system to help with manufacturing workforce development
- Create a research and development capability within the MEP program
- Seek a legislative change that would provide more flexibility in the center funding formula
- Consider a more regional approach for the MEP system

³³ The MEP statute (15 USCS 278k) requires each center to be reviewed by an external panel during years three and six and every two years thereafter. The panel reviews are managed and chaired by NIST-MEP using the Center Progress Report (CPR). The Center prepares the CPR, which includes the center profile, strategic and operational plans and quantitative performance-based results. The center and panel then meet to discuss and clarify the written report, recommendations (and funding for the center), and a written report that documents results of the process. These are developed and delivered to the center for implementation.

Table 5-1. Federal Agency Model Matrix

Agency	Funding Provided	Guidance/Performance Expectation	Regionalization	Performance Assessment
<p>Department of Agriculture Cooperative State Research, Education, and Extension Service</p>	<p>Competitive Grants</p>	<p>Annual published grant award criteria</p>	<p>None</p>	<p>CSREES conducts reviews of grant administration at the request of cooperating institutions.</p>
<p>Small Business Administration Small Business Development Centers</p>	<p>SBA provides 50% or less of the operating funds for each state SBDC.</p>	<p>Program Announcement— joint effort between states and Federal agency to set annual performance expectations.</p>	<p>SBA District Directors provide monitoring and oversight.</p>	<p>Peer based assessment process and annual survey of economic impacts.</p>
<p>Environmental Protection Agency</p>	<p>Grant program</p>	<p>Performance Partnership Agreements and Grants address goals and strategies, roles and responsibilities. Some performance measures</p>	<p>Regional Administrators develop, propose and implement regional programs.</p>	<p>Oversight of state compliance with federal statutes and objectives. Limited performance measurement system.</p>
<p>Department of Labor Unemployment Compensation</p>	<p>Funded almost entirely through employer taxes with partial funding from DOL.</p>	<p>Federal law and regulations define parameters under which state programs can operate.</p>	<p>Office of Workforce Security Regional Offices work with state offices.</p>	<p>Oversight of state processes to ensure compliance with federal law.</p>
<p>Social Security Administration Disability Programs</p>	<p>Full funding of state-based operations</p>	<p>SSA establishes policy and monitors performance without direct control of state operations.</p>	<p>Regional Commissioners provide primary oversight of state operations.</p>	<p>Monitors decisions and outcomes to ensure compliance with national policy and standards.</p>
<p>Department of Veterans Affairs State Approving Agencies</p>	<p>Full funding of state-based operations</p>	<p>Annual contracts with states that set performance expectations. Federal law and regulations define state operations.</p>	<p>Liaisons in VA Regional Offices work with state offices.</p>	<p>Peer-based evaluation system managed by VA headquarters.</p>

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

As noted in the first report for this study, the MEP Program is distinctive because it is the only federal program designed specifically to help small manufacturers, and is positioned to help create an infrastructure for supporting these firms as the U.S. economy undergoes enormous economic transition. The Panel believes it is time for the MEP Program—which *has* served the needs of small manufacturers well—to fundamentally alter its approach to this critical mission.

The most important changes which the Panel recommends for MEP are:

- emphasize technology diffusion as a basic function of the Program while increasingly brokering business and technical services through contracts with private sector consultants and training organizations
- building a strong national network of assistance for small manufacturers.

These recommendations stem from the extraordinary changes occurring in manufacturing coupled with the tremendous opportunity presented by the profusion of technological innovations in the United States. A national, integrated network which provides technological solutions to the performance problems of small manufacturers would be a tremendous national asset.

This is both an important and difficult undertaking that requires the full support and commitment not only of the people who work within the MEP Program but also those who have management and oversight responsibilities over the Program. Such changes will take time and should be approached in an evolutionary manner. Building the organizational and human capabilities envisioned in the recommendations of this study will take a great deal of skill and patience.

The Panel also believes that some aspects of the Program which have contributed to its achievements, including the funding formula, performance measurement system, and structural changes, should be revised to better position the program for a new approach to its mission. The MEP headquarters' role also needs to shift so that it serves as a facilitator of the new integrated network, developing strong knowledge management capabilities and providing firm direction about program requirements to state centers.

Even though fundamental change is being recommended, it is also important to recognize and preserve the elements of the MEP Program which have contributed to its success: the close-to-the-customer system of state centers; flexibility in program design; and leveraging of the federal investment and partnerships with private sector service providers. What is being recommended is to *build on* the Program's successes.

Recommendations

I. *Emphasize technology diffusion, product development, and supply chain integration services as basic services of the Program in addition to providing technical and business assistance to small manufacturers.* While the mission to improve the performance of small manufacturers would remain the same, the mechanisms for doing so would take a significantly different shape.

1. The MEP Program should alter its service mix to one that emphasizes technology diffusion, supply chain development, and new product development.
2. MEP centers should continue to provide business services, but the bulk of this work should be brokered out to private sector companies to the greatest extent practicable.
3. The MEP Program should serve as a channel of information to federal and university laboratories on the technology needs of small manufacturers to improve their manufacturing processes or to be able to produce new products.

II. *Build a stronger national network of assistance for small manufacturers*

The Program has done a good job of establishing the basic framework for a national system, but performance can be significantly improved by better integration of the efforts of state centers and by increasing partnering activities at the National level.

1. MEP headquarters should more directly establish national policy and initiatives that can forge a national integrated network of services and expertise.
2. MEP headquarters should sponsor the development of an enhanced knowledge management information system that captures and facilitates knowledge and information sharing among all e centers. Concerns about protecting any proprietary information about clients should be addressed by sanitizing client information that is shared across the network or if necessary, seeking a Department of Commerce General Council Opinion on how the information can be protected under existing FOIA and Privacy Act Statutes.
3. The MEP headquarters staff should develop a plan to expand the use of Communities of Practice across the entire network and begin to implement this initiative.

III. *Improve the coordination and partnering by MEP headquarters with other organizations that assist small manufacturers*

Several organizations provide similar or complementary services to the manufacturing industry, while there are numerous examples of partnering at the state center level, there needs to be more centralized linkage with these other organizations. Potential partnerships should be considered with:

1. Small Business Administration
 - a. Small Business Development Centers (SBDC)
 - b. SBA's Office of Technology

- c. U.S. Export Assistance Centers (USEAC)
 - d. Export Legal Assistance Network (E-LAN)
 - e. Service Corps of Retired Executives (SCORE)
 - f. Business Information Centers (BIC)
 - g. Women’s Business Centers (WBC)
 - h. Veterans Business Outreach Centers (VBOC)
2. Small Business Innovation Research Program (SBIR) and Small Business Technology Transfer Programs (STTR)
 3. The Department of Agriculture’s Technology Transfer Information Center (TTIC)
 4. Federal Laboratories Consortium
 5. Oak Ridge National Lab
 6. The Department of Commerce
 - a. Trade Adjustment Assistance Centers
 - b. International Trade Administration
 - c. Advanced Technology Program

IV. *Adopt some of the business practices of other programs that operate federal and state/local partnerships*

The Panel did not find an “off-the-shelf” model for MEP; nevertheless, important aspects of other federal programs could benefit the Program. They are:

1. Build a partnership with the community college system to help with manufacturing workforce development.
2. Create a research and development capability within the MEP Program.
3. Seek a legislative change that would provide more flexibility in the current funding formula for centers.
4. Give centers more specific direction.

V. *Improve the system-wide sharing of knowledge and information and the systems for measuring performance*

The MEP Program has developed several innovative approaches to managing information and measuring performance, but changes are needed and alternative approaches should be considered. (Appendix D discusses MEP center performance and includes a list of suggestions to improve the measurement system.)

- VI. *The Department of Commerce should consider aligning and integrating the various organizations within the Department that have manufacturing assistance responsibilities*
With the creation of a new “manufacturing czar” position within DOC, consideration should be given to manufacturing assistance organizational realignments and responsibilities to improve coordination and efficiency.
- VII. *MEP Program officials should consider structural and operational changes* including reestablishing a strategic planning process and adjusting the approach to training.

Planning

1. The Panel believes that the MEP Program should re-establish its strategic planning process and expand participation in the process to include input from all stakeholders.
2. As part of the planning process, NIST/MEP should articulate a clear statement about what programs are designed to accomplish and how the outcomes will be measured.

Training

3. If the basic emphasis of the Program is changed to technology diffusion and supply chain participation, there will be a need to develop training programs that provide the skills to support this change.
4. The MEP headquarters should consider establishing an executive training program and performance standards for center directors.

APPENDIX A

EXECUTIVE SUMMARY AND METHODOLOGY:

**Report 1—Re-examining the Core Premise of
the MEP Program³⁴**

Small manufacturing firms face huge challenges in this transforming world. Pressures to rapidly introduce new products and technology, reduce costs and increase quality leave many small firms struggling to survive. Today, many small firms operate well below their potential for reasons that are both within and outside their control. Although the challenges are significant and the competition fierce, small firms also have significant opportunities to improve their performance.

These firms, which employ seven million people, account for approximately \$711 billion (7 percent) of the Gross Domestic Product.³⁵ Manufacturing generally has undergone enormous change in recent years, reflected by 36 consecutive months of job losses.³⁶ During the recent economic downturn, America's total manufacturing base has shrunk significantly; 2.7 million jobs have been lost since August 2000.³⁷

For the last 15 years, a federal government program, the Manufacturing Extension Partnership (MEP) Program, has operated as a partnership among federal, state and local organizations and institutions, including the private sector, in an attempt to help small manufacturers improve their performance. Although the federal government provides funding for the program, the money is not used to subsidize small firms. Firms are expected to pay the incremental costs of direct services.³⁸

A Panel of the National Academy of Public Administration was asked by the National Institute of Standards and Technology, the MEP Program's parent organization, to research three issues:

1. The current barriers to productivity improvement faced by small manufacturers
2. The extent to which the MEP Program is positioned to help with reducing barriers
3. Alternative business models for operating the Program

³⁴ Extracted from *Report 1: Reexamining the Core Premise of the MEP Program, A Report of a Panel of the National Academy of Public Administration, September 2003.*

³⁵ U.S. Department of Commerce's Bureau of Economic Analysis was the source for GDP data regarding all manufacturers. These data were reduced by half, the estimated size of small manufacturing to the overall sector.

³⁶ Bureau of Labor Statistics Web Site. <http://data.bls.gov/cgi-bin/surveymost>.

³⁷ "In Rust Belt, Industrial Plight Drives Campaigns." Washington Post, August 2, 2003, p. A01.

³⁸ One-third of funding for the program comes from the federal government, with one third coming from state or local sources and one third collected as fees from the small manufacturers helped by the program.

This phase of the study concerns the first two issues. The second phase (alternative business models) is now underway and will be completed in February 2004.³⁹

This study found that barriers to improving the productivity of small manufacturers identified by earlier studies remain, although they have changed in their relative impacts. Additionally, several other factors have grown in importance and in some ways have made the challenges regarding small manufacturer improvement efforts more difficult. There are further opportunities for improving the way services are provided, yet the MEP Program does perform in a capable and effective manner, delivering impacts significantly beyond the costs of operating the program. The Panel finds that the core premise of the Program remains viable as it is fulfilling its mission by leveraging both public and private resources to assist the nation's small manufacturers.

The following are the principal findings of this phase of the study:

FINDING 1

Barriers to productivity and performance improvement continue to challenge small manufacturers.

- The barriers identified in earlier studies still exist but the relative importance of each to small manufacturers has changed since the inception of the MEP Program.
- Additional factors affecting small manufacturer performance have grown in importance since the inception of the MEP Program, including rapidly increasing competition from low cost countries in terms of the number of competitors and the quality of that competitive output; the explosion in the availability of information and information technology; insufficient access to knowledge workers by small manufacturers; and the high cost of providing health insurance for employees.
- Over the last decade, the importance of leveraging technology has become even more critical to improving the performance of small manufacturers. The MEP Program needs to better focus its corporate strategy on facilitating technology implementation, technology integration and technology transfer for small manufacturers.

FINDING 2

The small manufacturing market is underserved in terms of assistance with productivity and performance improvement efforts.

³⁹ The study was put on hold by NIST/MEP from November 2003 to January 2004 because of budget uncertainties. As a result, when the study resumed, the completion date for the final report was moved to May 2004.

- While there are individual consultants and firms and other private and public organizations that can and do provide services to small manufacturers, for the most part, this remains a largely underserved market.
- The MEP Program does not significantly displace these other entities in the marketplace but more typically serves as an enabler to link small manufacturers to their services.
- The MEP Program is uniquely situated to create the nationwide network and infrastructure that can provide systematic and comprehensive productivity improvement assistance to small manufacturers.

The Panel notes that given the wide range of performance and capabilities among MEP centers, there are opportunities to improve the Program's service delivery, organizational structure and outcome and performance measures. These will be the focus of the next phase of this study, which will consider alternative business models for the Program.

METHODOLOGY

The study team focused on answering two primary questions: First, what are the barriers to improvement *currently* faced by small manufacturing firms? Second, considering contemporary barriers, how well positioned is the MEP Program in helping the firms overcome them?

The barriers noted in a 1993 National Research Council report⁴⁰ were an important starting point since they helped shape the change in the primary focus of the MEP Program in the mid to late 1990s. The study team's first task was to consider whether the NRC barriers were still present and identify new barriers, if any.

The study team approached the issue of barriers by conducting a series of interviews with individuals representing a variety of important perspectives, including manufacturing interests, private-sector consultants, subject matter experts and MEP leaders. Interviews were conducted and information was solicited from manufacturing trade organizations; various-sized consulting firms and professional organizations; subject-matter experts; MEP headquarters staff; MEP center directors at the local (state) levels; and various stakeholders, including congressional staff members.

While time and budget constraints did not allow for a large survey of small manufacturers, the study reviewed the findings of 13 previously conducted surveys and focus groups with small manufacturers, which focused on issues of concern to small manufacturers and potential sources

⁴⁰ *Learning to Change: Opportunities to Improve the Performance of Smaller Manufacturers*. Manufacturing Studies Board. Commission on Engineering and Technical Systems. National Research Council. National Academy Press. 1993.

of assistance. The results obtained from the interviews were compared to the survey results and literature reviews.

The Academy also created a web site (nistcomments@napawash.org) to solicit public comments on the project. MEP staff sent an e-mail notification of the study with instructions on accessing the site to a broad cross section of organizations involved in small manufacturing issues.

The study team reviewed written materials, including the original authorizing legislation as well as subsequent MEP-related legislation and resulting changes in policies; studies, reports and analyses pertaining to the MEP Program; studies and analyses of the small manufacturing industry; information and materials from manufacturing trade organizations; information from consulting industry professional organizations; academic literature; and information from such programs as the Small Business Administration's Small Business Development Centers and the Organization of Economic Cooperation and Development's information and studies on government support for small manufacturing in other countries.

APPENDIX B

OTHER FEDERAL AGENCY MODELS WITH STATE-BASED OPERATIONS

Department of Agriculture

Cooperative State Research, Education, and Extension Service

The *Cooperative State Research, Education, and Extension Service (CSREES)* is the education, outreach and research agency of the United States Department of Agriculture (USDA) that partners with the states. It serves as the national office for the Cooperative Extension System and functions as the national office for agricultural research conducted by the land-grant university system. CSREES serves as the federal partner of the nationwide system of agricultural research and cooperative extension, which includes 74 state and territorial land-grant colleges, including the District of Columbia, and staffs in nearly all of the counties and parishes in the United States.

Program History

Three acts signed by President Lincoln in 1862 helped shape current agricultural programs: the act authorizing a U.S. Department of Agriculture; the Homestead Act, encouraging settlement of public domain lands; and the Morrill Act establishing land grant colleges in every state and placing instruction in agriculture and home economics in higher education. The Homestead Act caused a stampede for land and the problem arose of how to educate these new landowners about farming.

The history and formation of the cooperative extension⁴¹ dates back to the Hatch Act of 1887 which established a cooperative bond between USDA and the nation's land grant colleges to facilitate the allocation of annual federal funding for research. This was one way to improve the productivity of farms and by doing this, build up the economy and help local communities and help drive land-grant colleges to meet agriculture's needs. The Smith-Lever Act in 1914 provided funds for cooperative administration of agricultural extension education by USDA and the state land grant colleges.

During World War I, extension mobilized the war food production efforts while food production, preservation and clothing conservation projects were stressed. During the Farm Depression of the 1920's, emphasis changed from production to economic concerns, farm efficiency and the quality of rural life. Extension ranks were thinner and emergency funds were gone. Unable to hire professionals, extension called upon volunteers which stimulated rural leadership

⁴¹ The use of the word "extension" derives from an educational movement in England during the second half of the nineteenth century to provide "university extension" (the extension of educational opportunities) to urban areas. It developed quickly to become a well-established movement before the end of the century. Initially, most of the lectures given were on literary and social topics, but by the 1890s agricultural subjects were being covered by lecturers in rural areas. Improving Agricultural Extension. A Reference Manual. Food and Agriculture Organization of the United Nations, Rome, 1997. <http://www.fao.org/docrep/W5830E/w5830e01.htm#TopOfPage>

development. The extension program was also active in helping farmers to organize cooperatives.

The Farm Seed and Loan Program was organized during the Great Depression and the extension program was called upon to manage it. In the post depression and the New Deal era, extension became involved in the management of many Federal programs such as the Agricultural Adjustment Administration, Soil Conservation Service, Rural Electrification Program, and the Farmer's Home Administration.

CSREES Today

In September 1994, under the Federal Crop Insurance Reform and Department of Agriculture Reorganization Act, Congress authorized the establishment of the Cooperative State Research, Education, and Extension Service (CSREES). CSREES combines the missions, resources, personnel, and responsibilities of the former Cooperative State Research Service (CSRS) and the Extension Service (ES) and is the primary Federal link to university and other partners in cooperative programming in the food and agricultural sciences.

The primary functions of CSREES are: (1) to provide program leadership to identify, develop, and manage programs to support university-based and other institutional research, education, and extension; and, (2) To provide fair, effective, and efficient administration of Federal assistance implementing research, education, and extension awards and agreements.

Although CSREES does not exercise line authority over its partners, it does have certain statutory oversight responsibilities and authority for the funds that it channels to these institutions and individuals. This holds true whether CSREES funds constitute the sole source of a program's funding or only a minor source of support. CSREES-administered funds provide land-grant institutions and other partners with stable, readily available support, thereby leveraging additional staffing and financial resources, three to four-fold.⁴²

Today, CSREES administers all legislation related to agricultural research, education and extension programs of the land-grant university system across the United States and its territories. It also is responsible for distributing grants for extension, research and education to the states and territories and for assuring that these funds are utilized properly. Easily the oldest of the programs being considered, 'Ag Extension' is deeply rooted in American history and culture, including a famous Norman Rockwell painting, '*The County Agent*.'

CSREES is headed by an Administrator who reports to the Secretary of Agriculture through the Under Secretary for Research, Education and Economics. CSREES is comprised of the following organizational units:

Office of Extramural Programs (OEP) is responsible for CSREES formula funds, grants, cooperative agreements, special projects, and other Federal assistance instruments.

⁴² Cooperative State Research Education and Extension Service, USDA, Strategic Plan, FY 2001.

Plant and Animal Systems provides programmatic direction and manages the funding of research and extension issues such as biotechnology, pest management, plant and animal genome, food safety, invasive species, farm safety, aquaculture, and animal health programs.

Natural Resources and Environment provides leadership in programs of soils, water, forestry, wood products, agriculture and natural resources.

Science and Education Resources Development is responsible for competitively awarded higher education programs in the food and agricultural sciences; competitively awarded research, extension and academic programs for minority serving institutions; formula funded research and extension programs; international programs/projects that leverage the research, education and cooperative extension expertise of U.S. universities; and the Agriculture in the Classroom Program.

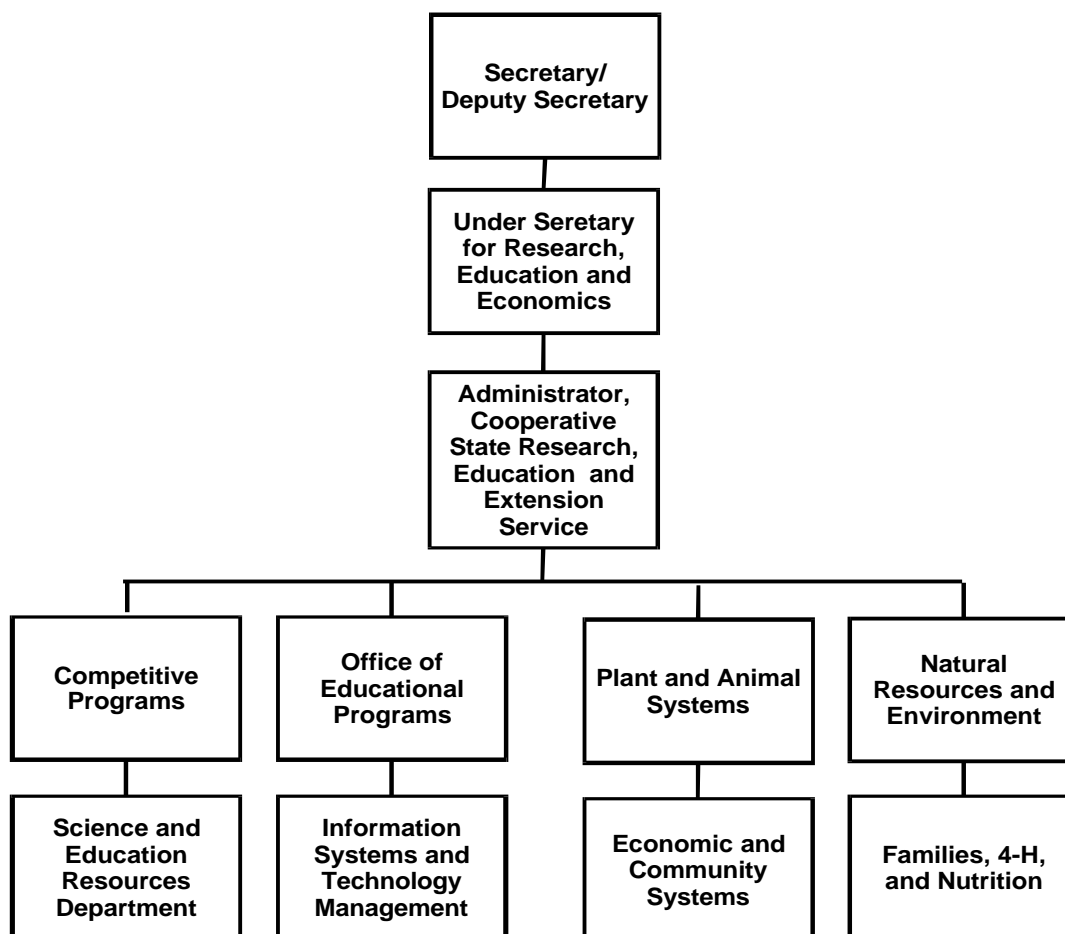
The Information Systems and Technology Management Unit (ISTM) is responsible for information technology applications and operations within CSREES.

Economic and Community Systems focuses on the application of social sciences to the issues and problems of families and consumers, farms and ranches, agricultural and other businesses, and rural communities.

Families, 4-H, and Nutrition provides national leadership in programs of nutrition, health, children, youth, and family.

Competitive Program grants build on the base provided by formula funds and include the National Research Initiative Grants and the Integrated Research, Education, and Extension Competitive Grants Programs.

CSREES Organization



CSREES Partners

CSREES works in partnership with the public and private sectors to maximize the effectiveness of available agricultural resources. Partners include:

- Land-grant institutions in each State, territory, and the District of Columbia
- More than 130 colleges of agriculture
- 59 agricultural experiment stations
- 57 cooperative extension services
- 63 schools of forestry
- 16 historically black land-grant institutions and Tuskegee University
- 27 colleges of veterinary medicine
- 42 schools and colleges of family and consumer sciences
- 29 1994 Native American land-grant institutions
- 127 Hispanic-serving institutions

CSREES Sponsors:

- Research programs on value-added products, plant and animal genomes, integrated pest management, water quality, human nutrition, food safety, and animal and plant systems.
- Education programs on food safety; sustainable agriculture; water quality; children, youth, and families; health; environmental stewardship; and community economic development.
- 5.6 million youth involved in 4-H projects and programs.
- The National Research Initiative, which supports research to solve agricultural and environmental problems.
- Grants to provide educational opportunities in the agricultural and food sciences.
- Design of interactive distance education activities to reach diverse audiences and sustain access to lifelong learning.
- Electronic access to flood and disaster safety, recovery, and other vital information.
- 3 million trained volunteers who work with outreach education programs nationwide.
- Over 9,600 local extension educators working in 3,150 counties.
- Over 9,500 scientists conducting research at 59 State agricultural experiment stations.
- International education programs taught by over 200 extension professionals in 17 countries.

While the mission and operating principles of CSREES differ significantly from MEP, there are some important aspects of agricultural extension that can apply to manufacturing extension, including the relationship with institutions of higher learning and the emphasis on research. These aspects will be more fully discussed at the end of this chapter.

Small Business Administration Small Business Development Centers

In 1977, as a way of expanding the availability of management and technical assistance to small businesses, the Small Business Administration (SBA) began an experiment with eight universities that it initially called University Business Development Centers and later called Small Business Development Centers (SBDC).

As discussed in the first report of this study, the Small Business Development Center (SBDC) Program provides management assistance to current and prospective small business owners. This \$100 million per year program counseled 22,612 small manufacturers during FY 2002 out of a total of 651,421 clients served. An average of 4.7 hours was spent with each client.

SBA provides 50 percent or less of the operating funds for each state SBDC; one or more public or private sponsors provide the rest. These matching fund contributions are provided by state legislatures, private sector foundations and grants, state and local chambers of commerce, state-chartered economic development corporations, public and private universities, vocational and technical schools, and community colleges.

The SBDC Program is designed to provide counseling, training and technical assistance in all aspects of small business management. SBDC services include, but are not limited to assisting small businesses with financial, marketing, production, organization, engineering and technical problems and feasibility studies. Special SBDC programs and economic development activities include international trade assistance, technical assistance, procurement assistance, venture capital formation and rural development.

SBDC assistance is available to anyone interested in beginning a small business for the first time or improving or expanding an existing small business that cannot afford the services of a private consultant.

There are 63 lead SBDCs with one in every state (Texas has four, California has six), the District of Columbia, Guam, Puerto Rico, Samoa, the U.S. Virgin Islands and a network of more than 1,100 service locations.⁴³ The lead SBDCs, manage the program and coordinate the program services offered to small businesses through a network of sub-centers and satellite locations in each state. 57 of the 63 SBDC Centers are university-based. The other 6 fall under state agencies.

As a partner to the SBA to provide customer service to the small business community, the SBDCs represent the Agency's largest grant-funded service delivery network. In areas with more than one district office, one project officer is the primary point of contact, but all district directors must sign off on negotiated proposals.

Program Announcements

Each year a *Program Announcement*⁴⁴ is issued to all Centers outlining what is expected of them in the upcoming year. Each Center must respond with a written proposal as to how it will meet the Program Announcement requirements. Goals are jointly negotiated and agreed upon with the participation of the District Director and the SBDC State/Region Director. Specific goals are negotiated based on the Agency's Government Performance and Results Act⁴⁵ (GPRA) goals which are relevant to the SBDC Program, including:

- Helping entrepreneurs starting new businesses to be competitive.
- Assisting existing businesses to be economically viable.
- Achieving high customer satisfaction rates as determined through surveys.

The SBA District Director has the authority and is directly responsible for negotiating the cooperative agreement with the Lead SBDCs. Lead SBDCs are required to have a program control center to provide administrative services to the SBDC network within the state. These administrative services include:

⁴³ Source: SBDC web site: <http://www.sba.gov/SBDC/>

⁴⁴ The current Program Announcement can be found at: <http://www.sba.gov/sbdc/sbdc2003.html>

⁴⁵ For additional information on GPRA see: <http://www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html>

1. Program development
2. Program management
3. Promotion and public relations
4. Financial accounting
5. Reports management
6. Internal quality control.

Records are maintained in the Lead SBDC which outline the Federal, State, local government, academic, and private sector resources available to the SBDC network and the types of services provided to clients.

There are also specific requirements in the Program Announcement for SBDCs to acknowledge SBA's support:

The SBDC program is a partially funded partnership program of the U. S. Small Business Administration. Subject to the availability of funds, the SBA provides federal funding to the SBDCs on an annual basis and each SBDC operates under the program's Federal regulations and Section 21 of the Small Business Act. Accordingly, SBDCs are expected to acknowledge SBA's support. All SBDC recipients must conform to SBA/SBDC guidelines regarding prominent display of the SBA/SBDC co-branding logo at the front of each office in the SBDC network. The SBA logo must also appear prominently on all SBDC websites that are related to this cooperative agreement. The following disclaimer and acknowledgement of support must be in legible, easily readable print (within 2 inches of the SBA logo).

“The SBDC is partially funded by the U. S. Small Business Administration. SBA's funding is not an endorsement of any products, opinions or services. SBA funded programs are extended to the public on a non-discriminatory basis.”

All publications, promotion pieces, websites, information and training materials must expressly acknowledge that the SBDC program is “partially funded by the U. S. Small Business Administration.” This acknowledgement may include the SBDCs other major funding partners.⁴⁶ The SBA will have unlimited license to use data and written materials generated under this cooperative agreement, whether or not the materials are copyrighted.

The agreement also speaks to the issue of how SBDCs will refer to themselves:

The specific identification “Small Business Development Center” or “Small Business and Technology Development Center” shall be a part of the name of every SBDC organization within the SBDC network. (Existing Alabama and Nebraska SBDCs are exempt from this requirement.) No other name designations or variations will be accepted. SBDCs will have two years from promulgation of revised SBDC regulations (currently in progress) in which to make a necessary name change. An SBDC proposing

⁴⁶ Small Business Development Center 2003 Program Announcement for FY2004 or CY2004. p. 4.

to use the identification “Small Business and Technology Development Center” must follow the procedures set forth in Attachment A, Section B, Guidelines, and have the advance written approval of the AA/SBDCs.

How services are to be provided are also delineated:

The SBDC network shall provide services as close as possible to small businesses by using a variety of service delivery mechanisms, including satellite locations, traveling counselors, or electronic capabilities, when appropriate. The facilities and staff of each SBDC shall be located in such places as to provide maximum accessibility and benefits to the small businesses which the SBDC is intended to serve.

The Lead SBDC must have a separate budget and identity and should not be an indistinguishable part of a larger unit. It must also have its own full-time staff. This shall include a full-time (100 percent) State/Region Director who shall operate and administer the operations of the SBDC network and shall have the authority to make expenditures under the Center’s budget as well as manage the Program activities.

Interagency and intra-agency cooperation is also spelled out as a part of the agreement:

SBDCs, Business Information Centers (BICs), Women Business Centers (WBCs), Service Corps of Retired Executives (SCORE) and U.S. Export Assistance Centers (USEACs), with the assistance from SBA district offices, must work collaboratively to coordinate their efforts in order to expand services and avoid duplication. When the SBDCs are located in communities with these resource partners, the SBDCs will work with them to offer training and other forms of assistance to their clients. In addition, as part of the cooperative agreement, the district director and the SBDC State/Region Director will negotiate the furnishing of on-site SBDC counseling at the OSCSs, the WBCs, the USEACs, and the BICs, subject to the availability of funds and local needs. SBDCs are encouraged to fully utilize the resources of other Federal, State and local government, academic and private sector programs concerned with aiding small businesses to provide new or expanded business development assistance.

Cooperative Agreements

Each Center is funded under a *Cooperative Agreement*. These are not grants or contracts but are awards which cover a three year period with an initial twelve month budget period and two twelve month option periods. The award signifies SBA’s *provisional intent* to support the SBDC for the award period but creates no legal obligation to do so. Continuation of support is contingent on the availability of funds, satisfactory performance and a determination that continuation of the award is in the best interests of the Government. The agreement also requires that the SBDC obtain funds from non-Federal sources which, at a minimum, must match the funds supplied by SBA.

Peer-Based Accrediting Process

Each Center also goes through a *peer-based accrediting process* wherein Centers evaluate each others capabilities based on an agreed upon set of criteria. The evaluations consider such subjects as:

- Leadership and organizational issues.
- Strategic planning.
- Client and stakeholder focus.
- Program performance standards.
- Staffing and resource utilization.
- Program delivery and management.
- Measurement of performance and outcomes.

The evaluations are coordinated by the OSBDC and are conducted by geographically-dispersed ad-hoc teams. The teams conduct site visits and share their feedback with management officials.

National Survey

A survey⁴⁷ of the economic impacts of SBDC counseling activities is conducted each year of 25,000 firms, some of which are surveyed on an ongoing basis. There are five areas of focus:

- Improvements in performance of the sampled small businesses.
- Tax revenues generated for the Federal and state governments as a result of SBDC counseling.
- Tax revenues generated by long-term clients as compared to the total cost of providing SBDC services.
- To determine if services comparable to SBDC counseling were available from private sector sources at an affordable price.
- To analyze the financing obtained by clients as a result of SBDC assistance.

The Association of Small Business Development Centers

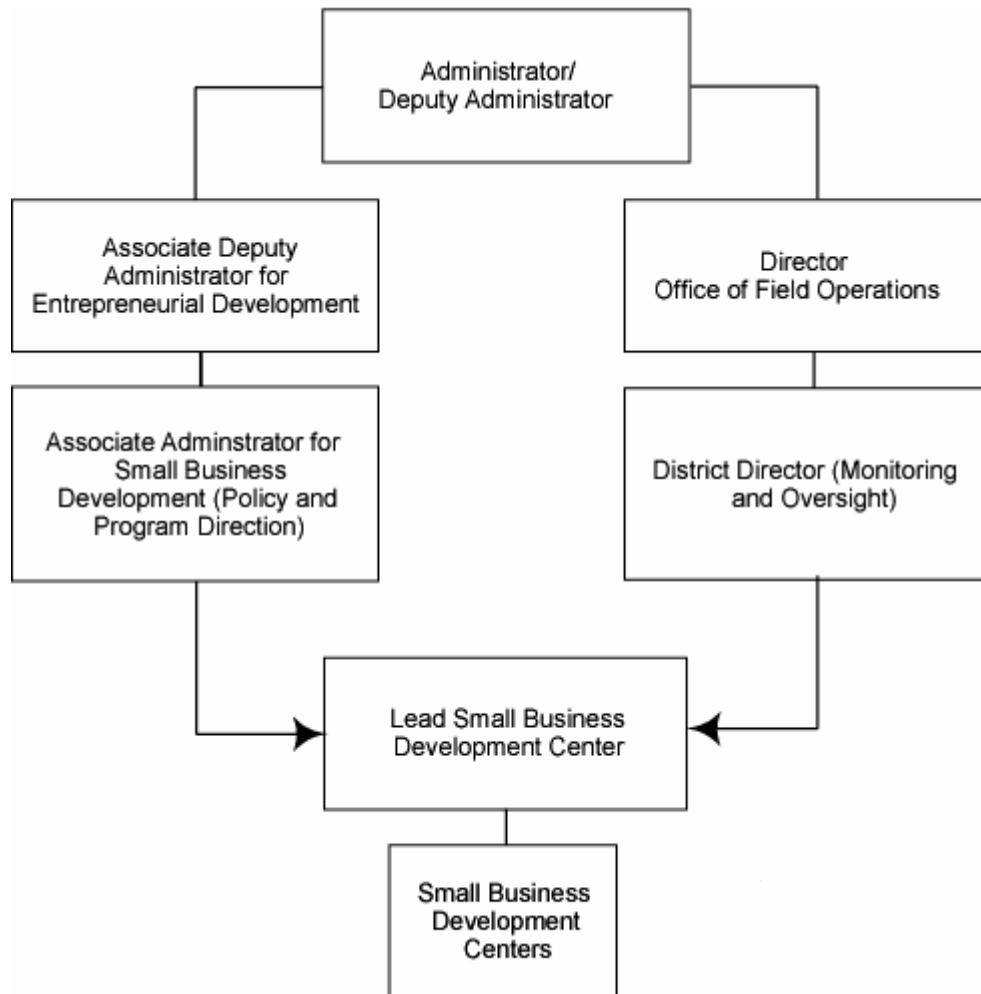
The Association of Small Business Development Centers (ASBDC) is a partnership program between private enterprise, government, higher education and local nonprofit economic development organizations. Founded in 1979, the ASBDC works towards the improvement of the Small Business Development Center program, through the exchange of information among members regarding objectives, methods and results in business management. It also provides technical assistance and takes an advocacy role in support of the small business community.

⁴⁷ Economic Impact of Small Business Development Center Counseling Activities in the United States: 2000-2001. James J. Chrisman. Department of Management and Information Systems, College of Business and Industry, Mississippi State University.

ASBDC also serves the information needs of SBDCs, the SBA and other related organizations by offering information in response to research requests, referral to experts and regional sources of information, training in information access techniques, access to business-related information via a web site and SBA publications.

Of all the organizations considered in this chapter, the SBDC Program most closely resembles the mission and operating principles of the MEP Program. This offers the opportunity for MEP officials to both consider adopting some SBDC processes as well as developing a closer working relationship with their SBDC headquarters' counterparts. It also would provide SBDC officials with the opportunity to learn from some of MEP's business processes. This is discussed further at the end of this chapter.

SBA/SBDC Organization Chart



Environmental Protection Agency

The Environmental Protection Agency (EPA) was created in 1970 in response to public recognition and concern about decades of rampant and highly visible pollution. EPA began operations by taking over existing programs relating to the environment from other Federal agencies including the Department of Health, Education and Welfare's (HEW) National Air Pollution Control Administration, the Bureaus of Water Hygiene and Solid Waste Management, and some functions of the Bureau of Radiological Health. The Food and Drug Administration of HEW gave up its control over tolerance levels for pesticides to the EPA. The Department of the Interior contributed the functions of the Federal Water Quality Administration and portions of its pesticide research responsibilities. EPA gained functions involving pesticide registration from

the Department of Agriculture. From the Atomic Energy Commission and the Federal Radiation Council, the new agency gained responsibility for radiation criteria and standards.⁴⁸

The EPA administers a number of programs that are conducted in partnership with state and local governments as well as private entities. EPA develops and enforces regulations that implement national environmental laws and is responsible for researching and setting national standards for a variety of environmental programs. It delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

In recent years, between 40 and 50 percent of EPA's enacted budgets have provided direct support through grants to State environmental programs. EPA grants to States, non-profits and educational institutions support research that is designed to improve the scientific basis for decisions on national environmental issues. EPA funding is used to:

- Provide research grants and graduate fellowships.
- Support environmental education projects that raise the public's awareness, knowledge, and skills to make informed decisions that affect environmental quality.
- Provide information to state and local governments and small businesses on financing environmental services and projects.
- Provide other financial assistance through programs such as the Drinking Water State Revolving Fund, the Clean Water State Revolving Fund, and the Brownfields program.

EPA works with over 10,000 industries, businesses, non-profit organizations, and state and local governments, on over 40 voluntary pollution prevention programs and energy conservation efforts. Partners set voluntary pollution-management goals; examples include conserving water and energy, minimizing greenhouse gases, slashing toxic emissions, re-using solid waste, controlling indoor air pollution, and getting a handle on pesticide risks. In return, EPA provides incentives such as public recognition and access to emerging information.

State Partnerships

EPA's strategy envisions states as equal partners in protecting human health and the environment. Most environmental laws provide for a strong role for state governments in managing environmental and human health protection programs. National laws set goals, standards, and approaches for environmental protection to which EPA and states commit. Since environmental issues can vary from region to region, EPA tries to maintain flexible policies that acknowledge local conditions. As state environmental authority and management capacity have grown over the past three decades, EPA has delegated or authorized primary responsibility to states for implementing many day-to-day program activities, such as issuing permits, conducting compliance and enforcement programs, and monitoring environmental conditions. States' direct administration of environmental and human health protection programs are coupled with EPA

⁴⁸ The Birth of EPA. Jack Lewis. EPA Journal - November 1985.

oversight to ensure thorough compliance with federal statutes and achievement of national objectives.

In 1995, the states and EPA agreed on a series of principles to guide their collaboration, which are known as the *Joint Commitment to Reform Oversight and Create the National Environmental Performance Partnership System*⁴⁹ (“NEPPS Agreement”). These principles call upon the states and EPA to set priorities jointly; develop performance agreements to define their roles, responsibilities, and accountability; encourage innovative environmental and human health protection strategies; agree upon performance measures; and jointly evaluate the results achieved. The states and EPA use a variety of tools to define their relationship and guide the implementation of environmental laws and the principles of the NEPPS Agreement.

These tools include performance partnership agreements (PPAs), performance partnership grants (PPGs) and/or categorical program grants to states, enforcement agreements, and primacy delegation or authorization agreements. In addition to the Performance Partnership System, EPA works with a variety of associations representing state environmental agencies, such as the National Governor’s Association, the Environmental Council of the States, and other organizations that deal with specific environmental media, such as the Association of State and Interstate Water Pollution Control Administrators. They also work with state agricultural and public health agencies on environmental protection efforts.

EPA’s mission also applies to Indian country and Alaska Native Villages. Because of the Tribes’ unique cultural, jurisdiction, and legal issues, EPA works with them on a government-to-government basis that complements tribal government structures, incorporates tribal priorities, and recognizes tribal cultural considerations.

Performance Partnership Agreements

EPA and individual States negotiate Performance Partnership Agreements which set out priorities and state how the partners will work together to solve environmental problems. State participation in performance partnerships is voluntary, and the pace and scope of implementation varies across the country.

The NEPPS Agreement outlines suggested topics to be considered in developing PPA agreements:

- The goals and objectives for environmental protection in the State
- Strategies that will be employed in meeting them
- Roles and responsibilities of the State and EPA in carrying out the strategies
- The measures that will be used to assess progress.

Priorities are based on an assessment of national and local environmental conditions as well as the performance of the individual State’s protection programs. The Agreement calls on States to perform a self-assessment of their environmental conditions as well as the performance of their protection programs. EPA provides its own perspective about the State as well as information

⁴⁹ <http://www.epa.gov/ocir/nepps/ovrsight.htm>

that explains and supports national and Regional priorities. This information is the starting point for negotiating priorities and other elements of the PPA.

The scope and coverage of a PPA can be very broad—covering all the programs where EPA and the State have parallel responsibility as well as environmental programs where only the State has jurisdiction—focusing on one or two program areas or on special projects or initiatives that the State and EPA plan to work on together. The PPA may cover just the programs the State wants to have funded through a Performance Partnership Grant (PPG) or can be a comprehensive statement of the State’s work with EPA. In a few cases, the PPA contains a more general discussion of the working relationship between EPA and the State rather than a discussion of priorities and programs.⁵⁰

More than two-thirds of the States are using one or more of the key components of performance partnerships with either a negotiated PPA and/or have been awarded grant funds through a PPG. The scope and coverage of these PPAs and PPGs varies.

Performance Partnership Grants

To gain greater flexibility in how they use Federal grant funds, States can also choose to combine grants in a Performance Partnership Grant (PPG). States can combine funds from up to 16 environmental program grants into a single grant. This saves on administrative costs resulting from reduced paperwork and streamlined accounting procedures and gives States an opportunity to address their priority environmental problems or program needs. The accounting for PPGs also makes it easier to for States to try multi-media approaches and initiatives that were difficult to fund under categorical grants.

A State does not need to negotiate a PPA in order to request its funds in a PPG. However, a PPA often serves as the strategic underpinning for a PPG (and other State grants), and the PPA can itself serve as a grant work plan if it meets statutory and other requirements for a grant work plan.

Performance Measures

EPA-State partnerships acknowledge that developing and using better performance measures⁵¹ are essential to implementing performance partnerships. Using the work which had been done to develop environmental indicators and performance measures for use in planning, managing, and evaluating environmental programs as a starting point, EPA and the States developed and adopted a set of Core Performance Measures.⁵² They include a mix of output and outcome measures. EPA and States continue working to improve performance measures as part of a larger effort to reform EPA's planning, management, and accountability system to better accommodate State priorities and needs.

⁵⁰ <http://www.epa.gov/ocir/nepps/agreements.htm>

⁵¹ http://www.epa.gov/ocir/nepps/performance_measures.htm

⁵² http://www.epa.gov/ocir/nepps/core_performance_measures.htm

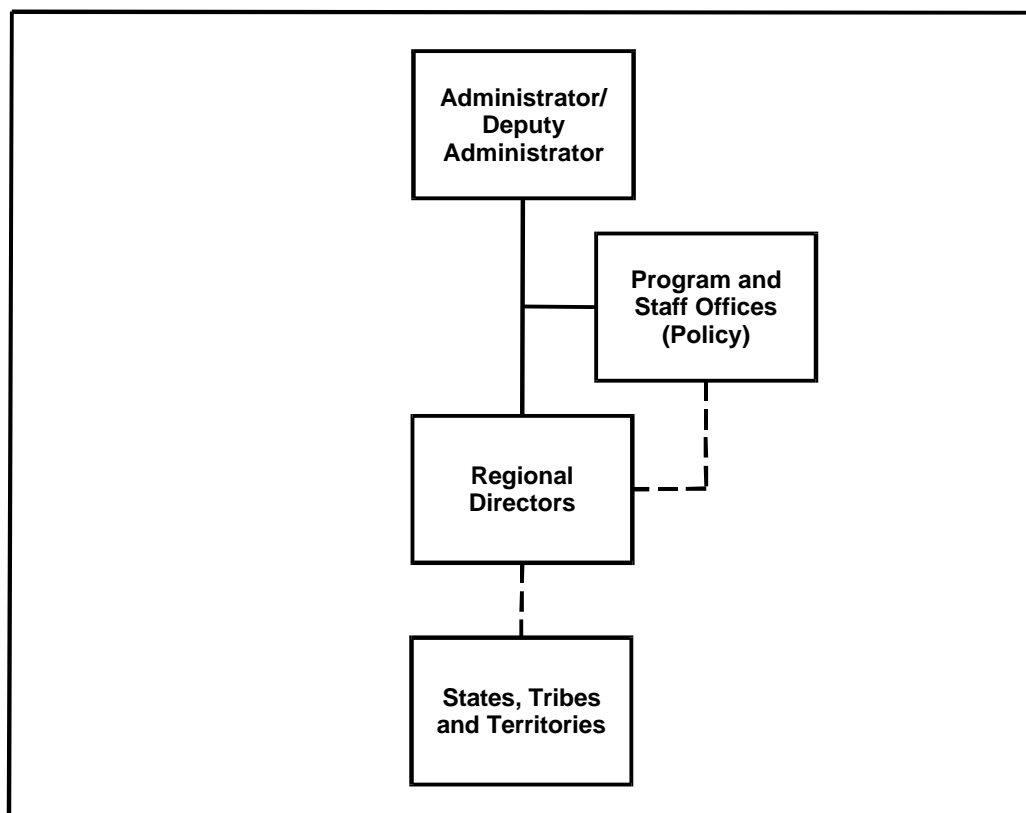
Administration

Each Program in EPA (air, water, solid waste, etc.) is administered through a separate headquarters office which in turn, works through a network of 10 Regional Offices that interact with the States. Each EPA Regional Office is responsible within its area of jurisdiction for the execution of the Agency's programs.

Regional Administrators work with Federal, state, interstate and local agencies, industry, and academic institutions, and other private groups to ensure that regional needs are considered and Federal environmental laws implemented. Regional Administrators are responsible for developing, proposing, and implementing regional programs for comprehensive and integrated environmental protection activities. They also conduct regional enforcement and compliance programs and translate technical program direction and evaluation provided by various EPA Headquarters elements into effective operating programs at the Regional level. Other functions include assuring that programs are executed efficiently; exercising approval authority for proposed State standards and implementation plans; and providing overall and specific evaluations of regional programs.

The Office of Regional Operations, which operates in EPA headquarters, serves as the Regional Offices' advocate and ombudsman at Headquarters. It serves as a link between the Regional Offices and headquarters elements and works to integrate Headquarters' policy and concerns into Regional Office operations, as well as the incorporation of Regional Office views and needs in the formulation of Agency and National policy and decision-making processes.

EPA Organizational Structure



Given the regulatory nature of its mission as well as the fundamental nature of EPA's practices and policies for overseeing environmental laws and dealing with states, there are limited opportunities for MEP to adopt EPA practices. The degree of control over state activities, outcome measures and contractual agreements are already more well-established in MEP.

Department of Labor Unemployment Compensation

The federal-state unemployment compensation (UC) program was created by the Social Security Act of 1935. Unemployment compensation is designed to provide benefits to most individuals out of work, generally through no fault of their own, for periods between jobs. In order to be eligible for benefits, jobless workers must demonstrate workforce attachment, usually measured by the amount of wages and/or weeks of work, and must be able and available for work.

The UC program is a federal-state partnership based upon federal law, but administered by state employees under state law. The U.S. Department of Labor (DOL) is the agency responsible for

the national program. The UC program is also almost totally funded by employer taxes, either federal or state. Three states also collect taxes from employees.

Eligibility for unemployment insurance, benefit amounts and the length of time benefits are available are determined by the State law under which unemployment insurance claims are established.

Federal law defines certain requirements for the program. The Social Security Act (SSA) and the Federal Unemployment Tax Act (FUTA) set forth broad coverage provisions, some benefit provisions, the federal tax base and rate, and administrative requirements. The major functions of the federal government are to:

- Ensure conformity and substantial compliance of state law, regulations, rules, and operations with federal law;
- Determine administrative fund requirements and provide money to states for proper and efficient administration;
- Set broad overall policy for administration of the program, monitor state performance, and provide technical assistance as necessary;
- Hold and invest all money in the unemployment trust fund until drawn down by states for the payment of compensation.

Each state designs its own UC program within the framework of the federal requirements, The state statute sets forth the benefit structure (e.g., eligibility/disqualification provisions, benefit amount) and the state tax structure (e.g., state tax base and rate).

The primary functions of the state are to:

- Determine operation methods and directly administer the program.
- Take claims from individuals, determine eligibility, and insure timely payment of benefits to workers.
- Determine employer liability, and assess and collect contributions.

Compensation is paid through public employment offices or other approved agencies; All of the funds collected under the state program are deposited in the Federal trust fund. All of the money withdrawn from the state trust fund account is used to pay compensation, to refund amounts erroneously paid into the fund, or for other specified activities.⁵³

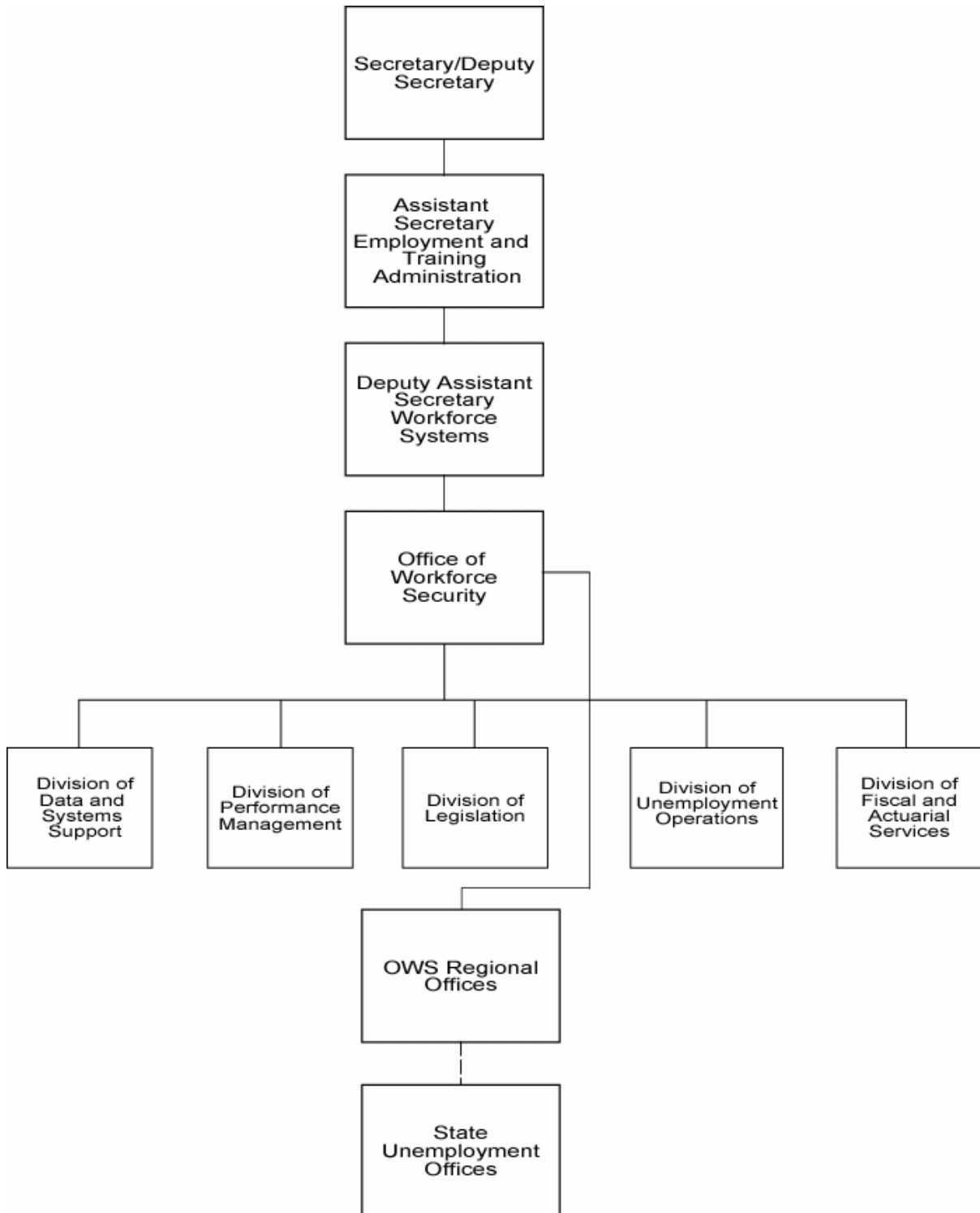
DOL is also responsible for the oversight of the quality of the States' unemployment insurance appellate processes. The responsibility within DOL for the UI program falls to the Office of

⁵³ Unemployment Insurance. Federal-State Partnership. U.S. Department of Labor. Office of Workforce Security. Division of Legislation. April 2002. <http://ows.doleta.gov/unemploy/pdf/partnership.pdf>

Workforce Security (OWS) within the Employment and Training Administration (ETA). OWS performs a variety of oversight functions:

- The *Division of Legislation*, in addition to working on Federal legislation, reviews every proposed state UI bill to ensure it is in compliance with federal law and advises states as necessary.
- The *Division of Fiscal and Actuarial Services* is responsible for providing the grant money to states for their UI administrative costs and maintains the state UI taxes held in their individual Treasury accounts. Regarding budget allocation, DOL consults with states during formulation but makes the final cuts themselves. DOL actuaries also generate revenue models based on proposed tax laws, which states can access.
- The *Division of Data and Systems Support* helps states' IT systems interface with the DOL data base.
- The *Division of Performance Management* performs quality control reviews of state decisions. The Benefits Accuracy Measurement System measures what states should be recovering in overpayments vs. what they actually recover.
- The *Division of Unemployment Operations* provides technical assistance to states regarding taxes, benefits and disaster assistance.

**Department of Labor/Unemployment Compensation
Organizational Chart**



Performance Measurement System

The national performance measurement system for Unemployment Insurance is *UI Performs*. It was designed by senior federal and state managers to provide a comprehensive overview of system operations. Among the key features of this system are:

- There are 10 key "Tier I" measures. Tier I measures represent highly significant areas of activity in the UI system, such as making benefit payments and collecting taxes promptly. All Tier I measures have uniform national performance criteria that represent minimally acceptable performance. They attempt to represent key dimensions of benefits, tax, appeals and trust fund management.
- There are over 50 "Tier II" performance measures, covering a slightly greater range of activity than Tier I measures. Although most are not as significant as "Tier I" measures, some are but do not have criteria because the measure does not have the same meaning in every state (e.g., benefit payment accuracy.) There are no required criteria for Tier II performance measures.
- The system focuses on a Plan-Do-Check-Act (PDCA) model of planning, operations, measurement and analysis of actual performance, and efforts to build improvement plans into the next planning cycle.
- Each state is required to submit an annual business plan called a State Quality Service Plan (SQSP). Through the SQSP, the state both enacts performance planning (based on both state and federal priorities) and provides assurances that it will meet federal grant requirements. All states have been using the SQSP for planning and budgeting since the FY 2001 cycle.
- Failure to attain a Tier I criterion requires a corrective action plan (CAP) in the next planning cycle.
- States are encouraged to raise performance in Tier II areas in various ways, primarily through continuous improvement plans (CIPs) in the SQSP. States whose Tier I performance already exceeds the minimum criteria are also encouraged to strive for improved performance through voluntary CIPs.
- An improvement plan can be mandatory if performance is egregiously poor (i.e., seriously out of line with the system's performance norm).
- Explains the standards for conformity and compliance and the process by which measures and criteria will be established.
- Outlines the steps to be followed through the SQSP process to improve performance
- Explains the actions that may follow for failure to improve performance and the steps that the department may take in determining whether to impose them.
- Explains reporting requirements, including report validity.

As with EPA, there are limited opportunities for MEP to adopt UC practices. The basic mission and model as well as the limited (non-regulatory) control over state partner operational issues does not offer good points of comparison for MEP.

Social Security Administration Disability Programs

The Social Security Act was signed into law on August 14, 1935, which, in addition to several provisions for general welfare, created a social insurance program designed to pay retired workers age 65 or older a continuing income after retirement. Disability-based benefits were added in the 1950's as was the requirement that determinations concerning eligibility for such benefits were to be made by the states, with funding provided by the federal government.

The Social Security Administration (SSA) is headed by a Commissioner and has a staff of over 65,000 employees within an organizational structure of 13 offices. SSA's central office is located in Baltimore, Maryland. The field organization, which is decentralized to provide services at the local level, includes 10 regional offices, 6 processing Centers, and approximately 1300 field offices. SSA also operates offices in U.S. Territories, but only state operations will be considered in this section.

Although SSA provides a variety of benefits and services, for the purposes of this study, only the disability evaluation processes, which are nationally funded programs that are administered through state offices for initial determinations, will be considered. (If decisions by state offices are contested or appealed, the issue can revert back to SSA for a decision and potentially, to federal court.)

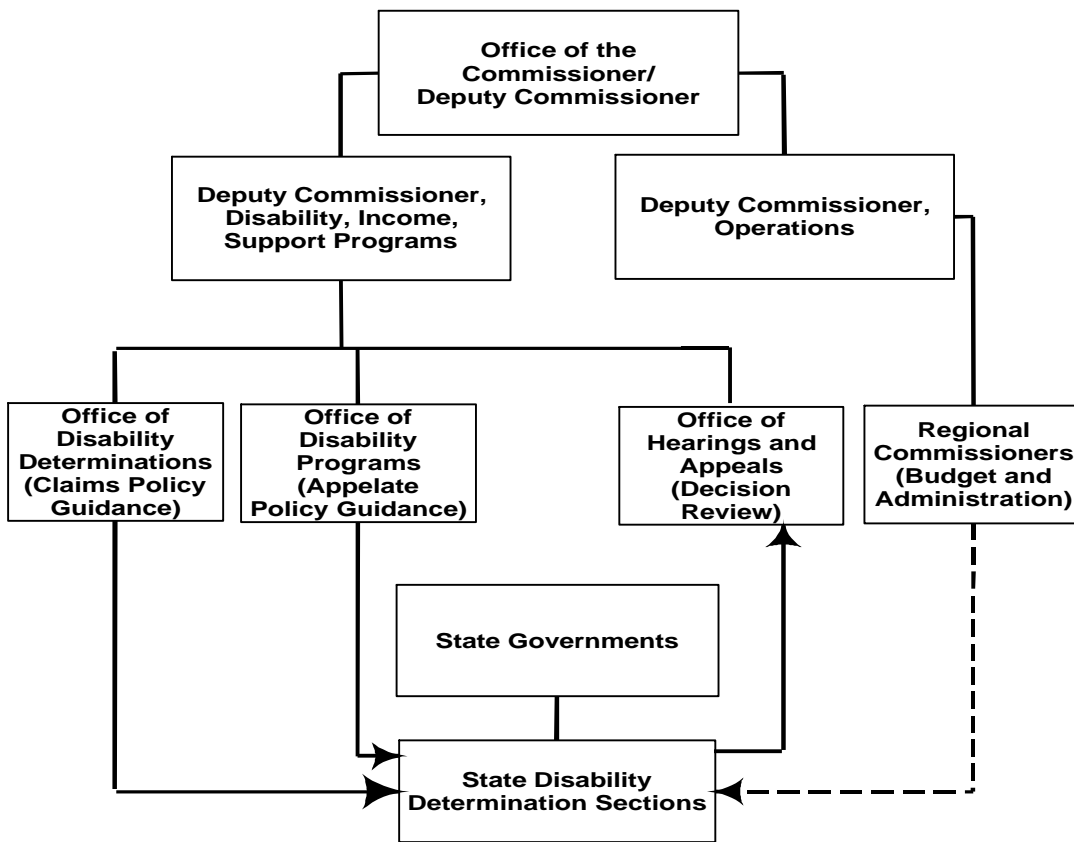
There are four separate SSA organizations that interact with state disability determination sections:

1. *The Office of Disability Determinations* provides operational standards, instructions, operational and procedural advice, technical support, and management direction to regional and field components and state agencies in support of SSA-administered disability programs. It also processes state agency workloads on a temporary or transitional basis and evaluates the impact of policy and procedural changes in state agency operations.
2. *The Office of Hearings and Appeals* administers the nationwide hearings and appeals program for SSA and provides the basic mechanisms through which individuals and organizations dissatisfied with determinations may administratively appeal these determinations.
3. *The Office of the Regional Commissioner* serves as the principal SSA component at the regional level and assures effective SSA interaction with other federal agencies in the regions; state welfare agencies; State Disability Determination Services (DDSs); and other regional and local organizations. The office is responsible for regional planning, implementation and evaluation of Agency goals and objectives and implements national operational and management plans for providing SSA service to the public. It facilitates integration and coordination of SSA programs with other federal and state programs in the region and provides overall management direction for the provision of personnel services and administrative priorities. The office maintains a broad overview of administrative operations of the regional offices (ROs) of SSA's Office of Hearings and

Appeals and a data operations center to ensure effective coordination of SSA activities at the regional level.

4. *The Office of Disability Programs* plans, develops, evaluates and issues the operational and administrative appeals process policies, standards and instructions for the SSA administered disability programs. It also develops and promulgates policies and guidelines for use by state, federal or private contractor providers which implement the disability provisions of the Social Security Act.

SSA Organizational Chart



The initial disability determinations for the Social Security Disability Program or the Supplemental Security Income Program are made by the state Disability Determinations Sections. These state offices have the following characteristics:

- Each state has at least one office with some states having multiple offices. (Multiple office states report back to SSA through a single entity.)
- States can opt for which part of the state government (e.g. labor, disabilities) within which the DDS' function.
- Workload and staffing budget projections are developed by SSA Headquarters and are provided to Regional Commissioners who in turn, provide the same to the states.

After discussions between SSA HQ, Regional Commissioners and the effected states, a final budget figure is arrived at for each state.

- SSA provides complete funding for these state operations, including salaries, space, heat, light, equipment, information technology, etc.
- Ultimately, a draw-down agreement is created between the Regional Commissioner and the states. This is the revenue source for each state DDS during the fiscal year.

The Regional Commissioner's Office provides the primary SSA oversight on the operations of state DDS' but does not have direct authority over these offices. SSA establishes national policies for the programs which are promulgated to the states. The Office of Disability Determinations provides guidance on claims processing while the Office of Disability Programs provides guidance for appellate issues. While SSA *does not* have any direct line responsibility for the state-based offices, it does monitor state spending and quality levels for the disability decisions. For example, if the quality level of a state DDS dips below a pre-set target for two review cycles, an automatic SSA technical review is initiated. If problems persist, help teams are sent in.

SSA also conducts security audits and IG audits of the DDS' and states provide disability investigation units.

Although SSA does not provide direct supervision of state offices, it does sometimes sit in on the selection of the state disability executives and helps in their training. For persistent problems in a state office, the Regional Commissioner brings the problems to the attention of someone higher in the state structure, up to and including the governor's office.

SSA provides the basic information technology system for each state office. The offices are allowed to select one of three approved front-end systems to interface with the SSA mainframe computers. SSA also pays for the development of the interface software ('middleware') used to link the state and federal systems.

In sum, SSA pays the bills, provides the equipment and technology, sets the policies and monitors the outcomes of the processes but does not directly control operations at the state DDS unit level. Even without direct control, however, the program does ensure the outcomes of state activities by providing strong oversight, using a variety of mechanisms, of both operational and administrative activities in the state offices.

SSA does provide a good example of how a Federal program can closely monitor output performance in state organizations without having direct control over operations. As mentioned in Chapter 2, while a focus on outcome/strategic measures is desirable, focusing on these measures alone to the exclusion of other (tactical) measures may inhibit the ability to ensure and maintain a cohesive and integrated network of Centers.

Department of Veterans Affairs State Approving Agencies

To receive VA education benefits, a veteran must be enrolled in an approved educational, vocational, or job training program. The approval of these various programs is the responsibility of the state in which the schools or job training establishments are located. The Department of Veterans Affairs (VA) pays approximately \$18 million per year to states to review and approve programs of education and training for veterans. The governor of each state designates the supervising organization that has responsibility for this function but in each case, it is designated as the *State Approving Agency (SAA)*.

Arising out of the post-World War II G.I. Bill, the SAA system was built to provide state (vs. Federal) control over programs of education for veterans. The Federal government bears the entire costs of the system and establishes the rules, through regulation, of the types of programs which can be approved. The SAAs work directly with the schools, training institutions and employers (on-job training and apprenticeships) to issue the approvals.

Using a funding formula driven by anticipated costs, VA determines the annual SAA budgets and administers them through contracts with the states. VA can, and sometime does, rescind the contract of a state, in which case, the approval function for that jurisdiction falls to VA.

VA uses a field-based structure for interacting with SAAs on administrative and operational issues while the Headquarters develops policies and oversees the contracting process. VA Regional Offices, which are located in every state, house an Education Liaison Representative (ELRs) who works directly with their state's SAA. Although they are located within a Regional Office, they report to a Chief Education Liaison Officer at one of the facilities which actually pays the benefits to veterans—a Regional Processing Office.

ELRs also work with schools and training establishments, particularly regarding the interpretations of VA rules and policies. They serve as a nexus for the sometimes complex interactions of the Federal/state/school/veteran interests that arise in this process.

ELRs also perform Compliance Inspections to ensure that facilities previously approved for veterans' training are continuing to follow VA policies. VA has the authority to hold the schools financially responsible for any erroneous payments that arise from a failure to follow regulations.

SAAs inspect schools and job training establishments to determine whether or not their programs meet VA requirements. They are required by VA regulations to maintain written records of the approvals and any subsequent modifications to them as well as the obligation to notify all appropriate parties of the modifications.

SAAs must submit a Quarterly Report of State Approving Agency Activities, showing the number of inspection, approval, and supervisory visits. ELRs review the reports for accuracy, and ask SAAs to make any necessary corrections, and forward copies of the reports to VA Headquarters. Federal law also requires VA to perform annual evaluations of each SAA's performance, qualifications, and the performance of its personnel. The qualifications and

performance standards are based on standards developed jointly by VA and the National Association of State Approving Agencies (NASAA.)

All SAAs are members of the NASAA,⁵⁴ a membership organization which works to help SAAs improve their individual operations, expand the programs of education available to veterans and to advocate for G.I. Bill programs. VA and the NASAA developed the NTC (National Training Curriculum) for the training of SAA employees.

VA conducts, in conjunction with the NASAA, an annual evaluation of each SAA. The Joint Peer Review Group (JPRG), which consists of two VA and two NASAA employees, perform the evaluation using the following criteria:

- (1) SAA's Plan of Operation.
- (2) SAA's Performance Standards.
- (3) SAA Self-Evaluation.
- (4) Regional Office Assessment.

Each SAA is assigned a rating of satisfactory, minimally satisfactory, or unsatisfactory, based on the self-evaluation and the ELR assessment. If the JPRG assigns a minimally satisfactory or unsatisfactory rating, then:

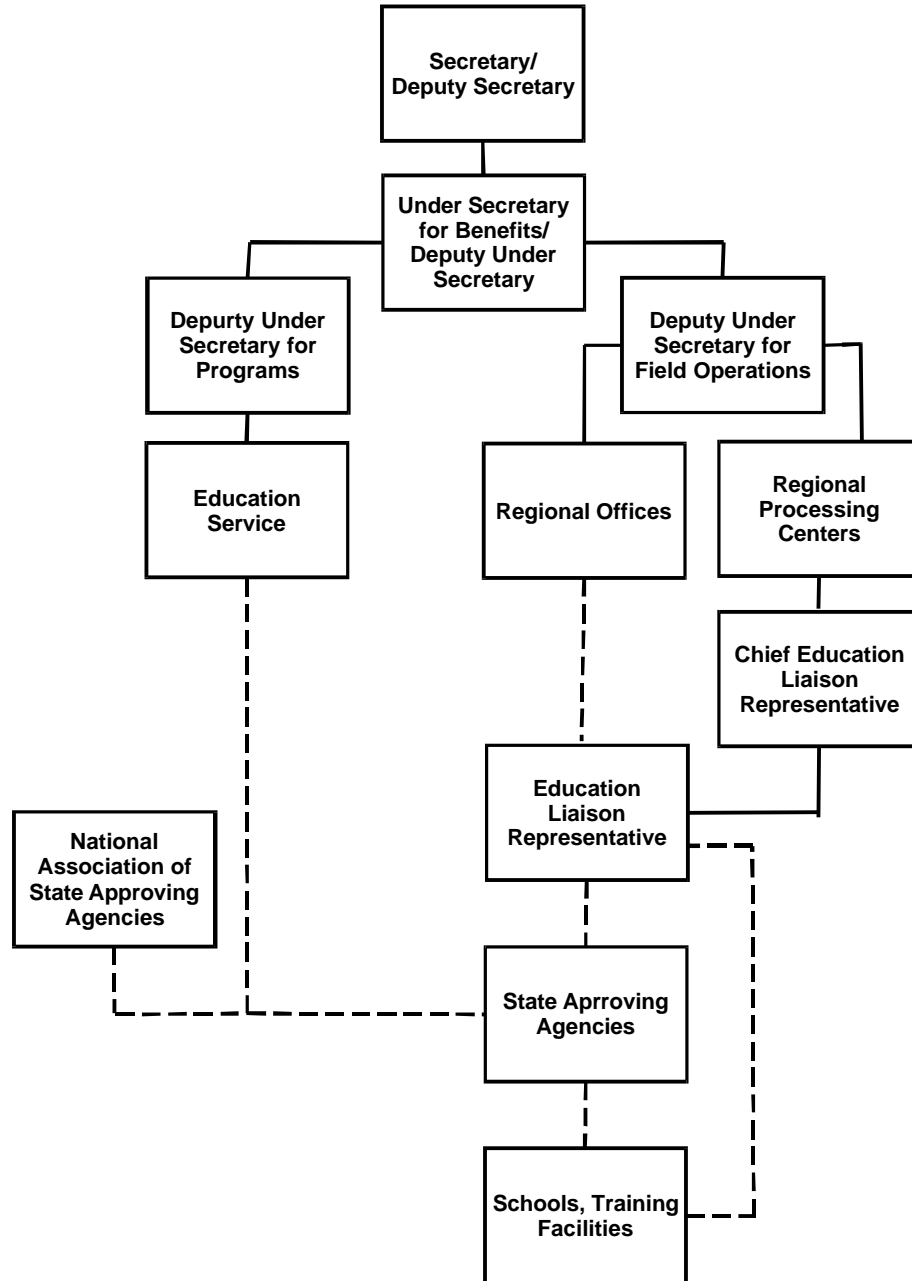
- It must identify goals and objectives for SAAs to improve their ratings.
- SAAs remain in a probationary status until their performance improves.
- If their performance does not improve, VA may decline future contracts with that agency.
- The JPRG must offer SAAs assistance from training teams and must schedule visits within 30 days of the rating.
- Training teams must conduct visits within 60 days.
- SAAs can appeal rating which then triggers an internal VA appeals process⁵⁵

The following organizational chart shows the relationships that exist to accomplish the approval of educational programs for veterans.

⁵⁴ <http://www.saavetrain.org/index.htm>

⁵⁵ Source: VA Manual M22-4, Part IX. March, 1998.

VA/SSA Organizational Chart



APPENDIX C

ORGANIZATIONS WITH WHOM MEP COULD ENHANCE ITS PARTNERING AND COLLABORATING RELATIONSHIPS

There are significant opportunities for the MEP Program to partner and collaborate with other organizations, not only to facilitate mission delivery but also to leverage scarce resources. This applies to organizations within the Department of Commerce (DOC) as well as other Federal agencies and non-Federal organizations. The need to explore these potential partnerships was a recommendation of a recent Department of Commerce Report on Manufacturing:⁵⁶

The National Institute of Standards and Technology, in collaboration with other federal agencies, and national laboratories, should explore the opportunity for establishing cooperative research programs on innovative manufacturing technologies among national laboratories, universities, the SBIR program, community colleges, and state and local technology development associations. The objective should be to develop a working model of such arrangements that would provide the rapid diffusion of research successes into the private sector, provide access for small entrepreneurial businesses to sophisticated research tools, and provide training opportunities, such as for future nanotechnologists and nanomanufacturers. The current pace of technological change places a premium on expediting such initiatives.

This section will explore some organizations the MEP Program could potentially partner with to help improve the productivity of small manufacturers.

Small Business Administration

In addition to the financial assistance it makes available to small businesses,⁵⁷ SBA, as the Nation's primary source of assistance to small business, offers a variety of business counseling and training assistance that are available to small manufacturers and complement the MEP program.

Small Business Development Centers (SBDC)

As discussed above, the SBDC Program provides cost-free counseling, training and technical assistance to small businesses with financial, marketing, production, organization, engineering

⁵⁶ Manufacturing in America. A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers. U.S. Department of Commerce Washington, D.C. January 2004.
http://www.commerce.gov/DOC_MFG_Report_Complete.pdf

⁵⁷ In 2002, the SBA backed more than \$12.3 billion in loans to small businesses, more than \$1 billion was made available for disaster loans and more than \$40 billion in federal contracts were secured by small businesses with SBA's help. Source: SBA web site: <http://www.sba.gov/aboutsba/history.html>

and technical problems and feasibility studies. Although the SBDC mandate includes all small businesses, in Fiscal Year 2002, services were provided to 22,612 small manufacturers. While this type of assistance is not typically provided to the depth and breath of the typical MEP intervention, it is clearly an area of opportunity for expanding and enhancing the services provided by each organization—MEP and SBDC. The research conducted by the Study Team found that while there is some partnering done by individual MEP and SBDC offices, there is no headquarters-to-headquarters relationship. A senior SBDC official indicated an interest in working more closely with the MEP Program.

SBA's Office of Technology

SBA views this program as a highly competitive program that encourages SMEs to explore their technological potential and provides the incentive to profit from its eventual commercialization. This office has pioneered the Federal and State Technology Partnership program (FAST). The objective of FAST is to strengthen the technological competitiveness of small business concerns in all 50 states, through a competitive state matching grant program in support of the SBIR program.

U.S. Export Assistance Centers (USEAC)

U.S. Export Assistance Centers, which are located in major metropolitan areas throughout the United States, provide small- or medium-sized business with local export assistance. Assistance is provided by a partnership which includes the Small Business Administration, Department of Commerce, the Export-Import Bank and other public and private organizations.

Export Legal Assistance Network (E-LAN)

SBA, in conjunction with DOC, offers free initial consultations with international trade attorneys from the Federal Bar Association to small businesses interested in starting export operations.

Service Corps of Retired Executives (SCORE)

The Service Corps of Retired Executives (SCORE Association), headquartered in Washington, D.C., is a nonprofit association with 389 local chapters and 10,500 retired and working volunteers that provides free business counseling and advice to small businesses. SCORE is a resource partner with SBA.

Business Information Centers (BIC)

Business Information Centers (BICs) provide high-technology hardware, software, and telecommunications to assist small businesses. BICs use personal computers, graphic work stations, CD-ROM technology, and interactive videos that allow the small business owner access to market research databases, use of planning and spreadsheet software, and use of libraries of information to help them start or build their businesses. The BICs also offer one-on-one counseling with business veterans through SCORE.

Women's Business Centers (WBC)

Women's Business Centers promote the growth of women-owned businesses through programs that address business training and technical assistance, and provide access to credit and capital, federal contracts, and international trade opportunities. There is a women's business ownership representative in SBA district offices, a nationwide network of mentoring roundtables, women's business Centers in nearly every state and territory, women-owned venture capital companies, and an Online Women's Business Center.

Veterans Business Outreach Centers (VBOC)

Veterans Business Outreach Centers provides services such as business training, counseling and mentoring to eligible veterans owning or considering starting a small business.

Small Business Innovation Research Program (SBIR) and Small Business Technology Transfer Programs (STTR)

SBIR is a competitive program that encourages small businesses to explore their technological potential and provides the incentive to profit from its commercialization. SBIR targets the entrepreneurial sector. However, the risk and expense of conducting serious R&D efforts are often beyond the means of many small businesses. By reserving a specific percentage of federal R&D funds for small business, SBIR protects the small business and enables it to compete on the same level as larger businesses. SBIR funds the critical startup and development stages and it encourages the commercialization of the technology, product, or service.

The SBIR Program is coordinated by the Small Business Administration. However, there are ten federal departments and agencies which are required by SBIR to reserve a portion of their R&D funds for award to small business.

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Education
- Department of Energy
- Department of Health and Human Services
- Department of Transportation
- Environmental Protection Agency
- National Aeronautics and Space Administration
- National Science Foundation

STTR expands funding opportunities in the federal innovation research and development arena. Central to the program is expansion of the public/private sector partnership to include joint venture opportunities for small businesses and the nation's premier nonprofit research institutions. STTR is a competitive program that reserves a specific percentage of federal R&D

funding for award to small business and nonprofit research institution partners. The risk and expense of conducting serious R&D efforts can be beyond the means of many small businesses. Conversely, nonprofit research laboratories are instrumental in developing high-tech innovations. But frequently, innovation is confined to the theoretical, not the practical. STTR attempts to combine the strengths of both entities by introducing entrepreneurial skills to high-tech research efforts. The technologies and products are transferred from the laboratory to the marketplace. The small business profits from the commercialization, which, in turn, stimulates the U.S. economy.

SBA also coordinates the STTR program, and as with SBIR, there are other federal agencies which are required by STTR to reserve a portion of their R&D funds for award to small business/nonprofit research institution partnerships.

- Department of Defense
- Department of Energy
- Department of Health and Human Services
- National Aeronautics and Space Administration
- National Science Foundation

These agencies designate R&D topics and accept proposals and make awards based on small business qualifications, degree of innovation, technical merit, and future market potential. The STTR Program also considers the nonprofit research institution's qualifications. Small businesses that receive awards or grants then begin a three-phase program.

- Phase I is the startup phase. For SBIR, awards are granted for up to \$100,000 for approximately 6 months to support exploration of the technical merit or feasibility of an idea or technology. For STTR, awards of up to \$100,000 are given for approximately one year to fund the exploration of the scientific, technical, and commercial feasibility of an idea or technology
- For SBIR, Phase II awards of up to \$750,000, for as many as 2 years, expand Phase I results. STTR awards can be granted up to \$500,000. During this time, the R&D work is performed and the developer evaluates commercialization potential. Only Phase I award winners are considered for Phase II.
- Phase III is the period during which Phase II innovation moves from the laboratory into the marketplace. No SBIR funds support this phase. The small business must find funding in the private sector or other non-SBIR federal agency funding.

SBA directs the participating agencies and departments' implementation of SBIR/STTR, reviews their progress, and reports annually to Congress on their operation. SBA is also the information link to SBIR/STTR. SBA collects solicitation information from all participating agencies and publishes it quarterly in a Pre-Solicitation Announcement (PSA). The PSA is a single source for the topics and anticipated release and closing dates for each agency's solicitations.

The SBIR/STTR Programs offer excellent opportunities for MEP to partner and collaborate. SBA is a good place to start but each of the agencies that participate in the Programs is also a potential partner. This is particularly important if MEP decides to build an R&D capability as

mentioned in the discussion of the Agricultural Extension Program. The Manufacturing Study also speaks to this issue: “*SBIR and STTR should place a higher priority on manufacturing R&D topics that would greatly leverage innovation in small and medium-size manufacturing companies.*”

Department of Agriculture

The Department of Agriculture’s Technology Transfer Information Center (TTIC) represents another potential partner for MEP. The TTIC helps promote the rapid conversion of federally developed inventions into commercial products by “getting the results of research into the hands of the SMEs that can put them to practical use.” They accomplish this through their Information Support System for Agriculture Research Service (ARS), which performs services such as:

- Providing a search service for national and international patent databases to optimize marketing and licensing of new technologies.
- Working with industry associations to identify and prioritize research needs, crisscrossing the federal labs, the university and private research systems to identify potential technologies to meet industry priority needs.
- Evaluating the technologies and documenting the findings in state-of-the-art reports and disseminating these reports to the appropriate industry sectors.

Federal Laboratories Consortium

The Federal Laboratories Consortium (FLC) was established in 1974 and charged by Congress to facilitate the transfer of federally developed technologies to the U.S. marketplace. Every federal lab is assessed a fee for the FLC. The fees amount to \$2 million a year. More than 700 federal labs and engineering Centers are members of the FLC.

The FLC is a professional networking organization. Its primary goals are to:

- Develop and test technology transfer methods
- Address barriers to the technology transfer process
- Provide training in technology transfer mechanisms
- Highlight grassroots technology transfer efforts
- Emphasize national initiatives in which technology transfer plays a role.

The FLC provides a free lab locator service that will locate the specific federal resource, technology or expertise that is needed. A technical request form can be submitted on line or through a toll free number.⁵⁸ The site also provides federal technologies available for licensing, information about technology transfer, links to other federal technology web sites, recent tech transfer success stories and information on FLC services and member labs.

⁵⁸ www.federallabs.org

As part of their annual meetings the FLC provides training on the fundamentals of technology training to new representatives. A FLC representative said that FLC would consider providing customized training to MEP staff on how to take advantage of the Federal Labs. The FLC publishes a “Technology Transfer Desk Reference” booklet that supplements their training as well as the “Federal Technology Transfer Legislation and Policy” booklet which provides a summary of all the significant technology transfer legislation and executive orders. While the Panel recommends that the MEP Program become more involved in technology diffusion (vs. technology transfer), it is still felt that the FLC could prove to be an important resource for identifying technology which is ready, or close to ready, for adoption by SMEs.

National Labs

The Oak Ridge National Lab is an example of one of the national labs that has specific programs to assist SMEs. The ORNL model for technology transfer includes a number of specialized offices that are designed to holistically address the issue. They have a commercialization manager’s office, where an expert is assigned to each research area to help the interested SME gain access to the latest technology and scientific expertise at ORNL laboratories. An office of Economic Development conducts educational seminars and matches businesses with their expert scientific staff. The ORNL also has a Center for Entrepreneurial Growth, whose mission is to create an entrepreneurial climate and improve the dissemination of the technology to SMEs by:

- Helping to identify technologies with commercial potential and marketing these opportunities to targeted groups
- Conducting workshops and monthly seminars describing technology related entrepreneurial experiences
- Providing access to emerging technologies and business counseling and even providing incubator space to SMEs.

The MEP Program could play an important role in bringing the National Labs and the technology needs of SME’s together. If technology diffusion is adopted as a central focus of MEP, such collaboration would be essential.

The Department of Commerce

Trade Adjustment Assistance Centers

The recently-released DOC manufacturing report,⁵⁹ states that there is a need to: “coordinate MEP fully with other Commerce Department programs that are helping manufacturers to be more competitive and expand markets.” One such program within Commerce is Trade Adjustment Assistance for Firms (TAA). This program also provides financial assistance to manufacturers, specifically, those affected by import competition. TAA pays for half the cost of consultants or industry-specific experts for projects that improve a manufacturer’s competitiveness.⁶⁰

Import-impacted manufacturers can receive matching funds for projects that strengthen operations and sharpen competitiveness through Trade Adjustment Assistance for Firms (TAA) managed through a network of twelve regional, Trade Adjustment Assistance Centers (TAACs).

TAA offers 50/50 cost sharing of projects aimed at improving a manufacturer’s competitive position. These matching funds are applied toward the cost of consultants, engineers, designers or industry experts for improvement projects in areas such as manufacturing, engineering, marketing, information technology and quality. TAA pays for half of the cost of these services, up to \$150,000 in projects with a maximum TAA share of \$75,000.

TAAC Centers offer many of the same types of assistance as MEP centers, including:

Manufacturing Assistance

- ISO/QS 9000 Preparation & Registration
- Product Development
- Product Certification—CE Mark, UL, etc.
- Manufacturing Technology Review
- Process Engineering
- Inventory Management
- Work Methods and Standards
- CAD/CAM Selection and Implementation
- Quality Assurance
- Product Design & Testing
- Operations Analysis
- Productivity Improvement
- Production Planning, Scheduling & Control
- Statistical Process Control
- Facility & Equipment Review, Selection & Layout
- Material Handling Methods

⁵⁹ Manufacturing in America. A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers. U.S. Department of Commerce Washington, D.C. January 2004.
http://www.commerce.gov/DOC_MFG_Report_Complete.pdf

⁶⁰ See: <http://www.taacenters.org/index.html>

Marketing Assistance

- Market Research
- Advertising/Sales Promotion/Brochure Development
- Distribution Analysis & Development
- Sales Force Management Programs
- Analysis of Competition
- Customer Service Analysis
- Marketing and Sales Strategy
- Web Site Development
- Distributor/Sales Representative Search
- Product Line Evaluation
- Export Development

Financial and General Management

- Profit Planning/Cash Management/Budgeting
- Cost Management
- Strategic Planning
- Organizational Analysis
- Customized Training Program Development and Implementation
- Succession Planning
- Debt Restructuring
- Quality Management
- Expansion, Diversification & Divestiture Studies
- Human Resources Planning & Executive Search
- Compensation and Incentive Programs

Information Technology

- Hardware/Software Evaluation & Recommendation
- Custom Programming
- Electronic Data Interchange (EDI)
- E-Commerce
- System Conversion/Enhancements Recommendation
- Integrated Manufacturing Systems
- Office Automation

Given the similarity of their respective missions, the types of assistance offered to small manufacturers and the fact that they both work for the same agency, establishing a closer working relationship with TAA should be a significant opportunity for improvement for MEP officials.

International Trade Administration

There are other programs within the Department of Commerce which offer collaborative opportunities for MEP. The Manufacturing Study⁶¹ highlights one such program:

The administration proposes to coordinate MEP fully with other Commerce Department programs that are helping manufacturers to be more competitive and expand markets. Through this coordination, the Commerce Department can more closely link the technical and business staff employed by the MEP centers located around the country with trade promotion specialists in the Commerce Department's International Trade Administration who are working with the proposed new Assistant Secretary for Manufacturing and Services. In addition, the ITA has experts with in-depth knowledge of and connections with various sectors of industry—automotive, textiles and apparel, energy, aerospace, machinery, metals, and microelectronics, to name a few. With a direct teaming of MEP field agents and these sector experts, the program can be a more effective national resource to help small manufacturers compete and succeed in the global marketplace.

The Panel believes that the opportunity for teaming with the ITA should be vigorously pursued by MEP. This not only can add expertise to the knowledge base of the system, it can provide a greater capability for developing network-wide capabilities.

Advanced Technology Program

The Advanced Technology Program (ATP) also a part of NIST provides early stage investment to accelerate the development of innovative technologies that promise significant commercial payoffs and widespread national benefits. ATP partners with companies of all sizes, universities and non-profits. More than half of the ATP awards have gone to individual small businesses or to joint ventures led by a small business. Large firms also work with the ATP, especially in joint ventures, to develop critical, high-risk technologies that would be difficult for any one company to justify because, for example, the benefits spread across the industry as a whole.

A recent NIST study was conducted to evaluate the feasibility of the MEP centers serving as a vehicle to accelerate the diffusion of ATP technologies to SMEs. By developing and implementing pilot diffusion plans for selected ATP-funded technologies, the project was designed to accomplish the following:

- Develop a screening process to identify advanced technologies that may be suitable for diffusion to SMEs,
- Evaluate the utility of cross-functional teams selected from multiple MEP Centers and ATP technology developers in the technology diffusion process, and

⁶¹ Manufacturing in America. A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers. U.S. Department of Commerce, Washington, D.C., January 2004.

- Identify key success factors and significant obstacles to effective diffusion of selected ATP technologies to SMEs through the MEP system.

Conducted over several years, the study identified key success factors for screening advanced technologies to identify those with potential for diffusion as well as obstacles to the diffusion of these technologies to SMEs. Perhaps the most significant conclusion of the study was that MEP involvement can accelerate the diffusion of advanced technologies to SMEs.

There has been little discernable effort by either MEP or ATP to implement the recommendations of the study. However, the study appears to have been well-researched and involved senior staff from both Programs and the Study Team believes that it could provide the basis for a future collaboration between MEP and ATP.

APPENDIX D

MEP CENTER PERFORMANCE ASSESSMENT

The MEP program management staff collects an extensive array of data on the activities of each center which is accessible through an internal Web site (*MEP Source for Centers*). The data is collected on a quarterly basis.

Prior to March 2003, the performance of centers was assessed based on a series of reviews that are described in pages 37-40 of the first report of this study. In March of 2003, the MEP Staff implemented a new set of performance assessment measures that are called the Minimally Acceptable Impact Measures (MAIM). According to the implementation policy document, the intent is for MEP to monitor and manage a center based primarily on the aggregate score of five quantitative components. In September of 2004 the “Customer Satisfaction” score will be replaced with a new measure, “Percent Quantified Impact.” The five current and future components as described in the MEP Implementation Policy Document are as follows:

Measures From 3/31/03 Thru 9/29/04

1. Bottom-line Client Impact Ratio
2. Cost per Impacted Client
3. Investment Leverage Ratio
4. Survey Response Rate
5. Customer Satisfaction Score

Measures as of 9/30/04

1. Bottom-line Client Impact Ratio
2. Cost per Impacted Client
3. Investment Leverage Ratio
4. Survey Response Rate
5. Percent Quantified Impact

Below is a description of how these measures are calculated and in general, what they indicate in terms of center performance.

1. **Bottom-line Client Impact**: The sum of cost savings (cost savings, avoidance of unnecessary investments, and savings on investments) reported by clients plus 15 percent of total sales impact (new sales and retained sales) reported by clients divided by the federal investment in a center. This measure was designed as a proxy measure of the bottom-line impact on the client of the services delivered by a center. Only 15 percent of the sales impact is captured in order to reflect an estimate of the gross margins for all manufacturers based on an analysis of data from the 1998 Annual Survey of Manufacturers published by the US Census Bureau. This indicator provides a measure of new and retained resources available to a firm that could result after the services are delivered.
2. **Cost per Impacted Client**: The federal investment in a center divided by the total number of clients responding to the survey that reported some business impact such as: an improvement in their profit margin; sales impact; jobs impact; cost savings; increase in sales per employee; new investment; avoidance of unnecessary investments; or, savings on investments. This measure provides an indicator of a center’s ability to efficiently generate client impacts.

3. Investment Leverage Ratio: The sum of new investment reported by clients (defined as new investment in plant and equipment, information systems and software, workforce skills and practices, and other areas) divided by the federal investment in a center. Investing in human and physical capital is an important ingredient in improving the productivity and competitiveness of small manufacturers. Investment leverage ratios are a commonly used performance metric in economic development programs.

4. Survey Response Rate: The number of clients completing the survey divided by the number of clients selected to be surveyed. The survey response rate is felt to be a good alternative indicator of customer satisfaction that provides a measure of the number of clients who are willing to respond to the survey in comparison to the number that do not respond.

5. Customer Satisfaction Score: **[Drops from MAIM calculation 9/30/04]**
 The average customer satisfaction score reported by clients responding to the survey. Clients are asked to rate their satisfaction with the services provided on a scale of 1 (very dissatisfied) to 5 (very satisfied). Responses are summed across all clients and divided by the number of clients responding to the survey. This measure has the advantage of providing a simple numerical summary but does not indicate how the responses were distributed. The rank order correlation among the centers in terms of the customer satisfaction score and the tails of the distribution (i.e., the percent of clients reporting that they were very or somewhat satisfied and very or somewhat dissatisfied) are positive and statistically significant. While some consider client satisfaction more of an intermediate outcome, there is a strong correlation between customer satisfaction and customer impacts. This indicator recognizes that the survey question only asks for overall satisfaction and that the lag between when the survey is conducted and when the services were provided may have a greater effect on the client's response to this qualitative question than it has on the more quantitative responses reflected in other measures.

5. Percent Quantified Impact: **[Included in MAIM calculation 9/30/04]**
 The number of clients providing a quantified impact amount in at least one of the questions asking for quantification of impact (i.e., sales increase, creation of jobs, sales retention, retention of jobs, cost savings, investment in plant or equipment, investment in information systems, investment in workforce practices, other investment, avoidance of unnecessary investments, and savings on investments) divided by the number of clients selected to be surveyed. This indicator provides a measure of the breadth of impacts, thus is a compliment to the investment leverage ratio which is a measure of the size of impact.

The minimally acceptable level of performance and weighted score for each measure is provided in the table below. The five measures have scores weighted to reflect their relative importance to the overall picture of client impact. More weight is placed on client impacts and cost per impacted client than on the other indicators.

Performance Metric	Bottom-line Client Impact Ratio	Cost Per Impacted Client	Investment Leverage Ratio	Survey Response Rate	Customer Satisfaction Score [drops 9/30/04]	Percent Quantified Impact [added 9/30/04]
Minimally Acceptable Level	3.00	\$31,000	3.00	70 %	4.2	32 %
Weighted Score	30	30	20	10	10	10

A center is “scored” on each measure and the scores for each measure are combined into a total score for the center. A rolling four-quarter average is used as the basis for examining center performance against these standards. If a center meets or exceeds the minimally acceptable level of performance for a particular measure, they receive all the points assigned to that measure. If they do not meet or exceed the minimum performance level for a particular measure, they do not receive any of the points assigned to that measure. Aggregate scores can range from a minimum of 0 (failing to meet the minimum threshold for each of the five indicators) to 100 (meeting or exceeding the minimum threshold for all five indicators). A center with an aggregate score of 70 or more is considered to have met the MAIM requirements.⁶²

One of the limitations of the current measurement system is that it does not allow for meaningful distinctions in the performance of the centers. If a center achieves the minimum score for one of the indicators they receive all of the points allocated for that measure, while a center that far exceeds the minimum level receives the same number of points. For example during the 36 month period from July 1, 2000 through June 30, 2003 the acceptable scores (minimum ratio of 3.0) for the Bottom Line Impact Ratio indicator ranged from 3.34 to 34.71. Under the current system the center with the 3.34 score and the center with the 34.71 score both received 30 points. The acceptable scores (3.0 minimum) for the Investment Leverage Ratio for the same period ranged from 3.35 to 35.64.

The MEP staff is in the process of developing a revised system that would allocate points based on a graduated scale that would begin to make the kind of distinctions that the Academy Panel

⁶² The source of this description of the Minimally Acceptable Impact Measures and the methodology used to calculate an aggregate score was drawn from the October 6, 2003 MAIM Implementation Policy

believes are necessary to adequately distinguish between the various levels of performance that exist throughout the 59 centers⁶³ today.

For the purposes of evaluating the relative performance of the 59 centers, the NAPA study team adopted a modified version of the Performance Management Index that the MEP Staff has been developing. Under this modified system, centers receive an additional 50 percent of the points allocated under the MAIM system if they were above the 50th percentile for an indicator and another 50 percent if they were above the 75 percent percentile for the scores in an indicator. The maximum score under this system is, therefore 200 points as compared to the 100 points allocated under the MAIM system. The team also used the measures that will go into effect on September of 2004. The following table shows how points were allocated under this system:

Indicator	Met Threshold	Between 50th & 75th Percentile	Above 75th Percentile
Cost Per Impacted Client	30	45	60
Bottom Line Impact Leverage	30	45	60
Investment Leverage	20	30	40
Completion Rate	10	15	20
Percent Qualified Impact	10	15	20

This approach allowed the team to stratify the performance of the 59 centers.

The team used the most recent 12 month data available (7/1/02 thru 6/30/03) as well as the cumulative data for the last 3 years (7/1/00 thru 6/30/03) to identify the top performers as well as the low end performers based on MEP’s data. The short and medium range periods were used to identify stations that are currently high and low end performers and which have also demonstrated sustained high or low performance over the past 3 years.

There were 8 centers that were in the top 15 for both periods of time and 11 centers that were in the bottom 15 for both periods. The team had to exclude Colorado which was in the bottom 11 because of a problem that the MEP staff has in obtaining discrete data for centers in Wyoming and Colorado. These two centers are part of a consortium with the Kansas Center, which provides the administrative support for the 3 centers. This is an issue that the MEP program management staff needs to address, since there are separate cooperative agreements with each center and a breakout of the underlying performance data is necessary to adequately analyze the performance of each center

Based on the interviews with center directors and the review of the performance management index scores and other performance indicators, the study team found a wide range of variation not only in performance but also in organizational structure, funding levels, use of 3rd party consultants, market penetration, and several other indicators.

⁶³ There is one center in each state (including Puerto Rico for 51) plus multiple centers in PA: 6 (+5), CA: 2 (+1), WI: 2 (+1), IL: 2 (+1) for a total of 59 centers. Only 58 Centers could be evaluated since survey data for South Dakota was not available because services were not provided during the survey period when the South Dakota Center was replaced with a new organization. When the study began there were 60 centers.

Concerns and Observations about the Survey Process

All of the MAIM outcome measures are derived from the results of the nationwide survey that is conducted by a third party contractor. The current contractor is Synovate. The survey is conducted approximately one year after a project is completed. The survey is focused on outcomes and is very consistent with the objectives of the Government Performance and Results Act. The study team, however, does have some concerns about the process itself which could potentially lead to biased results.

As part of the survey process, the MEP center staffs telephone the clients one week before a letter is released by the contractor that reminds the client that they will be contacted by the survey firm. According to the NIST MEP Management Information Reporting Procedures manual, the purpose of this call is to:

1. Re-establish the relationship with the client
2. Discuss how project impacts have played out
3. Remind the client about the survey and discuss how to quantify impacts
4. Market the next project

Although staff are told not to pressure a client to report quantifiable impacts if the client is uncomfortable in doing so, or to tell the client how to answer the survey, the proximity of this call to the survey creates at the very least the perception that there is the potential for manipulation of the results.

The following statement was taken from a document on best practices for the survey process which describes how one center requires their “manufacturing extension agents” (MEA) to make a personal visit to the client right before the survey:⁶⁴

About the time clients receive their survey letter, MEAs go to their clients to do the following: 1) give them a copy of the Closure Form; 2) review the NIST MEP Impact Survey; and 3) offer assistance as they prepare for the survey.

The Study Team believes the process could be improved by developing a standardized process as part of the initial engagement activities. As part of this process field staff would work with their clients to identify the appropriate baseline metrics and expected financial benefits that the company expects to achieve as a result of the services provided by the MEP Staff. The process would include completing an expected benefits form which would also be used as part of the exit briefing. During the exit briefing with the appropriate company official, the MEP staff would review the expected benefits and discuss how they can be tracked. The form would then be scanned or the data entered into the MEP data base and become the focus for the survey questions one year later to determine not only the amount of quantifiable impact but the degree to which the objectives were met on a sliding 5 point scale. A more customized survey would avoid the need to ask questions about impacts that were not related to the engagement. For

⁶⁴ MEP Client Survey Distinctive Practices, undated document on the Resources Page of the MEP Extranet site—MEP Source for Centers.

example question #5 asks a series of questions about changes in the area of information systems. If the project did not involve changes to the information systems, the questions should be deleted from the survey for that particular company.

There are some centers that currently use a standardized (for their center only) form for the purpose of identifying expected benefits at the beginning of their engagement.

In discussing how one of the larger consulting firms handles this issue, one of the Academy Panel members stated that his company has developed a model (the Enterprise Value Creation Model) to estimate the return on investment that a company expects to achieve as a result of the services provided by his firm.⁶⁵ He also stated that one of the company's objectives is to maintain a cohesive consulting delivery system that has "go to market consistency" throughout the company.

While periodic follow up calls by field staff represent a sound business practice in building and sustaining strong relationships with clients and in obtaining leads for future work, the study team does not believe the staff member(s), who provided services to a company should be involved in any pre-survey contacts.

Other Issues Involving the Current Performance Measures

The MAIM performance measures have only been in effect since March of this year, so it is difficult to determine what impact the new measures will have on center behavior. The new policy states that, "The intent is for MEP to monitor and manage a center based primarily on the aggregate score of the five quantitative components of MAIM." It further states that, "The legally stipulated annual and external panel reviews will continue to be performed. However, these reviews will also focus more exclusively on the performance metrics of MAIM and the trends over time of these metrics, and less on center structure and operations."

The focus on outcome oriented measures is a desirable objective for evaluating performance. However, by focusing on those measures alone to the exclusion of other performance goals and operational standards, program administrators at the national level may lose the ability to ensure and maintain a cohesive and integrated network of centers that leverage the resources of the entire network and of the complimentary programs that exist within the Department of Commerce and other federal agencies.

The MEP program management staff should continue to develop a revised index like the Performance Management Index to enhance the current MAIM system which does not make meaningful distinctions among the centers. While the proposal to provide additional points for centers above the 50th and 75th percentile for each measure represents a better alternative than the current system, strong consideration should be given to developing a more incremental continuous point system.

The study team also believes that consideration should be given to retaining the customer satisfaction scores which will be replaced in the MAIM system by the percent of clients who

⁶⁵ Interview with Scott McIntyre, Managing Partner for Bearing Point and Academy Panel Member.

quantify impacts. The rationale according to the MEP staff for replacing the customer satisfaction scores is that there is not enough difference in the center scores. If the program considers customer satisfaction to be an important goal of the program, eliminating it from the performance scorecard may send the wrong message to centers in terms of setting their priorities.

At the same time the new measure of percent quantified may drive centers to only report engagements with clients that they know will provide impact numbers. According to the MEP evaluation staff there is evidence that this is already occurring. The emphasis on this measure may also discourage center activities that are focused on educational or network development or supply chain development objectives that are not directly linked to specific quantifiable outcome measures.

The MEP program management staff recognizes that the Program's clients can only estimate the impact of an MEP engagement since it is extremely difficult for a client to isolate the impact of services provided by an MEP center in relation to other market variables such as the emergence of new competition, the development of substitute products, the health of the economy, changes in the labor market, the strength of the dollar, or changes in the availability of suppliers and component parts that have an effect on its financial performance. Despite this evaluation challenge, the MEP Program has to its credit developed and continues to develop sophisticated measures to assess the overall impact of each center.

The NAPA Panel, however, believes that the MEP program management staff should supplement these measures by periodically replicating the Jarmin study⁶⁶ which compared the impact of the MEP Program on the productivity of client vs. non client plants using the U.S. Bureau of Census' Longitudinal Research Database. The last study conducted was based on data from 1995 and 1996.⁶⁷ The study acknowledges that there may be some self selection bias in that companies that seek help may be companies that are more likely to improve. Nevertheless, the study provides an objective assessment of the impact that the program has had on improving the productivity of the clients that it serves using Census Bureau data.

Suggestions to Strengthen the Evaluation System:

1. As good as the evaluation system is the program suffers from some skepticism among various oversight stakeholders as to the accuracy of the reported performance improvements. The credibility of the results could be significantly enhanced by conducting periodic studies of client and non client productivity using the methodology from the Jarmin study.
2. The perceived integrity of the survey process could also be improved by modifying the process so that someone (preferably a neutral third party) other than the field agent who provided the services is required to contact the client prior to the survey.

⁶⁶ Ronald S. Jarmin, Evaluating the Impact of manufacturing Extension on Productivity Growth, *Journal of Policy Analysis and Management*, Vol.18, No. 1, 1999, page 99-119.

⁶⁷ Ronald Jarmin and Dean Prestegaard, *The Impact of the Manufacturing Extension partnership on Plant Performance: 1996* (An undated draft report prepared at the Center for Economic Studies of the U.S. Bureau of the Census for the National institute of Standards and Technology.)

3. The quality of the data could also be improved by developing and standardizing the use of a pre-engagement expectation agreement. The expectations that are set in the pre-engagement agreement should be used in the survey process as the basis for assessing how well the expectations were met and what actual impact was achieved. The current survey instrument asks questions about a wide range of possible impacts that may or not be relevant to the intended results of the engagement.
4. The current policy with regard to the performance evaluation which focuses on the 5 Minimally Acceptable Impact Measures to the exclusion of other indicators should be reevaluated. While the focus on these outcome oriented (strategic) measures is desirable and appropriate for use in determining eligibility for continued funding, focusing on these measures alone to the exclusion of other (tactical) measures may inhibit the Program management staff's ability to ensure and maintain a cohesive and integrated network of centers.
5. Customer Satisfaction scores should be retained in the performance measures.
6. MEP Headquarters should reevaluate the appropriateness of the "Percent Quantified Measure" in the MAIM system.
7. The MEP program management staff should continue to develop a revised index like the Performance Management Index to replace the current MAIM system which does not make meaningful distinctions among the centers. The MAIM performance measures should be modified so as to allocate points on a continuous graduated scale based on the extent to which a center exceeded the minimum score for each measure.

APPENDIX E

STATISTICAL ANALYSIS OF PERFORMANCE AND CENTER PROFILES

Before looking at alternative business models in other organizations, the study team worked with the MEP Staff to see what if any correlation existed between a high and low PMI score (the dependent variable) and the following set of independent variables. The objective was to determine what if any patterns exist which would suggest organizational and business practices that are consistently present in high performing centers and absent in low performing centers.

Independent Variables

1. The Ratio of state funding (real dollars plus in-kind services) to federal funding
2. Ratio of real state dollars (without in-kind service) to federal funding dollars
3. Total Revenue
4. Total Full Time Equivalent (FTE) Employees
5. Number of years the center has been in operation
6. The ratio of field consultants to total staff in a center
7. Percent of work that is brokered out
8. Market Penetration
9. FTE for every one million dollars of federal funding
10. Average Length of Engagements
11. Average # of engagements per client

The study team also looked to see if there were any clear distinctions in performance based on the type of organization (university based, 501 (c) (3), or a state organization) or the type of service area (urban, rural or a mix) that a center served.

What the study team found from the statistical analysis of the best and worst performers using the modified version of the performance management index (described above) as the dependent variable was that there was a strong correlation between performance and the following indicators:

- *The number of clients served* (correlation coefficient .6536). The high performers served on average 268 clients in the last year while the low performers served on average only 97 clients
- *The years in operation* (correlation coefficient .6913) All of the top 8 performers have been in operation for 8 or 9 years. The low end performers averaged 6 years and the range was between 2 and 9)
- *The total FTE of the center* (correlation coefficient .7272). The top performers had on average over twice (28) the number of employees (FTE) as the average for the low end performers (13). There was one exception where a center in a large city which has averaged 37 FTE over the past 3 years and was among the bottom 10 performers. Note: The top performers actually tended to be medium-sized. The Centers with more than 70

FTE) ranked from 27th to 48th under the Performance Management Index) used for this study.

- *Total FTE per \$1 million of federal dollar received* (correlation coefficient .7768)
- *The state funding level expressed as the ratio of state dollars (real and in kind services) divided by the Federal dollars* (correlation coefficient .8284). The high performers received on average of almost \$2 from the state for every federal dollar as compared to the low performers who received on average 70 cents from the state for every federal dollar that they received. In two states no funding was received from the state.
- *The state funding level in real dollars (excludes in-kind service) expressed as the ratio of state dollars divided by the federal dollars received.* (Correlation coefficient .7352)

Using these variables along with the 3 year averages for the “Investment Leverage Ratio,” the “Cost per Impacted Client,” and the “Bottom Line Impact Ratio” a multiple regression analysis was run. The results with a Multiple R Squared statistic of .9248, an F-statistic of 13.83 on 8 and 9 degrees of freedom and a p-value of .0003246 all indicate a strong fit.⁶⁸

There was no significant correlation between performance and the following variables:

- *Market penetration* (correlation coefficient of .2222)
- *Average # of projects per client* (correlation coefficient of .2449)
- *Average Project Length (3 year average)* (correlation coefficient of -.3195)
- *Percent of brokered hours (3 years)* (correlation coefficient of .0871)
- *The ratio of field staff to total FTE* (correlation coefficient of -.3612)

The statistical analysis of the performance data indicates that state funding is a critical variable in determining the success of a center. The centers that receive significantly more than a one third of their revenue from their state tend to have the highest client impacts. The top performers have all been in business for 8 or 9 years, which would seem to indicate that experience is an important factor in ensuring success. The top performers have staffing levels that range from 14 to 38 FTE, while the low performers with one exception tend to be much smaller ranging from 5 to 17 employees. The centers with more than 70 FTE ranked from 27th to 48th under the Performance Management Index) used for this study.

The type of organizational structure (501 (c) (3), university or state entity) did not appear to be a critical factor in performance, since one of the 3 state organizations and one of the 15 university based centers are among the top 8 performers. In terms of the type of area that the centers serve, 3 of the top 8 performers serve primarily urban areas, 3 serve primarily rural areas and 2 serve a mix of rural and urban. There was a similar mix among the 10 low performers (3 urban, 2 rural and 5 a mix of both).

The use of brokered 3rd party providers also varied significantly among both the high and low end performers. For the top 8 the percentage of brokered work over the last 3 year period ranged from 8 percent to 97 percent. At the low end it ranged from 6 percent to 73 percent.

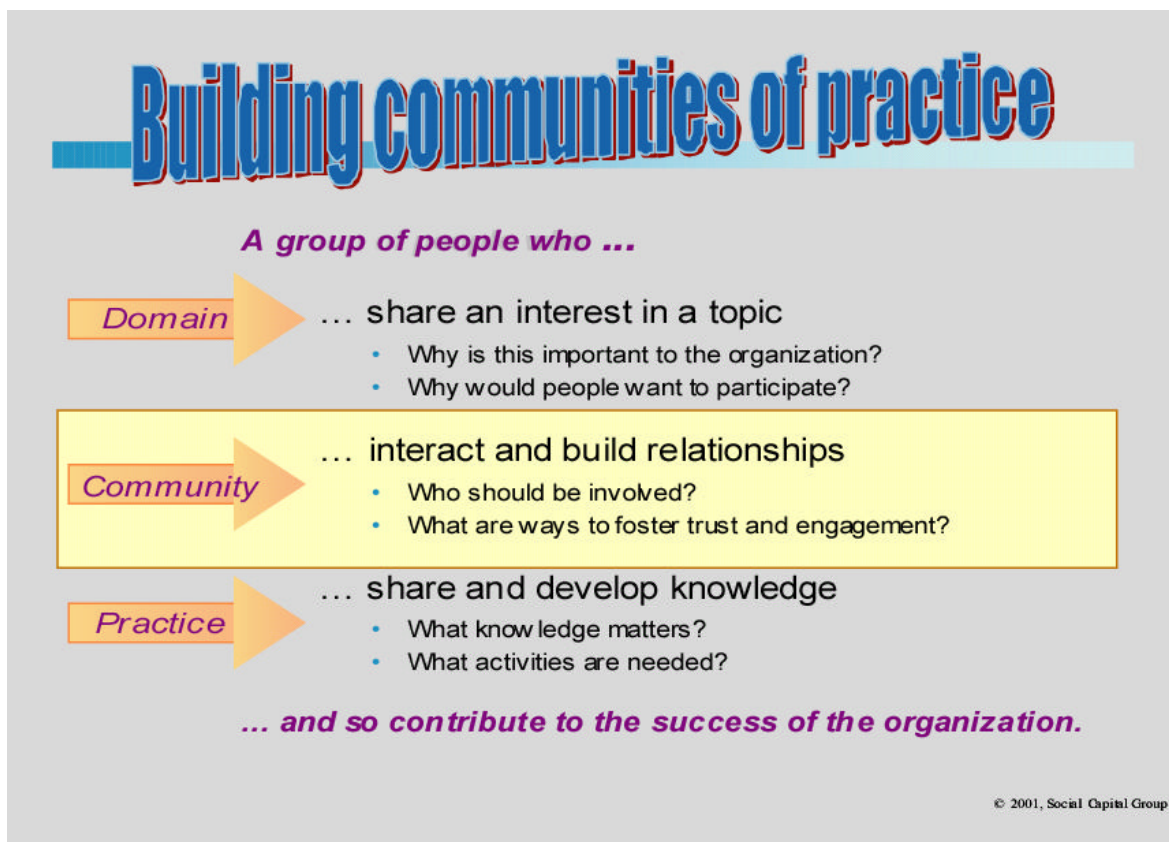
⁶⁸ The statistical runs were conducted by Kathryn Kilker, a statistician on the MEP Staff at the request of the NAPA study team.

It is clear from the Program's own measures that there are significant differences in the performance of the centers. Some refinements in the measurement system (MAIM) would make these distinctions more visible internally and as well externally among key stakeholders. The distinctions may be used to drive future funding decisions as well as to identify centers that need assistance to help improve their performance. Although the size of the sample used to test for the correlation between performance and several variables was very small, the results indicate that there are some organizational attributes that appear to be more prevalent in the high and low performing centers.

APPENDIX F

COMMUNITIES OF PRACTICE

The following slide was taken from a presentation by Etienne Wenger and William Snyder who are well known leaders in the theory and design of Communities of Practice.⁶⁹ The slide shows the three important dimensions of communities of practice.



Dr. Snyder met with several members of the MEP staff at the request of the study team to discuss the opportunities that could be afforded by organizing a stronger knowledge network supported by communities of practice. After meeting with the MEP Staff and the study team, Dr. Snyder suggested that in thinking about what it means to organize a knowledge network there are two levels to consider, the “Strategic Network Organizer” and the “Operational Network Organizer.”

⁶⁹ *Cultivating Communities of Practice, A Guide to Managing Knowledge, 2001.*

He described the following two roles or functions:

1. *Strategic Network Organizer* identifies various participants throughout the network as well as identifying the technology-industry combinations with highest potential (domains). For the MEP Program a sample of how that might be depicted is provided in slide #1 in the two slides that follows this discussion. These technology-industry combinations form the foundation for pilot projects and potential communities of practice in highly promising domains.

Strategic network organizers partner with co-sponsors and experts to identify the specific network of people to address opportunities in each strategic technology-industry domain. They organize events to bring people together and identify high-potential areas to address as well as co-sponsoring and funding projects. If there is an opportunity for diffusion, the strategic network organizer organizes communities of practice among end-users. They also coordinate various learning activities: training, virtual clinics, case studies, visits, on-line resources, technical assistance. Some of these are offered directly, others through partners, including centers and offices. (See slide #2, “A Community at Work” for a depiction of the ecology of learning methods).

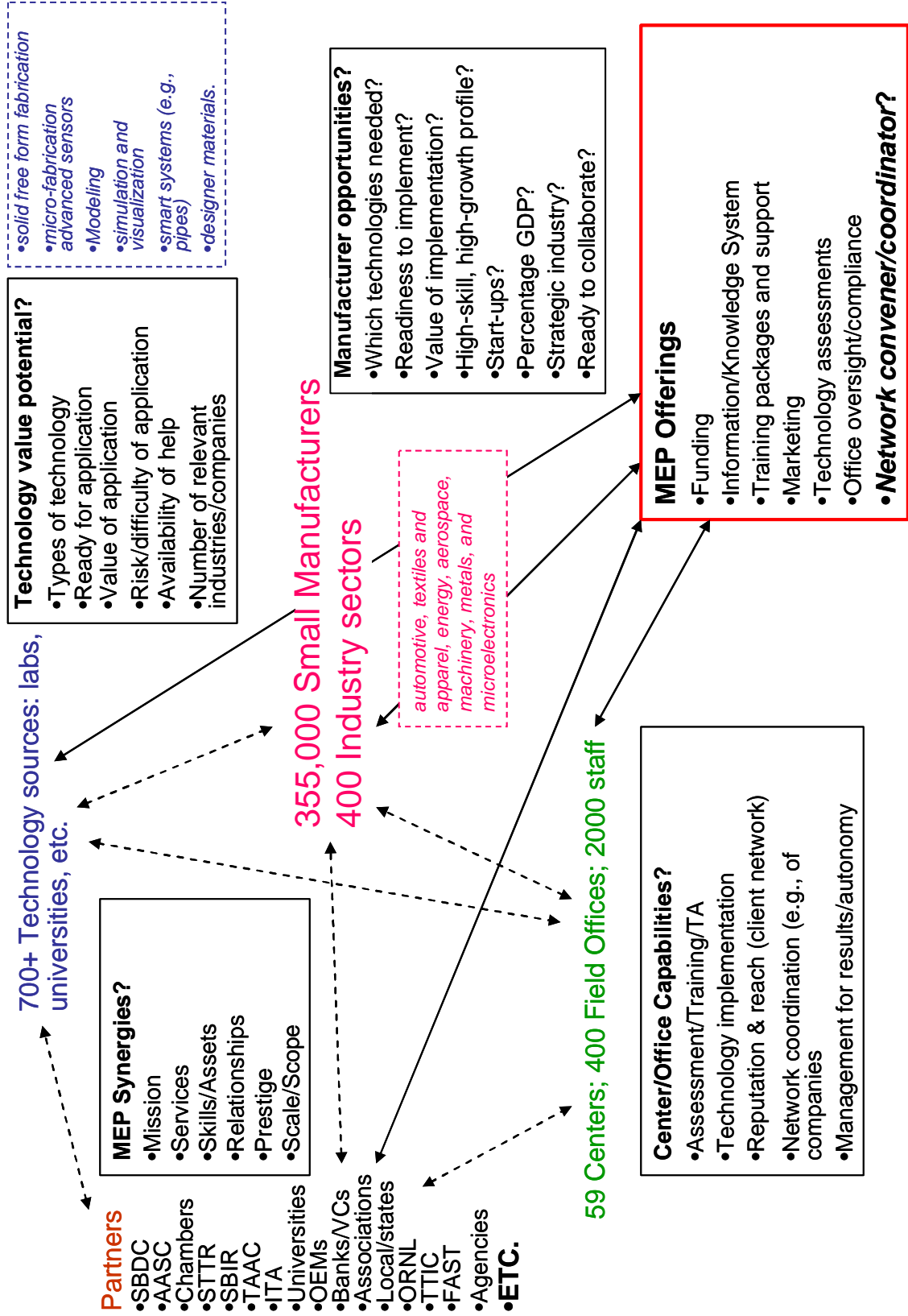
This involves a “top-down” approach to improving manufacturing excellence in US which suggests a strong search for where there are highest value opportunities in terms of GDP, future growth and high-skill jobs. The study team believes this is a role that the current Futures Group within the MEP Staff could fill.

2. *Operational Network Organizers* identify capability domains where centers/offices need strong skills to add value: training *processes*, training *content* (Lean, Quality, ISO, etc.), assessment, technology assistance, management (of themselves), technology knowledge, industry knowledge, partner relationships, etc.

This is a “bottom-up” approach with a focus on helping centers determine where they are now and where they could best build the capabilities they need and involves sponsoring, coordination, or directly providing various learning activities (See slide #2) for centers/offices. The focus here is to support centers/offices in building capability; to leverage opportunities for peer-to-peer learning; and to focus attention on those centers/offices with the most interest in learning. This is an organizing role that could perhaps be filled by the current Center Strategies and Support Office.

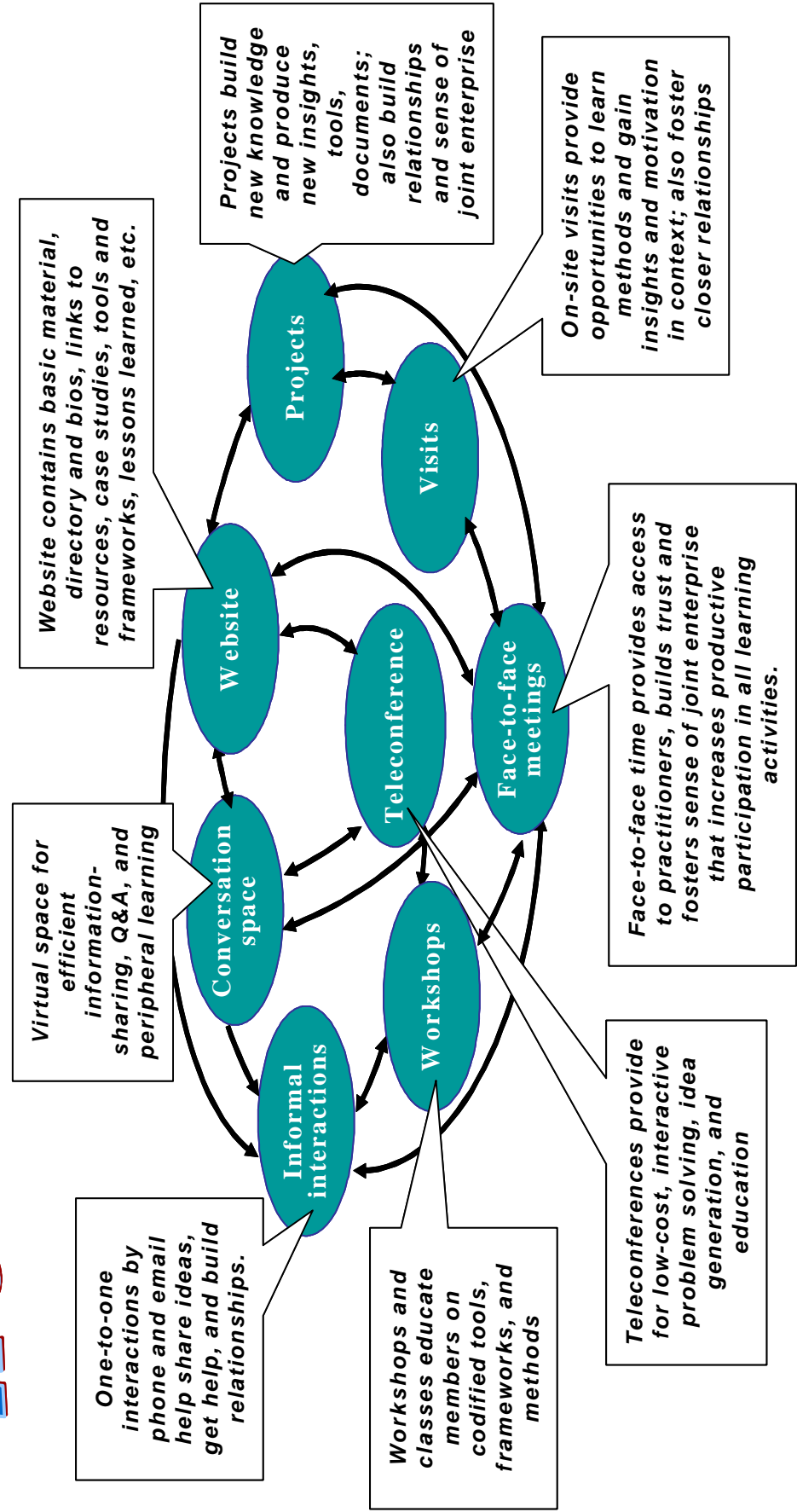
It is important to note that Dr. Snyder pointed out that creating a learning/innovation system that includes 59 centers, 400 offices, 2000 field staff, dozens of sponsor partners, 700 technology sources and 355,000 manufacturing companies in 400 industry sectors is a “colossal network challenge.” It requires an appropriate set of management tools and skills that are different from the ones most managers are familiar with, and it takes time to understand and learn these skills. He added that it is important to know this and to appreciate what you are getting into when you make a highly visible commitment to function as a Network Organizer.

Manufacturing Knowledge Network



A Community at Work

A community at work



APPENDIX G

PANEL AND STAFF LIST

Franklin S. Reeder*—*Chair*. President, The Reeder Group. Former Director, Office of Administration, The White House. Former positions with the U.S. Office of Management and Budget: Deputy Associate Director for Veterans Affairs and Personnel; Assistant Director for General Management and Deputy Assistant Director; Chief, Information Policy Branch and Deputy Chief; Policy Analyst; Chief, Systems Development Branch. Former Deputy Director, House Information Systems, and Committee Staff, Committee on House Administration, U.S. House of Representatives. Former positions with the U.S. Department of the Treasury and the U.S. Department of Defense focusing on information technology and systems.

Jay Brandinger—President and CEO of JA Brand Associates Inc. Pennington, New Jersey Brandinger has served on the Science and Technology Council of the States, a working group of Science and Technology advisors to governors sanctioned by the National Governors Association. As the state partner, he monitored the creation of the manufacturing extension center in New Jersey. With over forty-years in the electronics industry, Brandinger has recently started his own consulting company.

Matthew B. Coffey*—President, National Tooling and Machining Association. Former Executive Director, National Association of Counties; Vice President-Administration and Chief Financial Officer, Bridgeport Machines Division of Textron, Inc.; Senior Vice President, National Public Radio; President, Association of Public Radio Stations.

Scott McIntyre—Managing Director with BearingPoint (formerly KPMG Consulting) where he leads large scale systems integration and management consulting projects. He has worked with leading manufacturers, financial institutions, healthcare organizations, shipyards, construction companies, and federal government agencies providing enterprise resource planning (ERP) implementations, customer relationship management (CRM) implementations, portal development, business process reengineering, strategic planning and market analysis. He has led some of BearingPoint's largest industry studies focused on technology adoption and trends in technology development. Mr. McIntyre holds a BA in Business Administration from Washington and Jefferson College, an MBA and MPA from The Atkinson School of Management at Willamette University, and an MS in Information Systems from The Johns Hopkins University.

Sylvester Murray*—Professor of Public Administration, Cleveland State University, Former Manager, Government Consulting Services, Coopers and Lybrand; Former City Manager: Cities of San Diego, California, Cincinnati, Ohio, Ann Arbor, Michigan, and Inkster, Michigan.

Jane Smith Patterson*—Executive Director, Rural Internet Access Authority. Former positions with the State of North Carolina: Senior Advisor to the Governor for Science and Technology; Senior Advisor to the Governor for Policy, Budget, and Technology; Secretary of

* *Academy Fellow*

Administration; Acting Secretary, Department of Administration; Assistant Secretary of Administration. Former positions with the University of North Carolina at Wilmington: Vice Chancellor for Public Service and Extended Education; Acting Vice Chancellor for Advancement.

Larry Rhoades—President of Extrude Hone Corporation, Irwin, Pennsylvania. Extrude Hone Corporation is a leader in the field of non-traditional machining, finishing, and measurement. In 1989, Rhoades was named the first Small Business Exporter of the Year by the Commonwealth of Pennsylvania and currently serves as Chairman of the Board for the Southwestern Pennsylvania Industrial Resource Center, one of the MEP affiliates in Pennsylvania. In that capacity, he has testified before the House Science Committee on behalf of the MEP system.

Raymond Scheppach, Jr.*—Executive Director, National Governors Association. Former positions with the Congressional Budget Office: Deputy Director; Assistant Director for Natural Resources and Commerce; Chief, Energy and Transportation Cost Analysis Section. Former Vice President and Senior Consultant for Economic Studies, Jack Faucett Association, Inc.; Economist, Standard Oil Company.

STAFF

J. William Gadsby—*Responsible Staff Officer*. Vice President for Academy Studies, National Academy of Public Administration; Former Senior Executive Service; Director, Government Business Operations Issues, Federal Management Issues and Intergovernmental Issues, General Accounting Office; Assistant Director, Financial Management Branch, Office of Management and Budget.

Joseph Thompson—*Project Director*. President, Aequus, Inc., a management consulting firm. Former Under Secretary for Benefits, U.S. Department of Veterans Affairs. Director, VA Regional Office, NY. Chairman, Federal Executive Board, NY.

Patrick Nappi—*Consultant*. Over 30 years experience in supervision and project management. From 1999-2001 he was the Deputy Undersecretary for Benefits in the Department of Veterans Affairs. He received a BS degree from Syracuse University. Mr. Nappi is a retired Brigadier General from the US Army Reserve.

Paul F. Koons—*Consultant*. Former member of the Senior Executive in the Department of Veterans Affairs. Responsible for managing the VA's life insurance programs which provided over \$750 billion in life insurance protection to 7.6 million veterans and members of the uniformed services and their dependents. Also served as a Special Assistant for Business Processing Reengineering and was responsible for developing and implementing the Veterans Benefits Administration's National Phone Strategy and for developing and implementing VBA's computer based training programs and satellite network.

Christopher Wye—*Consultant*. Former Director, Center for Improving Government Performance, at the National Academy of Public Administration (NAPA) in Washington, DC. Dr. Wye joined the Academy in 1992 after an executive career in the United States government managing policy analysis, performance measurement, and program evaluation functions. He is the author of books, articles, and reports on strategic planning and performance measurement.

Alison C. Brown—*Project Assistant*. National Academy of Public Administration. Staff Coordinator for Performance Consortium. Project staff on past Academy studies: National Institute of Standards and Technology, United States Agency for International Development, Housing and Urban Development, National Oceanic and Atmospheric Administration, Department of Justice. BA in Sociology, Loyola University New Orleans.

Martha S. Ditmeyer—*Project Associate*. Staff for a wide range of Academy Studies. Former staff positions at the Massachusetts Institute of Technology and the Communications Satellite Corporation.

APPENDIX H

GLOSSARY

Academy: National Academy of Public Administration—an independent, nonpartisan organization chartered by Congress to assist federal, state, and local governments in improving their effectiveness, efficiency, and accountability.

Agricultural Extension Services: The Cooperative State Research, Education, and Extension Service is part of the United States Department of Agriculture. Its Cooperative Extension System (CES) is an educational network centered in the nation's land-grant universities that applies research-based practical education to the complex problems of America's rural and urban families, communities, agriculture, natural resources, and business and industry. Established by Congress in 1914, the nationwide system operates as a unique partnership of the federal government and 74 land-grant colleges and universities. Working in more than 3,000 counties, the system receives funding from federal, state, and local governments.

Annual Review: If a MEP center is not scheduled for an External Panel Review, they are subject to an annual review by the NIST-MEP staff prior to approval for continued funding.

APICS, Educational Society for Resource Management: Formerly, the American Production and Inventory Control Society is a not-for-profit international organization with educational professional certification programs. They have 60,000 individual and corporate members in 20,000 companies worldwide; their objective is to use education to improve the business bottom line.

Association of Manufacturing Technology: Represents and promotes the interests of American providers of manufacturing machinery and equipment, with the goal to promote technological advancements and improvements in the design, manufacture and sale of members' products in those markets and act as an industry advocate on trade matters to governments and trade organizations throughout the world.

ATP: Advanced Technology Program. This is another program that is part of the National Institute of Technology. The goal of the ATP is to benefit the U.S. economy by cost-sharing research with industry to foster new, innovative technologies.

BIC: Business Information Centers—provide high-technology hardware, software and telecommunications to assist small businesses.

Center Advisory Boards: These are less formal bodies that can be affiliated with any type of organization. The roles and responsibilities of advisory boards may be similar to fiduciary boards (see below) or may be more focused on areas such as client needs.

Client Manufacturing Establishment (CME): A single manufacturing establishment, plant, or facility that is a client of an MEP center.

Clusters: A geographically limited critical mass (i.e. sufficient to attract specialized services, resources, and suppliers of companies that have some type of relationship to one another –generally complementariness or similarity in product, process, or resource (excerpt taken from the glossary of terms in “A Governor’s Guide to Cluster-Based Economic Development”)

Communities of Practice: A network of subject matter experts who possess a common sense of purpose and a need to know what each other knows. The community is defined by knowledge rather than task.

CSREES: Cooperative State Research Education and Extension Service – Education outreach agency of the U.S. Department of Agriculture that partners with states.

ECQ: Executive Core Qualifications are a set of five skills required of senior managers in the federal government that prepare them for performance management and leadership.

External Panel Review: By law (15 USCS) 278k) every Manufacturing Extension Partnership center is subject to an external panel review at the end of year three and year six and every two years after they begin operations. The review is managed and chaired by the NIST–MEP Staff in Gaithersburg, MD. The panel typically consists of 3-5 members chosen from center directors, small manufacturers from another center’s Board of Directors, a state or other key stakeholder from the center’s state or an outside economic development expert.

Fabricators & Manufacturers Association: Provides members, their companies, and industry with current and evolving metal forming and fabricating technology. The association delivers this information through education programs, expositions, publications, and related communication. The goal of this association is to improve quality and productivity through the optimization of employee and management performance in manufacturing.

Center Fiduciary Board: A fiduciary board exists for all freestanding non-profit organizations, and is typically involved in making policy decisions, hiring and firing the Director/President/CEO, and in the center’s planning and operations.

GDP: Gross Domestic Product—Gross Domestic Product (GDP), the total value of goods and services produced in a country over a period of time. GDP may be

calculated in three ways: (1) by adding up the value of all goods and services produced, (2) by adding up the expenditure on goods and services at the time of sale, or (3) by adding up producers' incomes from the sale of goods or services.

House Science Committee: The Committee in the United States House of Representatives that has jurisdiction over the National Institute of Standards and Technology.

Institute of Management Consultants USA: A national professional association representing management consultants and awarding the CMC (Certified Management Consultant) certification mark.

ISO 9001/ 2000: Management system to insure continuous quality improvement.

LCC: Low Cost Countries—Countries whose labor and other operational costs are significantly lower than similar costs in the United States. The competitive position of many of the LCCs has been enhanced by monetary policies that do not index their currencies to world currencies. Their currencies are kept artificially low to encourage exports and maintain a favorable balance of trade.

Lean Manufacturing: Producing more with existing resources by eliminating non-value added activities. A systematic approach to eliminating waste and creating flow throughout the whole company.

MEP: Manufacturing Extension Partnership Program—a Department of Commerce program that is part of the National Institute of Technology. The program involves a partnership between federal, state and local organizations and institutions, including the private sector that works together to improve the performance of small manufacturers.

MEP Centers: The Manufacturing Extension Partnership Program consists of 59 manufacturing extension centers and 400 satellite facilities, which are located in every state and Puerto Rico. Each center works directly with local firms to provide expertise and services tailored to their most critical needs, ranging from process improvements and employee training to new business practices and the application of information technology. Services are delivered through direct assistance from center staff, outside consultants, or a combination of both.

MTC: Manufacturing Technology Centers—the original name of the centers that were established by Public Law 100-418 to make advanced technology developed in the National Institute of Technology labs available to small manufacturers as a way to improve productivity.

NAM: The National Association of Manufacturers stated mission is to enhance the competitiveness of manufacturers and to improve American living standards by shaping a legislative and regulatory environment conducive to U.S. economic

growth, and to increase understanding among policymakers, the media and the general public about the importance of manufacturing to America's economic strength. The NAM represents 14,000 members (including 10,000 small and mid-sized companies) and 350 member associations serving manufacturers and employees in every industrial sector and all 50 states.

MEPNAP: Manufacturing Extension Partnership National Advisory Board—A nine member board, established by the Secretary of Commerce to provide guidance and advice on the MEP Program from the perspective of industrial extension customers, and providers who have a vision of industrial extension with a national scope.

NTMA: National Tooling and Machining Association is the national representative of the custom precision manufacturing industry in the United States. Many NTMA members are small businesses, privately owned and operated. It has over 2500 members who design and manufacture special tools, dies, jigs, fixtures, gages, special machines, and precision machined parts...

NTTC: National Technology Transfer Center was founded by Congress in 1990. Its mission is to act as a focal point to aid US industry in locating federal technologies and technology services and to accelerate the flow of technology to US industry.

NRC: National Research Council—organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purpose of furthering knowledge and advising the federal government.

OEM: Original Equipment Manufacturer

PART: Program Assessment Rating Tool. A process used by the Office of Management and Budget (OMB) to evaluate the effectiveness of government programs.

PBA: A Professional Business Advisor (PBA) is an individual leading a portfolio of enterprise-wide business advisory services. The PBA leads a collaborative network of highly skilled manufacturing specialists, dedicated to supporting client organizational transformation, growth and expansion. This is a position that was developed as part of the MEP 360 vu Brand initiative.

Public Law 100-418: The Omnibus Trade and Competitiveness Act of 1988, which directed the Secretary of Commerce to establish the Manufacturing Technology Centers' program whose name was later changed to the Manufacturing Extension Partnership

RTTC: Regional Technology Transfer Centers—There are six located regionally within the U.S. Each is charged by NASA with implementing technology transfer commercialization efforts within their region.

SBDC: Small Business Development Center Program is administered by the Small Business Administration. The program provides counseling, training and technical assistance in all aspects of small business management. SBA provides 50 percent of the SBDC's funding. Matching funds are provided by the states, private sector foundations and grants, state and local chambers of commerce, state-chartered economic development corporations, public and private universities, vocational and technical schools and community colleges.

SBIR: Small Business Innovative Research Program provides funding for technological innovation for small US companies in two of three phases of product development.

SME: Small Manufacturing Enterprise—Small manufacturers employ less than 500 people. They are defined as establishments engaged in mechanical or chemical transportation of materials or substances into new products and are often described as plants, factories or mills. Small manufacturers assemble component parts of manufactured products, blend materials, such as lubricating oils, plastics, resins, or liquids into new products, and make products of agriculture, forestry, fishing, mining and quarrying.

SSA: State Approving Agency—State agency funded by VA to perform compliance inspections of on the job training and apprenticeship programs, as well as, institutions of higher learning.

STTR: Small Business Technology Transfer Program modeled on SBIR program. Major difference Between SBIR and STTR programs is that STTR program requires small businesses to collaborate with non-profit research institutions.

Technical Specialist: An employee of a center (either directly employed by the center or subcontracted to the center as defined in the center's operating plan) with the primary job function to deliver services to CMEs. Technical Specialist performs some sales and other functions as part of their duties. The service delivery could be performed either on site at the CMEs facility or the person may be charged with outreach and/or marketing to CMEs. These individuals were previously called field agents, field engineers, brokers, or manufacturing specialists.

Technology Transfer: According to the Federal Laboratory Consortium (FLC),⁷⁰ technology transfer is generally considered to be the process by which technology or knowledge developed in one place or for one purpose is applied

⁷⁰ Federal Laboratory Consortium Technology Transfer Desk Reference, Universal Technical Resource Services, Inc., Cherry Hill, NJ, 2002, pp. 1-1 – 1-2.

and exploited in another place for some other purpose. The FLC specifically defines it as the process by which existing knowledge, facilities, or capabilities developed under Federal research and development (R&D) funding are utilized to fulfill public and private needs.

According to the National Technology Transfer Center (NTTC),⁷¹ there is no widely accepted definition of technology transfer, but, generally speaking, technology transfer is the sharing of knowledge and facilities among Federal laboratories; industry; universities; Federal, state, and local governments; and third party intermediaries.

The Office of Management and Budget definition⁷² of technology transfer is as follows: Technology Transfer consists of efforts and activities intended to result in the application or commercialization of Federal laboratory-developed innovations by the private sector, State and local governments, and other domestic users. These activities may include, but are not limited to technical/cooperative interactions (direct technical assistance to private sector users and developers; personnel exchanges; resource sharing; and cooperative research and development agreements); commercialization activities (patenting and licensing of innovations and identifying markets and users); and information exchange (dissemination to potential technology users of technical information; papers, articles, reports, seminars, etc.). Each of these three definitions includes specific reference to Federal investment and involvement.

The Washington Area Chapter of the Technology Transfer Society uses the following definition:⁷³ The transfer of technology, expertise, or facilities from one person or organization to another for the purpose of commercialization or product/process improvement.

The Association of University Technology Managers (AUTM) uses the following definition:⁷⁴ the formal transfer of new discoveries and innovations resulting from scientific research conducted at universities and nonprofit research institutions to the commercial sector for public benefit. In each of these definitions, there is the notion that technologies or ideas are created in a laboratory (Federal, university, or corporate) and transferred somewhere else to be commercialized.

Technology diffusion/infusion is at the opposite end of the spectrum from technology transfer (as it is traditionally defined). Technology diffusion

⁷¹ National Technology Transfer Center, What Is Technology Transfer? NTTC, Wheeling, WV, <http://www.nttc.edu/products/guide/seca01.html>, viewed on 20 Feb 2004.

⁷² Office of Management and Budget, Circular A-11, 1994.

⁷³ Washington Area Chapter, Technology Transfer Society, Technology Transfer: Issues and Processes, on <http://www.millkern.com/washtts/docs/ttdefmec.html>, viewed on 20 Feb 2004.

⁷⁴ Association of University Technology Managers, http://www.autm.net/index_ie.html, viewed on 20 Feb 2004.

encompasses all of the processes needed to identify and implement (infusion) technologies, beginning at the point of origin to the ultimate manufacturing_user of the technology, whether for new or improved products, process improvements, service configuration, or business model innovations. It includes identification of technologies, matching of technologies to company needs, evaluation of their commercial potential, and transition of the technologies or their subsets into practical products, processes, services, or business models of commercial value.

Table 1 shows the differences between technology diffusion/infusion and technology transfer.

Table 1.
Differences Between Technology Diffusion/Infusion and Technology Transfer

	Technology Diffusion/ Infusion	Technology Transfer
Customer	Business (Manufacturers)	Laboratory
Motivation	Identifiable need to improve product or process to gain competitive advantage in marketplace	Research various scientific disciplines for the identification of technology which may have promise in the marketplace
Focus	Satisfying the manufacturing customers' requirements	Searching for the means to apply leading edge technology
Investment	On methods which ease the process of the technology acquisition and implementation to satisfy customer needs	On improving and developing the technology into a product or process
Approach	Demand (Customer Need, related to market strategies)	Push (Outreach, based on availability of technology)