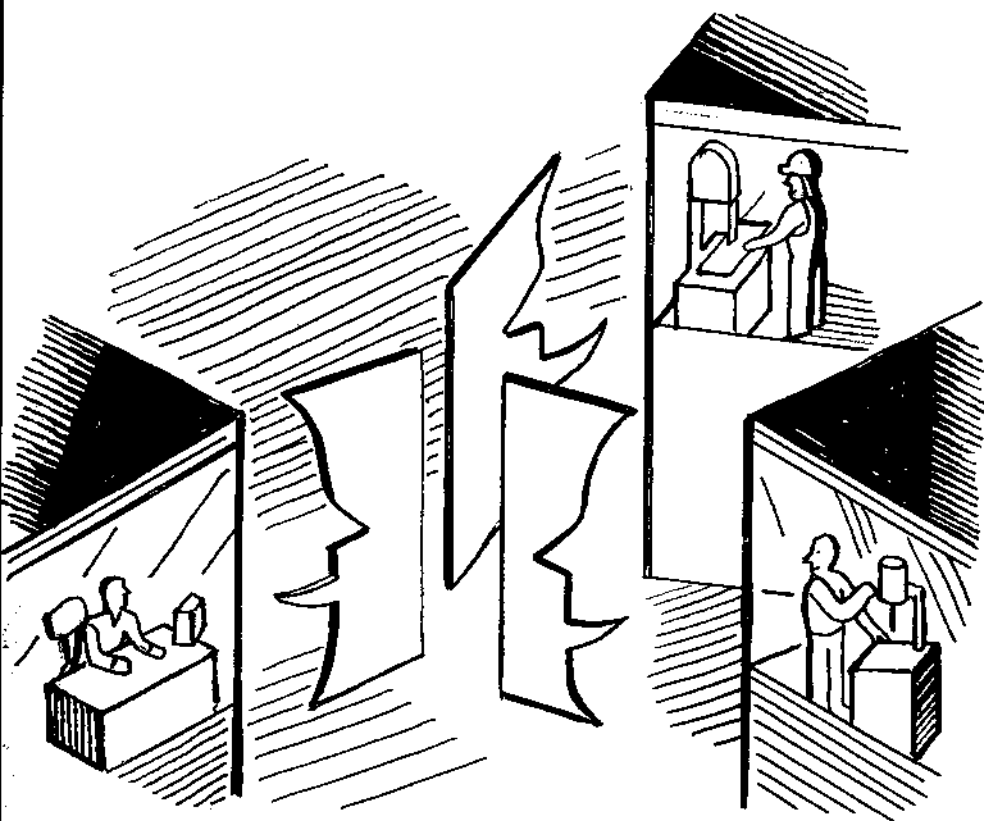


SIGNIFICANT OTHERS

Exploring the Potential of
Manufacturing Networks



Brian Bosworth • Stuart Rosenfeld

Regional Technology Strategies, Inc.

RTS, Inc. is a tax-exempt non-profit organization with main offices in Chapel Hill, North Carolina and a New England Office in Providence, Rhode Island. The organization designs, develops, pilots, and assesses technology related policies and programs that will enhance industrial competitiveness, economic development, and technical employment opportunities, and pays special attention to least advantaged areas and populations. RTS operates as a flexible policy network, drawing on the expert researchers and practitioners from throughout the United States and Europe.

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Exploring the Potential of Manufacturing Networks

**The Aspen Institute, Aspen Colorado
July 1-3, 1992**

Support provided by The Aspen Institute,
the Joyce Foundation, and the
U.S. Department of Agriculture



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ISBN 0-9636927-0-4

Cover Art by David Suter ©

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Acknowledgments

This publication could not have been produced without support and advice from many fronts. First, a grant from the State Policy Program of The Aspen Institute for Humanistic Studies to Regional Technology Strategies, Inc. provided the core funding that made the meeting and publication possible. In addition, grants from the Joyce Foundation and travel funds from the U.S. Department of Agriculture (USDA) allowed the meeting to be expanded to include European participants and additional U.S. practitioners. But even more important was the advice from and contributions of key people in those organizations—Dewitt John, The Aspen Institute; Unmi Song, the Joyce Foundation; and Ken Deavers and David McGranahan, USDA's Economic Research Service fully participated in the entire process and were instrumental in helping us achieve our goals.

We are particularly grateful to our many European and Canadian colleagues for traveling so far to join us, for so candidly discussing their own situations and clarifying our notions of European experiences, and for expanding our horizons and stretching our thinking. The background papers prepared by most of the participants and distributed in advance helped to shape the agenda and spark discussions. And, once again, Janet Papke was invaluable in making conference arrangements, taking care of all logistics, and making sure everything ran smoothly.

Once we achieved a document acceptable to the group—after taking into account excellent comments on early drafts by a number of participants—Janet Topolsky took over as lead editor and made it immeasurably more readable. We take full responsibility for the major editing, and in some cases shortening, of the working papers, and Barbara Styers made the final edits. Alice E. Whicker designed the layout of the publication and managed the production process. Finally, Mary Eldridge, who attended the meetings, offered ideas, advice (and notes), and edited final copy.

Preface

Over the past five to ten years, more and more attention has been directed toward the small and medium-sized manufacturer, both in the United States and abroad. These firms traditionally have been very independent, and many quite creative. But mounting pressures from newly industrializing nations compounded by advances in new technologies put many of these firms at risk.

Experts and public sector agencies have made many suggestions designed to help small firms become more competitive. One in particular has generated an unusual level of interest. That's the concept of firms working together to accomplish more than they can individually. Although not new in practice—for, in fact, many firms already have developed special relationships with other firms—it is new conceptually as an economic development strategy. It was the Italian region of Emilia-Romagna, largely due to the spectacular success of its small artisan-based industrial economy in the 1970s, that gave rise to the idea of flexible specialization, cooperation and networks. Its success was bolstered by the even more spectacular success of the manufacturing sectors of Japan and southern Germany, also based on tighter relationships among firms.

The idea of small manufacturing firms competing successfully by working together—supported and encouraged by government policies—has gained international prominence as an economic development strategy. For many, small firm collaboration offered an appealing way to retain the flexibility and innovation of small organizations while capturing the benefits of larger scale.

Intrigued by the possibilities that experiences in Italy and elsewhere demonstrated, policy experts from many parts of the world began to look at these places for ideas. An increasing number of places in the United States and in Europe began to experiment with collaboration policies—offering widely varying levels of support, ranging from a full-scale national program in Denmark to foundation grants to U.S. communities—to replicate these successful economies, while carefully customizing them to fit local circumstances. A wide variety of institutions, public agencies and business organizations turned their attention to organizing firms as “flexible manufacturing networks.” But due to the popularity of the concept, the term began to be applied to a range of activities, which created more confusion than clarity. Just as in the seventies individuals struggled to find a new vocabulary to

explain new and emerging relationships, in the nineties firms are struggling to find a new vocabulary to explain their new and emerging relationships. Hence the title, "Significant Others." Further, as with any new policy that needs champions, attracts advocates and seeks to capture new resources, there is a desire to show success—to claim it, if not to achieve it. It has been in this environment—rapidly growing interest with limited time for firms to see economic benefits and little effort devoted to evaluating, documenting and learning from the many efforts—that many regions have charged ahead full-steam with initiatives to encourage collaboration.

For all these reasons, 28 people were asked to meet at the Aspen Institute in Colorado in July 1992. We dedicated three days to thoughtful, spirited, and sometimes heated discussions about what has transpired since flexible manufacturing networks began to blossom about six years ago and about what the future holds. We took this opportunity to step back from our own special circumstances, critically assess our directions and progress to date, and learn from each others' experiences.

We were unable to invite all those involved in this emerging strategy, but we tried to achieve a good mix of knowledgeable public officials, policy advisors, and practitioners who represent a wide range of experiences and regions. The agenda was organized around finding a common language, tackling tough questions and common problems, and debating the pros and cons of alternative roles for public sector. For example, must firms be clustered geographically? Are brokers necessary to establish networks? What types of networks lead to innovation and continual improvement and which only to lower costs? What incentives are most effective? Controversy was encouraged, and the logic and assumptions of participants' theories and approaches were constantly challenged.

This document represents the results of three days of continual debate and discussion about the possibilities and pitfalls of current efforts to build flexible manufacturing networks and the best thinking of the group about how to maximize success. Most important, the document is intended to spur critical thinking, about collaboration in particular and manufacturing modernization in general, and to help others build better approaches that do even more for their local economies.

Stuart Rosenfeld
Project Director
Chapel Hill, North Carolina
March 28, 1993

The Aspen Statement

On July 1-3, 1992, twenty-eight development policy experts and practitioners from the United States, Canada and Europe gathered at the Aspen Institute in Aspen, Colorado for a critical discussion about a growing U.S. phenomenon: flexible manufacturing networks. The meeting was organized by Regional Technology Strategies, Inc. and supported by The Aspen Institute, the Joyce Foundation and the U.S. Department of Agriculture. What follows is a summary of the Aspen Group's collective outlook on the promise and potential of small-firm network enterprise in the United States.

Toward a High-Performance Economy

As our century winds briskly to a close, America's citizens are painfully aware that American industries face a clear and present predicament, head-on and struggling.

Too many of our companies, having lost pace with changes in production technologies, no longer manufacture the goods—in many cases, globe-leading, technology-based products that these same firms conceive and design—here at home. Sadly, many of the skills and much of the knowledge that firms and workers gain when they produce new goods and services have been lost in the process. So have the jobs.

In earlier years, before technology advances took hold beyond our shores, states took for granted that their manufacturing industries were competitive. State government's primary interest in our nation's business crystallized into one simple and direct question: "Will you locate in one of our All-American communities?" To move firms toward "Yes," states only needed highlight a few cost-competitive locales with attractive amenities and good workers, and then sweeten the deal with a few financial enticements.

This economic development strategy favored clear winners: new or expanding branch plants. Precious few state resources targeted small local suppliers or specialty producers—the backbone that underpinned the more visible and glamorous large-scale manufacturers. As a result, America's small- and medium-sized enterprises (SMEs), increasingly at the mercy of their large firm customers and facing internationally savvy small firm rivals offshore, have come to suffer a competitive inferiority complex.

In short, the old strategy is no longer sufficient. Government today needs to organize and prepare for new economic fundamentals that go beyond large-scale plant locations. It must help foster long-term growth, support firms—no matter their size—that are *committed* to a region, and promote a high-performance economy.

In turn, if the manufacturing sector is to continue producing wealth and increasing our nation's standard of living, it too must adjust and change. To pay high wages, producers must compete at higher ends of the market. Following the new competitive lead set by global corporate pacesetters, America's companies, large *and* small, must get better at using high skills and advanced technologies to produce high-value goods.

Form Flexible Manufacturing Networks

This situation is not unique to the United States, nor is its solution. In July 1992, we assembled in Aspen, Colorado with colleagues from Europe and Canada, many in the same situation. All of us—practitioners, academics and officials of public or private institutions—are concerned about industrial competitiveness. Each has thought a great deal about what industry needs to do, and what the public sector should and should not do, to influence business practice. We disagree on certain tactics, but we hold some common beliefs.

To start, most of us argue that firms fare better if they organize by region or by common or related sectors. That's because when firms—especially small and independent firms—form links, they increase their opportunities to acquire information, resources, expertise, advanced technologies and knowledge. Even better, they can expand their production capacity, allowing them to improve performance and capture new or expanded markets. When small manufacturers organize into units that tackle problems, produce, market or learn together, it's most commonly called a *flexible manufacturing network*.

In flexible networks, manufacturing vertically *disintegrates*. Firms congregate by choice into smaller, inter-connected units of production. These networks better enable each member firm to achieve flexibility, economies of scope, continual improvement and innovation—the very qualities that characterize the high performance industrial economy we now seek.

Ideas about inter-firm linkages have been evolving and maturing among U.S. policymakers and practitioners for the past five years, gathering momentum and attracting resources for planning and demonstrations. Indeed, many regions in the U.S. have begun to formulate and adopt industrial policies that build on the presumed advantages of inter-firm collaboration. Perhaps even more telling, U.S. firms now are beginning to interact *spontaneously*, apparently driven by common needs and common problems.

Criticize and Cohere

We came to Aspen to assess the promising and novel concept of manufacturing networks. We're not missionaries for the network approach. Neither are we passive observers. That's why, today, many of us are growing concerned that the fundamental goals originally set out for the network strategy are not being met. We want to help regions avoid jumping on the bandwagon if the band is playing the wrong tune. We want *network* to avoid meeting the same fate that Robert Reich attributed to the term *competitiveness*: "Rarely has a term in public discourse gone so directly from obscurity to meaninglessness without an intervening period of coherence."

At Aspen, we agreed to carefully consider the principles, problems and possibilities associated with the burgeoning collaboration strategies that target small and medium-sized enterprises (SMEs). We were searching for:

- *A common language* to describe the collective activities that give firms comparative advantage without compromising rewards for individual effort.
- *A clearer picture of the respective roles* that government, firms, workers and support institutions can play to help networks grow.
- *A set of design principles* for effective network development.

On a more immediate, equally practical level for public and public/private policy initiatives, we wanted to:

- *Learn* from both the strengths and the weaknesses of network programs and regional development strategies and about the conditions associated with each.

- Discuss the *scale* of effort needed for regional impact.
- Identify the *industries and places* with greatest potential for collaborative enterprise.

Principles, Puzzles and Prototypes

Over the course of three days, our discussions led to a variety of outcomes. Some discussions clarified issues. Others explained differences. Still others defined demands for ongoing research and debate.

Where We Agree

"Competitive" applies to firms, not regions or sectors. High performance SMEs that have the potential to benefit from collaborative efforts surface in every sector or region, no matter the economic condition of that area and industry.

Networks are no panacea. A network doesn't, by simply joining weak firms together, make them efficient and innovative. Creating a network does not magically eliminate problems. Rather, it can provide a learning system that helps firms find solutions to problems.

Networks should exploit natural clusters. Some fundamental social underpinning—a sense of community or region or common interest—must form the basis for collective business action. Networks are more effective when they are part of industrial clusters where face-to-face interaction occurs frequently. High firm concentration is not only a large-city phenomenon; clusters exist in small cities as well. In rural areas, geographic dispersion can hinder networks, but it's not insurmountable; dispersed firms must establish more formal network business relationships to compensate for distance.

Network brokers make a difference. Intermediary agents—commonly called "brokers"—can be critical to growing new networks. Brokers facilitate collaboration. They help SMEs through the early stages of building trust, identifying opportunities and cultivating collaborative projects. Network brokers have many calling cards: They can work out of trade associations, government agencies, consulting companies, banks, colleges, financial institutions or other firms. But to gain the trust of SMEs, brokers must act solely as

an agent of the network and have no conflicts of interest. European experience has found that the most effective brokers are generalists, not specialists.

European models require translation. Although Europe provides valuable lessons and an important catalyst for network initiatives, its experience must be transferred with care and tempered by the American environment. In fact, U.S. network activities now underway are broad enough to construct our own processes and compare our own experiences with those of other nations.

U.S. networks are underachieving. Admittedly, U.S. networks, with few exceptions, are not yet reaching their potential. Too many networks stop after successfully implementing schemes that achieve money-saving economies of scale. While this is an important outcome, we think it is insufficient in light of the existing industrial challenge. Networks should push on to help each member firm become a high performance work organization: the modern firm that seeks continual improvement and innovation to improve product and service quality, while empowering its workers to acquire skills and make decisions that benefit the firm—and themselves—in the process.

Where We Disagree

Is it "network" yet? Some confusion and disagreement about the goals underlying collaborative efforts is reflected in our differing opinions about what constitutes a "network." These differences reflect both individual philosophies and, more importantly, local circumstances. For example:

- In regions with few trade associations, networks take on the characteristics of trade associations.
- In most European nations, where trade associations are more prevalent, networks are identified more narrowly, based on purpose—for example, joint production, marketing or improvement.
- Some believe strongly that the real goal is not to create formal networks but to nurture on-going "networking." Collaboration, in

this view, is most effective when it stimulates learning; cost-saving is a temporarily useful but ultimately misdirected aim.

Emerging Network Models

In the course of our discussions, three models of working networks emerged:

- *Vertical networks*: Firms at different stages of the production chain—or with complementary products—join together for production, product development or marketing.
- *Horizontal networks*: Firms collaborate to share equipment or resources, purchase supplies or acquire capital.
- *Knowledge networks*: Firms meet to identify and solve common problems, exchange information, and stimulate continuous learning and improvement.

The Public Sector

Every small, independent firm establishes its own comparative advantage, based on its internal abilities and how it responds to market forces; indeed, that is its responsibility. But monitoring the health of a regional economy—determined by the composition and decisions of many such small firms—is one of government's responsibilities. Thus, government has vital, if limited, roles to play in guarding and improving a region's health. To be specific:

- A *clearinghouse* government can provide access to information, without directly attempting to solve firms' problems.
- A *catalyst* government can stimulate firms to improve their practices by offering incentives and encouragement without presuming to tell them what to do or how to do it.
- A *broker* government can direct firms to sources of assistance, without providing direct service.

We believe that because government's regional economic objectives may not always match the economic objectives of resident firms or networks, it will have to assume the costs for functions that do not instinctively "speak" to the individual interests of firms. Government may decide appropriately to provide ongoing incentives or other encouragement, urging firms and regions to take a high road they might not spot on their own.

The Danger Signs

A few very real dangers threaten the success of public network development initiatives in the United States:

- *Networking is a process, not a program.* Networks do not fall from the sky, nor are they easily assembled from a kit. The likelihood that faddish adaptations will render networks just "another government program" could limit their potential impact on regional development.
- *Networking is not industrial modernization.* Working together, the public and private sectors need to shape a comprehensive strategy to modernize the economic vision and corporate practices of America's regions. Networking, in its best light, is a means to this end, not its substitute.

Networks develop a greater awareness of the need for change, foster a collective vision about how to make that change, accelerate demand for crucial modernization services, help firms learn about them and then acquire ideas and services from each other. As such, every network is a unique learning system. Keeping in mind that each network must thus develop its own personality can help keep in check government's tendency to copy-cat and window-dress its way into pat programs.

Federal Leadership

In the past, the federal government has encouraged various forms of cooperation among large corporations, but it has paid virtually no attention to cooperation among SMEs. Until now, a few states and private foundations have been carrying the entire SME-support burden. We believe it is now time for the federal government to lead the charge. We urge that the administration and Congress give careful consideration to the following suggestions.

1: Use the Power of Persuasion. The president and other national political leaders can, by their use of persuasion alone, inspire and influence the attitudes of agencies and businesses toward cooperation. They can make it clear that collaboration among SMEs need not minimize competition; indeed, it will accelerate modernization and allow smaller firms to flourish in the global economy.

2: Establish a Network Agenda. A new National Commission on Cooperation and Industrial Competitiveness, if created by the president, could draw SME owners and their representatives into the national industrial policy debate, and help formulate a shared agenda for fostering SME networks that take on world markets.

3: Educate Your Own. The federal government should educate its own field staff, housed in federally funded services and centers, about network development so that they can serve as network brokers or refer businesses to potential network opportunities.

4: Target Dollars to Networks. Portions of existing federal program resources can be rededicated to fostering networks. For example, federal grant programs could set aside a percentage of available dollars to fund proposals submitted jointly by three or more small or medium-sized firms.

5: Spark State Action. The federal government should offer states matching grants to spur networking. Specifically, incentives modeled on the State Technology Extension Program (STEP) of the National Institute of Standards and Technology (NIST) would likely steer states toward network modernization activities.

6: Demonstrate, Demonstrate, Demonstrate. Nothing convinces like experience—if it's visible. The federal government could launch and partially fund network demonstrations, evaluate them, disseminate the knowledge, and conduct ongoing research to learn more about the value of networks.

7: Make it Legal. Legal issues—like anti-trust and shared liability—frustrate and confuse many embryonic network efforts. The federal government can examine these concerns and then lead the legislative reform or clarification effort.

None of these recommendations is intended to be costly—or permanent. Each aims to put the federal government in a leadership role, helping it become an active catalyst for networks instead of a passive on-looker.

The Aspen Group

Our "representative" group of policymakers, practitioners and thinkers does not presume we can speak for everyone working in this field; indeed, many have more experience and expertise than we. The usual culprits—budget constraints and ensuring an optimally sized group for effective interaction—limited how many people we could involve face-to-face in the Aspen dialogue. Others have been invited, however, to comment on drafts of this monograph. Still others, we are quite confident, will have ample opportunity to respond and debate these issues at future forums. Our intent is to open, not close, avenues for policy debate.

Few of us are fully convinced that networks of small firms will become a major force for modernization, much less a guarantor of industrial competitiveness. The theory seems persuasive, but there is not yet enough practice. We all see the promise, however; and we are united in our call for more demonstration and evaluation.

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The Changing Nature of Competition

American Firms Face the Twenty-First Century

The United States is facing an unprecedented economic challenge. The American Century, defined in large part by our nation's decades-long dominance of the world's manufacturing, is winding briskly to a close. So is our manufacturing supremacy.

It's almost as if the industries, firms, people and public agencies that populate this market-based economy are relearning what "competition" means. For generations, the only real economic competition that our nation as a whole experienced visited our larger institutions: Multinational U.S.-based corporations competed aggressively with each other for profits, and states vied with one another for jobs. Each firm or government knew the ground rules of these competitions. From a national perspective, who won these games really didn't matter, because it was an intramural event: The winnings and winners always stayed at home. Increases in a corporation's market share or a state's number of branch plants were won, in effect, in a zero-sum game.

In the meantime, the industrial strength and savvy of our offshore rivals grew to the point that they could challenge us—and did. America's global market positions started melting from the heat. Today, we rank far below the majority of industrialized nations on most competitiveness measures. For example, in 1990, the World Economic Forum, an international organization based in Switzerland that compares the economic progress of 23 industrialized nations, ranked the United States 12th in product quality, 11th in on-the-job training, and 22nd in "future orientation." These are subjective measures at best, but still disturbing.

Our response to this new competition has been mixed at best. Many resource-rich large corporations, able to respond without addressing the root problems, have simply moved their mass-production facilities offshore, and started importing critical parts and components for their domestic plants—all to take advantage of dramatically lower labor costs available in developing nations. Choices haven't been so easy for the 360,000 small and medium-sized independent manufacturing establishments that supply our large corporations or fill specialized market niches. Generally more rooted in their communities, more accustomed to scrambling to stay afloat, the imperative embedded in the real challenge is clearer to them: Either improve products, quality and operations—or go out of business.

While eyes remain focused on the fate of our multinational corporate behemoths, slowly more and more experts are recognizing and telling our small and medium-sized enterprises (SMEs) that their vitality is crucial to America's long-term economic viability and progress. Why? To start, the U.S. economy no longer can rely primarily on mass production systems. In an environment where consumers expect more and better choices and quick response, economies of scale no longer rule. Gradually, business leaders and policymakers have come to agree that capabilities like specialization, expertise, flexibility and community loyalty—all characteristics associated with SMEs—are what America's industrial system really needs to compete. Even our largest corporations are beginning to emulate small firms, decentralizing their operations to gain the quality and speed advantages associated with smaller-scale service and production.

But neither our SMEs nor our large corporations are yet up to speed with global business trends. Too much of the old dog, the old view of competition, the old way of doing and making things remains. Thus, the U.S. is losing ground at both ends of the economic spectrum. At the low end, typified by low-value-added, mass-production industries, less-developed nations are gaining on the basis of minuscule labor costs and widely accessible communication technologies. Actually, if America wants to remain a high-wage, high-standard-of-living economy, this low-end loss is unavoidable. The true threat is our spotty capacity to compete at the high end, which, if it persists, will be devastating.

Our toughest competitors, our high-end rivals, may look like us. But these nations are not playing the old game anymore; rather, they are redefining the terms of competition. One thing they've come to understand better than we is that: *Size isn't everything. Small can be beautiful.* Today, many of the most successful industrial regions both here and abroad are composed of small and medium-sized manufacturers—hardly a primary target of our states' development attention in recent history.

Indeed, the ruling American business theory of this century—scientific management and practice—is based on the assumption that bigger is better. The perceived benefits of this theory led industry to integrate vertically, to standardize operations, and to dedicate their plants and equipment to single products. Being "big" in the mass-production era offered many advantages:

- *Integration efficiencies.* It stands to reason that in any manufacturing venture, the phases of production—or the "upstream and down-

stream" operations involved in producing a final product—must be linked. According to business school theory, these linkages are more secure, stable and efficient when they're organized under one management.

- *Scale economies.* In mass production industries, larger and longer production runs yield economies of scale that lower the cost of each individual unit produced. With scale economies in sight, a large corporation can make large investments and distribute the costs widely enough to keep its prices competitive.
- *Institutional learning.* Under large-scale mass production, "learning" is defined, in effect, as groups of employees making a product in less time. Production innovations, never the province or responsibility of front-line workers, were formulated in research labs and engineering units, then delivered to the shop floor as new operating instructions. Generally, innovations aimed to lower costs through improving workers' speed and routine specialization, rather than to improve product quality or reliability. The "learning curve," then, was set by how much cost dropped as the number of units produced increased.

That was then—when American industries ruled the roost and were able to build and shape customer demand. Today, our customers are more discriminating and dispersed across the globe, as is our more sophisticated competition. In this climate, manufacturers must respond quickly and accurately to the customer—whether an individual consumer or another firm—listening to their demands for product and service quality, design, reliability and timeliness.

So finally, along with the rest of the world, American industry is moving. It's moving away from the mass production housed in giant corporations toward specialized production lodged more and more in smaller, more agile establishments. It's transforming vertical integration and heavy investment in plant and equipment into horizontal contract relationships with decentralized firms that offer specialty products or services. This shift to small and medium-sized manufacturing enterprises changes the face and facets of American manufacturing. Small firms generally have many customers who buy in smaller quantities, so they must be able to adapt very quickly to changes in customers demand and design. To operate efficiently, they seek economies of scope—the ability to produce short runs as efficiently as long runs—not economies of scale.

We do not mean to suggest that all manufacturing in the U.S. in the future will be carried out in small establishments, and we do not wish to engage a debate about the relative merits of large versus small manufacturing. Lean production systems have demonstrated that coupling the radical decentralization on the plant floor with new approaches to removing finished goods and in-process inventories can achieve remarkable gains in quality and productivity in large-scale establishments. As the restructuring of big manufacturing evolves and continues, the twenty-year trend of rapid gains of relative employment and production in smaller establishments may slow. Therefore, our focus is on the question of how to accelerate the process of modernization among the smaller firms.

We want our small manufacturing firms to be able to compete successfully at the high end of international markets. This requires the deployment of higher levels of technology. It means more efficient use of capital and sophisticated credit policies. It demands more sophisticated business practices (including many of the principles of lean production employed by larger firms) and it requires more careful market analysis and planning than most small firms practice. High-value production needs high-skill workers and managers who are motivated, organized and helped to learn. Learning how to work with other firms in acquiring these capabilities can accelerate the modernization process.

Unfortunately, still too few managers or operators of these smaller firms are prepared yet for this new environment. Productivity and wages in the growing small-firm economy lag those in the declining large-firm sector. Still fewer governments are organized to encourage or support a continually innovating and improving small firm industrial economy. Hence, both the public and private sectors are looking for new organizational relationships and structures that might improve the prospects for their SME-based manufacturing industries.

A New Development Opportunity

Networks and Inter-firm Collaboration

Given that today's competitive industry must be flexible and responsive to customer demands for quality, design and delivery, and that small, specialized producers can better fill this bill, the question is: How can we help these firms recognize and join the new age?

Our nation's small manufacturing firms operate within a very unstable economy, a volatile international marketplace where they compete with goods producers in Europe and the Far East. In these other nations, collective inter-firm efforts and government action are cushioning the volatility of market changes; they've helped spread the burden of adjustment to industry restructuring and changing demand cycles. But in the U.S., the individual small firm typically has had to absorb the full consequence of these market adjustments.

The scale advantages that large firms facing the same new economy enjoy sharpens the contrast. Their market-sensing capacity, their vertical integration, their market power and their ability to outsource work to small suppliers—or to bring it back in-house when times are tough—have helped insulate large companies. To be sure, that insulation thins significantly as global competition intensifies. Moreover, to the extent it impairs large firms' ability to innovate, insulation is no advantage. Still, relative to the small firm, larger enterprises harbor a greater capacity to weather change, and emerge less vulnerable to market turbulence.

The Network Advantage. Leading-edge small firms already have learned that to operate successfully in the high-end economy, they must get very good at niche-marketing customized products, and must produce those goods with cutting-edge technology and skill. A small firm can gain this ability more easily by developing relationships with other small firms, using the links to form collective learning systems and reduce the risks associated with specialization.

Indeed, networks help SMEs take on the guise of large firms—and the accompanying business advantages—while maintaining their independence. For example:

- *Economies of scale.* Collaboration among small firms can help achieve economies of scale in human resources development, technology,

market research, materials purchasing, sales, distribution and service. For many small companies, the cost of the new economy business essentials—training, technology development or acquisition, market planning—are prohibitive. By sharing those costs with other similar firms, they can do collectively what they might not be able to afford or accomplish individually.

- *Pools of expertise.* Cooperating firms often discover new ways to pool their individual capabilities to develop, produce and market goods or services that combine their expertise.
- *Heightened flexibility.* A firm that is itself flexible, having honed its ability to respond quickly to changing technology or markets, can heighten that flexibility when it enters into dynamic networks with flexible firm colleagues.
- *Lowered risk.* By pooling their risk, several firms that pursue common objectives or plans together can lower the damage to any single firm if they don't succeed, or accelerate the rewards if they do. Investing in new technology, developing new markets and upgrading the skills of workers and managers can therefore become less risky. Networked firms can depend on each other to cushion the risks inherent in decentralization and autonomous specialization.
- *A learning system.* Last, but perhaps most important over the long term, by interacting regularly with other firms in their region or sector, any one firm can transform its own inner workings. Any company trying to compete in the sophisticated, cluttered, high-end, high-return international marketplace knows one thing for sure: *There is just too much to know.* To succeed, businesses must develop a kind of collective intelligence. They have to find a way to learn from each other. In networks, they can do just that, accelerating their own modernization in the process.

The Aspen Meeting

Constructive Dialogue about Network Progress

In industrialized regions of western Europe, cooperative behavior among firms not only is a more accepted way of doing business, it's supported by public policies. Recent European success with network-style business enterprise has, in fact, captured the interest of policymakers and business owners alike across Europe, the United States and Canada. While some states in this country cling to a wait-and-see attitude, content to rely on attractive locations rather than competitive industries, other states dealing with declining industrial employment are eager for ideas. They are looking at a plethora of initiatives that promise to modernize and revitalize manufacturing.

Despite the growing interest, the field intelligence concerning flexible networks is still pretty hazy. There is no clear definition of what a network is, or exactly what constitutes inter-firm collaboration. No in-depth understanding has identified the conditions under which associative behavior develops and flourishes. No one fully agrees *if* the public sector should encourage collaborative behavior among firms, much less *what* it can do. Nor has anyone established reasonable expectations or ultimate aims for networks.

So, in July 1992, a group of people actively involved in designing, managing or studying programs that encourage and facilitate inter-firm collaboration met in Aspen, Colorado, to take a hard look at current efforts. Participants strongly believed in the importance of SMEs and the value of inter-firm collaboration—some, of course, more fervently than others. All were painfully aware that building trust among SMEs, and a willingness to work together toward common goals, requires a slow, arduous and time-consuming process with few shortcuts, made all the more difficult by the fact that the real benefits are long-term and strategic. In this light, the group feared that exaggerated or premature success stories might foster expectations that could never be met, or pressures for too-quick results or the wrong ones—for example, an unbalanced focus on cost-savings over innovation or high-performance production. Participants also acknowledged that, even though small firms are beginning to collaborate, large manufacturers continue to dominate and exert influence on SMEs and their practices, and, therefore, on networks.

Hailing from the United States, Europe and Canada, The Aspen Group determined to examine how networks can best strengthen regional development, and how lessons from Europe's experience might apply to U.S.

practice. In the process, they wanted to help hone and clarify some of the existing network intelligence, by addressing some key questions surrounding networks:

- What is a “network”?
- What are the chief obstacles to inter-firm collaboration?
- What lessons emerge from Europe’s advanced experience with networks?
- What is the current status and direction of U.S. networks?
- Which questions about networks most concern the economic development field? How does the collective knowledge answer them?
- How can state and regional strategies support network development?
- What is the agenda for federal action?

The remainder of this report addresses each of these questions in turn.

What Is a "Network"?

Finding a Common Language

Firms of every size are experimenting with different models and different combinations of autonomy and cooperation; no single model of cooperation fits every nation or every collection of firms. The term most commonly used to describe such interactions among SMEs is "flexible manufacturing network"—often, simply "network."

The word "network," however, is somewhat ambiguous: It means different things to different people in different situations. For example, "network" is used widely in the fields of electronics and telecommunications and even in social relationships, with specific meanings that range from a computer link-up to a power breakfast. To the Aspen Group, "network" also carries a special meaning: *A network involves a form of associative behavior among firms that helps expand their markets, increase their value-added or productivity, stimulate learning improve their long-term market position.*

But even this definition leaves considerable room for ambiguity. Is the inter-firm collaboration typified by a conventional buyer-supplier relationship a network? Is a trade association that provides business services to its members a network? Do firms that subscribe to a computer-based purchasing service, or firms that share a manufacturing facility, constitute a network? Do groups of firms that meet regularly, but informally, to discuss problems or make deals constitute a network?

Working Models of Networks. Aspen participants produced various typologies to explain the diversity of networks, but most fit roughly into one of three categories:

- *Vertical Networks.* In vertical networks, firms at different stages of the same production chain—or with complementary products—join together for production, product development or marketing. These firms have an input-output relationship, typified, for example, by being a link in a particular production chain that manufactures a final product, by forming part of the supply chain between suppliers and original equipment manufacturers (OEMs), or by aggregating compatible products for more effective marketing. The underlying characteristic of vertical networks is firm's *complementarity*. The network goal is to strengthen market position.

- *Horizontal Networks.* In horizontal networks, firms identify similar needs for technologies, expertise or services that exceed their individual capabilities or resources. Typically, they collaborate to share equipment or resources, purchase supplies or acquire capital. The underlying characteristic is *commonality*. The network goal is to enhance market intelligence or power, or to reduce the cost or improve the quality of their common inputs, such as skilled labor or materials.
- *Knowledge Networks.* In knowledge networks, firms want to seek and use new information, want to increase their understanding of business practices, and are willing to share information with others on a quid pro quo basis. Knowledge network firms meet to identify and solve common problems, exchange information, and stimulate continuous learning and improvement. These firms may not even be in identical or complementary markets. The underlying characteristic is *shared learning systems*. The goal is continual improvement.

Other characteristics can help delineate networks. Collaboration may also be classified by the *degree of formality, openness and permanence of organizational structures*. Vertical networks, which pursue production or marketing objectives, generally have formal and contractual relationships for specified periods of time, and limit their membership to firms that contribute to the final product or product line. Horizontal networks, which form to reduce costs or improve capabilities, may have formal membership requirements but are more open, more likely to include firms that compete with each other, and are expected to be more stable and long term. Paul Sommers of the Northwest Policy Center also distinguishes (with exceptions) between for-profit organizations, which usually are vertical networks, and not-for-profit organizations, which more often are horizontal.

Distance can also be a factor. The more dispersed the network, the greater the need for contractual agreements. Vertical production networks usually involve firms in close proximity, because shared manufacturing often requires frequent face-to-face communication. Horizontal relationships, where firms join together to reduce costs or enhance market intelligence or visibility, do not depend as much on face-to-face communication.

Knowledge networks, aimed at learning and innovation, are the most open form. However, because they might exchange strategic information, knowledge networks may require the greatest amount of trust and social compatibility among members. In many places, firms meet regularly at CEO breakfasts or engage in on-

going forums to learn together and from each other. *Experience Exchange* groups in Denmark and *Women's Work Circles* in Germany both are intended to share ideas. European participants at the Aspen meeting acknowledged the importance of these knowledge networks, but contend that such informal associative behavior, which is more common in Europe, is not what they mean by "network."

Finding the Right Model. The network model that is promoted in any given region is a function of the region's economic and social fabric, economic goals and history. For example, Denmark's recent network program was designed explicitly to foster vertical networks that will expand markets and product lines. Most of the resulting new Danish networks are quite structured and formal. Denmark could set these constraints because an existing system of knowledge networks, trade associations and industrial cooperatives meets other firm needs.

In U.S. regions where trade associations and unions are weak, many of the emerging networks are horizontal; they cooperate to yield economies of scale—the quickest results and the least risky. In older industrial states that boast stronger trade associations, unions and government programs, networks are apt to be vertical.

Portugal defines its so-called "cooperation networks" more narrowly, by function. Its national program supports firms that cooperate to meet its goals, specifically, commercialization, production, distribution of goods, or improvements in organization quality or design. Portugal prefers, but does not require, that a new legal entity be created to take on a network endeavor that will explicitly improve members' competitiveness, with investments made by each participating firm. By contrast, networks in Italy are quite informal. According to Mario Pezzini, people keep coming to Italy demanding that he: "Show us cooperation. But I can't." In Italy, cooperation is simply embedded in the culture; it's part of the way business is carried out.

The Aspen discussions converged into a realization about defining network: No single definition of network can or should suffice; in general, the term should be used very cautiously. Networks cover a wide range of associative behavior, many typologies are used, and each suggests very different public policy. It also became clear that U.S. practitioners tend to define network more broadly than do colleagues in Denmark and Portugal, for example. General consensus emerged, nonetheless, that the various existing typologies adequately capture the diversity of networks. Perhaps, as Niels Christian Nielsen suggested, "We need definitions and differentiation of 'network,' much as Eskimos need 54 different words for 'snow.'"

Obstacles to Collaboration

Culture, Competition and Loose Connections

There is some disagreement about the speed with which SMEs are embracing collaboration in the United States; however, most agree the current level is fairly low but building. Everyone agrees as well that successful collaboration entails a long-term process that requires considerable patience because it involves behavior that is not customary for small firms in this country.

Business Culture and Anti-Trust. Several reasons explain the relatively low level of consortial behavior in American industry. On the whole, American manufacturers simply are not accustomed to cooperating. Our businesses generally want to be fiercely competitive in their local markets; thus, they are not inclined to cooperate locally in pursuit of global markets. Moreover, especially among small manufacturing firms, entrepreneurship tends to be an individual activity. Consequently, to some extent, there are fewer opportunities for firms to "practice" association in America.

The strong anti-trust tradition in America, supported by our nation's strict anti-trust laws, also contributes to a business/legal culture that does not look favorably on any kind of cooperation. Attorneys who specialize in anti-trust agree that the cooperative behavior exemplified by flexible manufacturing networks and other developing forms of inter-firm cooperation are in no way prohibited by current anti-trust law or enforcement doctrine. Nonetheless, existing anti-trust law still sends a powerful message to the business community that cooperation is wrong. It reinforces the "cowboy culture" of entrepreneurship in America, and discourages firm owners from trying to learn from each other.

A Domestic Competitive Framework. Perhaps the sharpest reason for the strikingly different patterns of associative behavior exhibited by firms in America versus other industrialized nations is our relative emphasis on domestic over international competition. For a long time, small and medium-sized manufacturing companies in European and Asian nations have seen themselves as competing on an international scale. In the United States, however, the field of competition has shifted from local to global only very recently—and some SMEs have yet to see or understand that shift.

As small firms increasingly specialize in highly-segmented market niches with customized products, they become more inclined toward collabo-

rating locally to compete better globally. Thus, the modernization process itself can provide a firm with the incentive and the opportunity for greater cooperation with local firms in the same sector.

Inadequate Institutional Mechanisms. Even though these changes in the locus of competition are hitting America's small manufacturers very quickly, many small manufacturing firm owners and managers in America remain ambivalent toward inter-firm cooperation. While the logic of cooperation—that it can help firms gain external advantages of scale and learn from each other—is increasingly accepted, small firms lack well-developed institutional mechanisms for getting to know other firms in their region and their sector, or institutions that promote collective learning. They seldom collaborate with other firms outside of the context of very specific and, usually, very immediate problems. They lack an adequate vocabulary to talk about collaboration as a business strategy. Thus, inter-firm cooperation is slow to emerge.

Very few sector-specific industry associations exist in the U. S. at the local or state level. And industry associations that *are* organized at a national level cannot offer their members (especially SMEs) the frequency of contact that nurtures trust relationships. Moreover, American trade associations are much weaker than those in other industrialized nations. While most U.S. communities have a local chamber of commerce or its equivalent, these groups tend toward social and philanthropic purposes rather than meeting the real business needs of their members. Lacking established business-related associations, small firms in the U.S. are at a comparative disadvantage when it comes to creating specific business alliances.

The European Network Experience

Lessons Learned and the Questions of Relevance

The United States never has mounted an industrial policy that deals with SMEs on any significant scale. Because western Europe has, it's quickly become a model for U.S. efforts to build inter-firm linkages. Within Europe, northern Italy—first disclosed to the American public in Michael Piore and Charles Sabel's *The Second Industrial Divide*—has become the prototype. And within Italy, Emilia-Romagna, with its highly industrialized and very successful small industry economy, has emerged the ideal to which many U.S. regions aspire.

Northern Italy: Natural Networks. To be sure, Germany, Sweden and many other countries have highly competitive small manufacturers, many of which work collaboratively with their respective governments' support. But nowhere is the process as advanced and as dynamic as in northern Italy. Many Aspen participants—and many others—have traveled to Bologna and its Emilia-Romagna environs on what has become almost a *de rigueur* pilgrimage to observe the Italians, learning not only how their firms both cooperate and compete, but also about the institutions that support them. Visitors routinely are awed by the regionally-concentrated clusters of hundreds of very small, technologically advanced manufacturers, clusters that work in intricate inter-relationships to produce very high quality goods for export markets. At a time when the restructuring global manufacturing economy has created new opportunities for smaller firms—most seemingly unable to recognize or take advantage of them—the Italian industrial district phenomenon has emerged a powerful model.

The economic fabric of Emilia-Romagna is woven from the services of trade associations and sector-specific service centers. Although both provide assistance to SMEs, there is an important distinction between them. The trade associations provide "essential" services—like accounting, financing and training—for a fee, and they are self-sufficient. The 12 service centers, established by the regional government starting in the late 1970s, provide "competitiveness" services, and depend on a combination of membership dues, service fees and government support. Though U.S. sources generally label these centers as self-sufficient, they are not, and Italy's current national budget reductions threaten to close several less-utilized centers. This raises important questions for government: Which services should government prompt? Which should it leave to market forces? Which should it subsidize as a public good?

Not surprisingly, the early infatuation with Emilia-Romagna has attracted some understandable criticism. Many business leaders and public officials question the validity of a model that is based on apparently unique economic, cultural and historic conditions. For example, the presence of very active trade associations, along with high concentrations of very small, locally owned artisan firms in the same or related sectors and tight family and community relationships, signals an environment that differs significantly from most U.S. regions. Representatives from Emilia-Romagna who joined the Aspen discussion helped assess the relevance of collaboration and industrial policy in northern Italy. Raffaele De Maria stressed the importance of shared values and the face-to-face contacts among firm owners and workers, particularly in vertical networks and knowledge networks. Personal interaction, he contends, is essential to achieve the information flow that helps find solutions to common problems and convert innovative ideas quickly into products.

Denmark: Networks by Design. If Italy is the best-known example of a naturally evolving inter-connected SME economy, Denmark is the best-known model of a purposefully crafted inter-connected SME economy. The Danish manufacturing economy has long been populated almost exclusively by small, export-oriented firms with a long history of associative organization through trade and industry groups. As the European Common Market continues to develop, bringing tougher competition and larger, potentially more powerful firms with it, the Danish government sees networking as an opportunity to build relationships among its small firms that will make them more competitive.

In 1989, after studying the Italian system, Denmark began to design and implement its own process for getting firms networked. Rather than try to create Italian-style industrial districts, Denmark sought to promote complementary production among small firms. The nation drafted a plan to develop a nationwide system that would train network brokers and provide challenge grants to encourage new forms of cooperative behavior. Before the Danish government launched the program, many firms argued that the nation's business culture and competitive environment would not be open to cooperating for production purposes. Policymakers used the controversy to spark public debate on the new industrial policy idea, persisted with the plan, and made a large investment in SMEs—\$25 million. Time has proven that the predicted reluctance to cooperate was largely unfounded: A significant percentage of Denmark's firms now are involved actively in formal networks.

It must be noted that Denmark began its program with a solid technology assistance infrastructure in place, including the Danish Technological Institute, 15 county-level Technology Information Centers, five research universities and intermediate applied research centers, numerous local technology centers, strong trade associations and unions, and industry consultants. Moreover, the Danish firms started out more oriented to export markets than are small firms in the United States, and, thus, perhaps more ready to cooperate if it meant competing globally. Further, most firms in Denmark belong to cooperatives or trade associations, which for years have provided network-type opportunities through joint purchasing schemes and learning exchanges.

Portugal: Cooperation Networks. Denmark proved that the benefits of vertical inter-firm collaboration could be realized without adopting another nation's model wholesale—a valuable lesson. Based on its pioneering efforts, it now advises and supports many other European regions. Portugal, for example, recently introduced a similar program under the leadership of Albertino Jose Santana. Starting in 1986, various national agencies that support Portugal's SMEs tried to encourage cooperation, but met little success. Then, in 1991, the national development agency's Specific Program for the Development of Portuguese Industry (PEDIP) took over the project. PEDIP traced the steps Denmark had taken with publicity, recruitment and training network brokers, as well as incentives to overcome firms' initial resistance to cooperation. Drawing lessons from Denmark, Portugal designed and implemented its own program of "cooperation networks," funded at about \$10 million.

Germany: Growing Collaboration. Finally, SMEs in Germany—on average, larger than the firms in Italy or Denmark—work together in a variety of ways. Some are informal, like Italy's, and others quite formal, organized by industry associations or university centers. For example, small and mid-sized firms in Baden-Wurtemberg established and built a shared training/retraining center for their employees. Another group of firms has set up a quality management center under the Steinbeis Foundation in Gosheim. Even so, there is a growing sense in Germany that firms still are missing many opportunities for collaboration, particularly around marketing and research and development. The machine tool industry in Baden-Wurtemberg, for example, is encouraging its members to consider such consortia.

Network Lessons from Europe. What lessons do recent European experiences with stimulating collaboration hold for American policymakers?

- *At first, government efforts to stimulate cooperation will be resisted.* The assumed aversion small U.S. manufacturers feel for cooperation is not uniquely American. European nations faced the same resistance.
- *But cooperation already exists.* In Europe, as in America, a closer examination of current business practice reveals that cooperation already occurs at various levels and among many firms—in, for example, purchasing cooperatives, “handshake” agreements to share orders, and training consortia.
- *European networks are more formal, and focus on market penetration.* Compared to the young U.S. efforts, most European regions closely limit the definitions of the networks they wish to create. Europe seeks formal organizations that combine all or part of three or more firms, with the objective of directly improving their comparative advantage in new or existing markets. Cooperation along other dimensions—for sharing information, training, or purchasing—has deeper historical roots in Europe; it is encouraged, but not officially classified as a network.
- *Network policies can't work in isolation.* Perhaps the most important lesson is that our European counterparts do not isolate networks from industrial policy; they consider networks only one part of a comprehensive strategy. Government's most important policy objective, according to Niels Christian Nielsen, is not to subsidize or promote particular management techniques or the adoption of advanced technologies—but to stimulate enabling practices. They realize that although, ultimately, competition drives innovation, encouraging both competition and cooperation is not incompatible. So they focus on their strong industries, not the weak. And Europeans work at weaving the social and economic fabric that will allow networks to form, thrive, and disband organically when no longer needed.

Networks in the United States

Current Status and New Directions

Networking as an economic development policy is of very recent vintage in the United States. Up to now, development theory and practice at the state and local government levels have been focused almost exclusively on firm-specific strategies: first, to recruit out-of-region firms to relocate, and second, to build the capacity of a region's indigenous companies and entrepreneurs. The notion of working with firms in groups or clusters to encourage and strengthen the relationships among them is quite new and still not widely understood.

American efforts to organize firms and develop inter-firm linkages began in the mid-1980s, after the success of northern Italy's small-firm industrial clusters was first described by Michael Piore and Charles Sabel, and then popularized, largely through the efforts of New Jersey Institute of Technology's C. Richard Hatch later in the decade. With support from the German Marshall Fund of the United States, Hatch led American policymakers on a series of network study tours to Europe. More recently, news of Denmark's national program to encourage network formation, along with the scattered but growing number of small-scale collaborative activities in this country, have strengthened the U.S. base of support. This increased visibility of networks, coupled with growing credibility at a time when industrial policy is becoming respectable, have attracted many more players into the game—as has the potential for network funding from foundations and state and federal agencies. Indeed, private, non-profit national and regional foundations have supported most of the initial U.S. network program experiments to date, with recent, but still limited, involvement from state governments, including Michigan, Illinois, Oklahoma, Oregon and Arkansas.

Young but Growing. Despite the late start, by 1992, a catalogue of manufacturing network profiles, published by the National Institute of Standards and Technology (NIST)¹ and compiled by network broker and expert Gregg Lichtenstein, already listed almost 80 young networks in the United States. Lichtenstein's work produced several insights. He found wide diversity and complexity of form and function among these early-stage experiments, but no common, coherent vision of networks or inter-firm cooperation. Typically, U.S. network programs are being managed by

¹ Compiled by Aspen participant Gregg Lichtenstein, *A Catalogue of U.S. Manufacturing Networks*, NIST GCR 92-616 (Washington, DC: U.S. Department of Commerce, September 1992).

induced efforts at building networks center in suffering industrial sectors—for example, metalworking, woodworking and apparel—and attract interest from firms in the same lagging sectors, especially clusters of relatively mature small firms in regions that have been hit hard by global competition. Far less program effort is being devoted to networking strategies in newer, more growth-oriented industries.

While many networks avow a long-term interest in joint manufacturing, only a few actually are doing it. ACENet, based in Athens, Ohio, offers one example of firms organizing to identify a new market (and product)—in this case, accessible kitchens for the handicapped—and developing the collective capacity to produce for it. A more common first network goal is joint marketing. For example, the Furniture Guild in Philadelphia combines compatible products to sell as a single product “line.” Most networks, however, have multiple objectives, and are finding that one form of collaboration often leads to others. The Technology Coast Manufacturing and Engineering Network (TeCMEN) in Okaloosa County, Florida, started out by collectively marketing their capabilities, moved into joint training, and joint purchasing, and now develops, submits—and wins—cooperative bids as a supplier network.

An Emerging U.S. Model. Much of the U.S. networking activity that is being supported by economic development agencies builds on what might be termed a “static” model. It aims to create a multi-firm network organization with a defined membership and internal structure. Members see each other as the “designated cooperators” for a range of activity that might start out quite limited but broaden over time. They expect the organization to endure over an undetermined period, but probably a fairly long one. Each member may have different expectations about the benefits or importance of the network to his or her firm. Although it’s rarely presumed that every activity of the network will involve every member, it is generally agreed that only members will participate.

This contrasts with the far more “dynamic” and spontaneous model of network formation apparent in Northern Italy. There, multiple network relationships evolve and dissolve almost organically, based on the changing requirements of the marketplace. Such dynamic inter-firm relationships accelerate learning and inter-dependence within the region.

Finding the Right Focus. While networking is beginning to receive a great deal of attention within the U.S. economic development community, large-scale government initiatives to promote networks are still rare. And

most programs to date have focused on creating government horizontal to promote networks of firms that seek joint solutions to common problems. Because the common problems often include lagging market demand, activity has concentrated on "non-modernization" efforts like cost-savings—that is, they do not target achieving the advances in manufacturing technology and business practice that will enable member companies to produce higher value-added products.

Indeed, NIST's Gale Morse points out, in America, small firms are "most focused on improving the bottom line in real time." She suggests that, to buy into a network, individual firms must be able to see its potential to render a tangible and fairly short-term impact on that bottom line. Further, she believes that small firms feel that taking on modernization activities might "expose" each firm's organizational and technological weaknesses; thus, it requires a higher level of trust among members than is likely to be realized in the simpler cost-saving activities that most emerging networks pursue.

Unfortunately, the reliance on the Italian and Danish experience, while offering a powerful case for collaboration, has led to some misunderstanding in the U. S. about the specific benefits of inter-firm cooperation. Some U.S. networks focus too much on linking individual firms only to gain production economies of scale, believing that somehow will make up for their individual inefficiencies. However, in most instances, that will not happen. Scope, not scale, is the critical determinant of SME competitiveness in the global economy. In the rush to create production networks, we may be losing sight of the goal—efficient, innovative, flexible small firms which, because they work at the high end of the market, produce high levels of value-added and create more wealth for their workers and the regional economy.

Sabel suggests that a small firm's success and survival are linked to the collective efforts of the community to which it belongs, whose prosperity it must therefore defend. To grow its business, a small firm must expand the range and sophistication of its products. To do that, it must extend the range and sophistication of its capital equipment and management, which are enhanced by cooperative relationships with other firms in the region. Trust, therefore, fosters the technological progress of the whole sector.

The lesson to U.S. networks is this: Among relatively sophisticated, very small firms with an established foundation of trust relationships, net-

works can offer important economies of scale. However, among less advanced firms in lagging sectors, networks that seek economies of scale may not succeed as well as those that try to accelerate learning and build trust. Networking, in other words, is not a way to make inefficient, non-innovative firms efficient and innovative by somehow joining them together. Rather, it offers a way to help small firms *become* efficient and innovative over the long term. Creating the network, then, does not magically eliminate a problem: It develops a learning system that can help develop solutions to a problem.

Issues and Controversies

Questions from the Field

Discussions about public and public/private initiatives that encourage inter-firm collaboration inevitably lead to questions about process and resources, goals and expectations. The Aspen meeting participants brought evidence to the table—most from programs that are quite new—that pointed to some preliminary conclusions.

What conditions enhance inter-firm cooperation?

Few generalizations can be made about the underlying conditions that support inter-firm cooperation. Just as cooperation can take many different forms, widely varying sets of preceding conditions can foster it. However, the emerging U.S. experience does offer some lessons about what kind of conditions appear to generate or influence inter-firm cooperation.

Common Crisis. First, a perceived crisis often precedes action. In industrial economies that, unlike the U.S., enjoy a strong history of cooperation among firms, the appearance of a business opportunity by itself may stimulate firms to work jointly. However, in the U.S., the business culture is relatively unfamiliar with associative behavior; thus, the recognition of a serious threat will more likely lead to group activity. The most obvious threat that has spawned the most inter-firm collaboration among U. S. firms is market loss arising from global competition.

Moreover, the commonality among the firms that face the threat must be established quickly. If perceptions about the relative impact of the problem vary widely among members of the group, there may be more suspicion about motives than can sustain cooperation. This helps explain why so many of the emerging U.S. networks are in lagging sectors confronting the most severe competitive pressures.

Common benefit. Firms also frequently need to perceive a very obvious and immediate common benefit. Attitude is less often the enemy of inter-firm cooperation in this case than is time. Owner/managers simply are unlikely to invest the time in exploring inter-firm cooperation without the clear potential for some fairly quick pay-off. This does not mean that all the benefits of cooperation (or even the most important ones) must be immediate, but it does suggest that some pretty quick and obvious gains must offset the loss of time.

Personal contact. Opportunities for face-to-face contact among the firms' owners/managers seem very important, especially among small firms. David Armacost's experience with building a network in Florida, for example, has convinced him that trust and communication are the essential starting points for effective inter-firm collaboration. Personal relationships that can produce trust are quite critical to multi-firm relationships, because the need for flexibility and rapid change in today's economy often precludes reliance on the more familiar formal and legalistic methods of regulating inter-firm interactions. Personal relationships can facilitate problem-solving and accelerate the information flows that lead to higher levels of innovation.

Total firm commitment. The commitment to cooperation must be shared at every work level in the participating firms. The attitude of the person at the top is especially crucial: Ideally, the CEO sets the tone and priorities for all the firms' business decisions, and mid-level managers and workers must see clear evidence of a commitment to cooperation from the chief executive.

Geographic concentration. Finally, geographic concentration is a prevailing but not essential characteristic of most successful inter-firm cooperation. Experience in Europe demonstrates that spatial proximity has been pivotal when sector-related SMEs seek to establish collaborative relationships. Advanced telecommunications and information processing technologies sometimes can substitute for the face-to-face relationships that build trust, but only up to a certain point. Personal relationships develop most rapidly when the firms' owners/managers and workers enjoy frequent in-person contact. The relative density of firms within a region and the extent of the local infrastructure also can be critical. In regions where the firms are not tightly clustered, the role of network brokers may loom more significant.

Should network initiatives target industries or regions?

Many early network efforts in the U.S., as noted, have originated in industries that are declining, both in terms of employment levels and output. Critics argue that trying to save endangered industries may waste resources and raise the potential for the network concept to be rejected; they recommend that effort instead be directed at growth industries like biotechnology, instruments and telecommunications equipment. Similarly, some suggest that attention to SMEs in poor or distressed areas is less likely to pay off than effort aimed at SMEs in strong regions. In short, can and should network

initiatives be employed to fulfill redistributive policies, similar to enterprise zones or retraining programs, or should they be directed toward areas where the greatest growth potential already exists?

The answer to this targeting dilemma cannot be generalized to sectors; it is much more apt to lie within the firm. In other words, the strength of a sector or region is less important than the strength of individual SMEs. Public experiments to catalyze collaboration are most effective if they begin by seeking specific SMEs that exhibit the potential for innovation and growth, firms that want to be high performance work organizations—whatever their industrial classification. Weak SMEs are unlikely to join together for purposes other than to reduce their operating costs, and groups of strong SMEs are unlikely to tolerate weak members.

But targeting decisions that focus on a firm's weakness or strength cannot be made by government agencies based on any existing database. Indeed, public policy should encourage *all* SMEs to seek collaborative opportunities, and then allocate resources based on the merit and potential of the ideas proposed. If, however, a particular industry is crucial to a region's economy—as is wood products in the Northwest or apparel in the Southeast—governments may choose to pay it special attention. But even in these regions, the greatest impact emanates from the firms with the best and most creative ideas, those most willing to innovate and change.

Are brokers or incentives necessary to organize and support networks?

Some development organizations have concluded that public and private agencies can accelerate the formation of inter-firm relationships by carefully establishing incentives to organize and support networks. Incentives commonly take one of two forms. In some cases, state development agencies and/or private foundations offer to subsidize some organizational costs and initial activities of the networks. In others, local development agencies provide "brokers" to help catalyze and maintain the networks.

Incentive Financing. Providing incentive financing was a central element of the Danish approach to network development. In its recent nationwide program, the Danish government agreed to underwrite the cost of studying the initial feasibility for developing specific networks that applied to the program. Some groups of Danish firms also qualified for larger grants

to offset half the cost associated with network planning projects and, as a follow-on, 30 percent of the implementation cost. Such "challenge grants" help reduce the expense of investigating inter-firm relationships, and signal that government is strongly interested in building inter-firm cooperation. Other countries (Spain and Portugal) seeking to stimulate networking activity have established similar challenge grant programs.

Likewise, a few state development agencies and foundations in the United States have set up challenge incentives. Michigan, Ohio, Oregon, New York, Indiana, Arkansas and Pennsylvania are among the states that have used challenge grants to induce networking behavior. In each case, however, programs have been funded at a very modest level and are of very recent vintage—too new to permit careful evaluation. But preliminary evidence suggests that financial incentives by themselves may not be enough to motivate inter-firm cooperation. In cases where the grants have spawned some early success, it's frequently because some non-government institution or individual has devoted time and resources to organizing firms into groups that can pursue the challenge grants.

Brokers. Local development organizations in the U. S. have supported the formation of networks on a somewhat wider scale, by offering "broker" services. That is, they provide a person (the "broker") who meets with firms in the region to outline the potential for networking activity and to encourage firms to explore the new forms of cooperation together. Brokering activities are still rare among local development organizations, but more locals are beginning to explore the concept, sometimes with the support of state agencies that train the brokers. Frequently, brokers continue to work with the firms over a significant stretch of time, often acting as an administrative manager or executive director of the network group.

Brokers play a key role in Danish network development. The typical broker is a private consultant who recognizes networks as a device for organizing small firms into larger groups that can afford to engage his or her consulting services. In Denmark, such consultants and other interested individuals paid fees to acquire "broker training," which was initially provided by the Danish Technological Institute as part of a government program. In Germany, the broker's role is somewhat institutionalized into the mission of the trade and industry associations and the local skill training institutions, such as the Fraunhofer Institutes. In Baden-Wurtemberg, the Steinbeis technology centers now play a significant role in brokering cooperative behavior among small firms. Portugal also considers brokers to be a critical element of the government's networking strategy.

Finding the American Formula. Given the relatively low level of firm collaboration and the absence of strong trade and industry associations in the U.S., Aspen participants generally agree that financial incentives and network brokers are very important. Faced with daily pressures and demands, owner/managers have neither the time nor skills to track down other companies that might be able or willing to help solve their mutual problems. Moreover, SME owners and managers usually will not travel to meet their peers in other firms. Financial assistance for studying the feasibility of inter-firm linkages can be instrumental in overcoming some of these obstacles. Even more important, broker support can extend the time and skills of the owner/manager. Particularly in the early stages of network development, decentralized, locally-based brokers can offer the all-important face-to-face interaction that stimulates attention and action toward networks.

In the U.S., brokers tend to be private consultants or employees of local development organizations. This system has its problems. Consultants are constrained by the availability of dollars for compensation. They become brokers to make money; thus, they tend both to promote their own expertise and services and to rely on either challenge grants or SME dues. Development agency staffers are constrained by the lack of a reward system. Further, the functions and expectations of their existing jobs often vary so much from those of a broker's that they may not possess enough rudimentary knowledge of SMEs to become effective brokers.

Moreover, in stark contrast to Europe, very few industry associations in the U. S. have the resources or capability to facilitate inter-firm cooperation among their memberships. Occasionally, associations may help members develop group insurance programs or set up special joint projects on regulatory compliance. But they seldom have the staff or inclination to become more intimately involved in identifying joint solutions to common problems. On the basis of his experience in Pennsylvania, however, Bob Coy believes that industry associations *can* play an important role in bringing firms together to learn from each other and establish cooperative projects—if they want to. Targeting education at industry association leadership, along with some limited financial support, might help these groups move away from their limited traditional roles as lobbyists and regulation fighters. Pennsylvania's Manufacturing Innovation Network Initiative (MAIN) applied these principles in a successful experiment with trade associations in the foundry, plastics, tool and die, and apparel industries.

However, outside Pennsylvania, industry associations have rarely taken a leadership role in promoting collaborative activity among their memberships. Many associations are uncertain about helping some members form groups that other members might not support. Some even see networks as potential competitors for the financial support that the firms provide to the association—a concern which, at times, is well-justified. A few emerging networks—such as the forgers network in Pennsylvania, the heat treaters network in Ohio and the rural manufacturers in Minnesota and North and South Dakota—have taken on the characteristics of more formal, traditional associations and, to some extent, compete with them.

Is long-term network self-sufficiency a reasonable expectation?

Recently, public and private agencies have started designing network development initiatives with the goal of eventually phasing out their external support; the expectation is that participating firms, once involved in networks, will decide to establish a self-sustaining environment for collaboration. In these cases, as H. Richard Anderson, President of Michigan's Northern Economic Initiating Corporation, says, "Government's role is to promote transformation, not just transactions." That is, a successful public intervention or external funding effort should be temporary; it is supposed to change the attitudes of firms toward working with and learning from each other. Proponents generally present such network initiatives to legislative bodies as short-term programs in which government is a catalyst, using the assumption that firms will find sufficient value to justify allocating their own resources to form networks or employ brokers. Each program typically identifies a specified period of time to accomplish its goal.

But is it reasonable to expect to change the established behavior of firms over the course of a few short years? Aspen participants expressed attitudes ranging from cautious optimism to strong skepticism about the willingness of large numbers of SMEs to continue investments and sustain networks on their own. The optimism is based on many examples of spontaneous network formation lacking outside support, driven either by crisis or by new or expanding business opportunities. Yet skepticism persists, largely due to the fact that the current scale of network activities is quite small in comparison to its estimated potential.

Should self-sufficiency be expected? If yes, when? Technology extension programs offer a comparable situation. They too are launched with

the expectation that they will create demand for services and, eventually, elicit a willingness from firms to pay fees for the valued services. Yet rarely has this been achieved. No U.S. technology extension program or SME service center to date has reached a high level of self-sufficiency.

European experience with self-sufficiency is mixed as well. After a decade of receiving financial support, Emilia-Romagna's highly regarded ERVET service centers—including the knitwear industry's center, CITER—are not yet self-sufficient.² By contrast, the Danish Technological Institute and the Steinbeis Foundation's Technology Transfer Centers offer examples of institutions that now operate with little (only about 10 percent) government support. In both these regions, however, government agencies provide other forms of information and business assistance.

Mario Pezzini suggests that governments generally initiate new programs because firms can't afford certain services or sources of information, or because there is too little customer demand for the specialized services to attract private providers—even though the information and services are vital to an important industrial sector in the region. Under such circumstances, governments might justify playing a continuing role. For example, state and federal dollars continue to support cooperative agricultural extension services and experiment stations in the United States. Farmers have never been expected to pay for the costs of these services because a strong agricultural sector is thought to be in the public interest. In a similar vein, the ERVET programs, Pezzini argues, should not be asked to operate without any government support.

The Joyce Foundation's Unmi Song points out that if the purpose of industry centers is to catalyze new product development—that is, experimental programs and practices—which is a legitimate goal of government, and if these centers are non-profit and cannot gain returns on investments, then continued government support may be justified. Or, if networks spur regional development, and if regional economic development is a public good, perhaps network brokering, information and selected services, particularly in sparsely populated areas, could and should receive long-term support. On the other hand, services that are readily available in the private sector at market prices, or services whose benefits can be captured and held by a single firm or network, ought not to receive long-term subsidies.

² In the months following the Aspen meeting, in fact, most of the ERVET Centers (not CITER, however) were closed when government support was withdrawn and industrial support was too low.

One way to resolve this issue of subsidy is to be very precise about the objective of the service or project. In general, if an effective service catalyzes and facilitates—rather than problem-solves—it should be treated as part of the economic development infrastructure, not as a service for a fee. On the other hand, service centers that act as network hubs, as well as other programs aimed at solving discrete problems, should be established on a fee-for-service basis. Eventually they should become self-sustaining (or very close to it) or get out of the business.

Do networks lead to innovation?

The ultimate goal of networks is to increase innovation, the driving force of economic growth. Yet SMEs rarely pursue “innovation” as an early network activity. This seeming reluctance is both understandable and explainable. First, firms find it difficult to plan innovation and to measure its effects. So instead, they seek projects with quick, tangible results. Second, innovation is the very thing that gives individual SMEs their competitive edge; hence, they consider it proprietary information and want to protect it from other firms. Thus, SMEs find it much more difficult to collaborate on R&D—even in Germany where networks are well established, as Kevin Morgan notes. Indeed, the prevailing ethos among German SMEs is “My knowledge is my lifeblood.”

Ironically, collaboration can and does lead to innovation, but probably not often in formalized network activity. There are exceptions: for example, situations where an innovation is already common knowledge and firms seek ways to adopt it more quickly or economically, or where developing a specific product requires the collective expertise of firms. More often, however, innovation occurs in networks not as a targeted collective activity, but as the offshoot result of what firms learn from each other when collaborating for other purposes. In northern Italy, Rafaele De Maria explains, the existence of networks with person-to-person contacts is essential for the high level of creativity in the region. Innovations in the networked SMEs surface as incremental improvements in products or processes, stimulated by the knowledge gained from casual conversations with peers, customers, suppliers, vendors and even competitors, as well as individual responses to joint study tours, plant visits and expert presentations. Because the changes can seem minor until aggregated, they often are not even recognized and classified by firms as innovations.

Do networks improve skill formation and work organization?

In the United States, SMEs typically hire less-educated workers, provide less formal training and offer lower wage scales and smaller benefit packages than do large firms—despite the fact that work tasks in SMEs often are more diverse and demanding. Moreover, few SMEs have become what experts call high performance work organizations.³ Both these conditions make it difficult for SMEs to attract or retain good, technically-competent employees.

Can networks lead SMEs toward higher performance organization, greater training investments, higher wages and increased entrepreneurial activity?

Work Quality and Organization. There is some reason to believe that networks can improve work and work organization:

- *Training itself can be a network activity.* A few U.S. networks already have formed around education and training needs. Groups of metalworking firms, for example, are collaborating both to attain the scale of demand necessary to justify specialized training courses at schools, and to experiment with new youth apprenticeship programs. In apprenticeships, young people rotate among member firms to gain broad experience before taking on full-time employment. SMEs, which rarely have participated in such programs in the past, gain significant employee value from apprenticeship initiatives.
- *The benefits of cooperation can transfer into the firm.* Network cooperation among firms requires greater reliance on others, increased communications and shared responsibility—all qualities that may be transferable to the internal as well as external operations of participating SMEs.
- *Example speaks louder than words.* Examples set by—and competition from—network firms that feature the highest-performance workplaces may inspire other member firms to imitate them.

Despite their potential, too few firms are using networks as opportunities to change the way they operate, organize work and use the intelligence and experience of their employees internally. Most SMEs still tend to believe

³ A high performance work organization is a term used to describe firms whose top priorities are product quality and customer service, that give frontline workers better skills, broader responsibilities, and more authority and achieve significant flexibility by organizing workers into teams developing systems that accelerate learning and innovation.

that low cost is what will make them most competitive. They view human resources and resource development as costs to be minimized, not investments with returns to be realized. Until SMEs also begin to establish teamwork and collaborative relationships *within* their operations, increased skills and knowledge will not fulfill their potential or promise.

Entrepreneurial Activity. Similarly, these is reason to believe that combining an SME work environment with networks may lead to increased entrepreneurial activity. To start, work in small firms is more conducive to the start-up of new, offshoot SMEs, simply because employees in small firms are closer to the ground. By necessity, they must be versatile enough to take on any and every task to get the job done. Thus, SME workers are exposed to more aspects of business, more business opportunities, and they are closer to the markets. Networks can add to this asset, by multiplying opportunities to identify and develop specialized products. Regrettably, however, this still looks to be more obvious in theory than in practice.

What outcome measures can be used to assess network progress?

Accountability rapidly is becoming one of the fundamental operating principles of good and responsible government. More and more, citizens and their representatives are holding public agencies accountable not only for how public funds are spent, but, more importantly, for the results that the programs' architects and sponsors promise.

The key phrase in accountability today is "Go for *outcomes*, not *inputs* or *outputs*." In the case of network programs, value must be measured ultimately by their impact on SMEs, SME employees and a region's economy, not by the dollars invested (input), or how many SMEs participated (output), or the numbers of networks formed (output). Instead, outcomes—such as changes in profits, sales, wages, income, employment and other local economic conditions, and the sustainability of all these—must be evaluated. The Danish government has conducted a midpoint audit of its network program to measure the first outcome—impacts on SMEs. For instance, 42 percent of the new Danish networks realized new sales, 67 percent reduced costs, and 75 percent believed they had become more competitive. Further, 94 percent said they would continue to collaborate after the subsidies had ended.

Measuring outcomes is hard as it is. Outcomes are evaluated best through surveys and in-depth, long-term case studies, a costly and time-

consuming process. Unfortunately, proponents of any modernization policy, including networks, face the added twist that results of programs that target existing SMEs are much more difficult to assess than more conventional *growth* programs—like firm recruitment or entrepreneurship assistance—where outcomes can be measured by quantity, not quality. Quite simply, it is far easier for legislators to count the number of jobs created in recruited plants or start-up businesses than in slowly-but-steadily growing SMEs.

Since success can be quite obscure, Phil Shapira of the Georgia Institute of Technology suggests it may be better to measure failures—and conclude that lack of failure is success. For example, a network fails if it cannot provide greater demonstrable net benefits to individual firms over the long run than the firms could achieve by themselves, if workers do not share in the benefits that firms reap, if it does not stimulate fundamental changes in business behavior, and if it does not motivate learning and continual improvement. Another suggested measure was self-sufficiency, that is, the degree to which SMEs are willing to pay for the services and continue the network practices originally stimulated by public incentives and subsidies.

State and Regional Strategies

Government's Role in Stimulating Inter-firm Cooperation

Government can be a very significant force in encouraging inter-firm cooperation among SMEs. Its proper role rests at a very strategic level, seeking to influence the form and pace of cooperation, but not necessarily its content.

The Public and Private Interest. The interests and aims of government must not be confused with the interests and aims of individual firms: They are not the same. A firm must see its individual advantage in collaboration. It will act only out of that interest; and if it has none, no amount of government prodding will induce a firm to participate in networks. On the other hand, if the resulting gain and interest are both immediate and obvious, the inter-firm activity will likely go ahead no matter what government does. Denmark Network Entrepreneur Neils Christian Nielsen suggests that the government's precarious role lies somewhere in the gap between first, the individual and objective pecuniary interest of firms and second, the collective and more subjectively measured interest in building a competitive economy that equitably improves standards of living. However, this distinction is often difficult for governments to make.

Indeed, too often states have ignored the fact that businesses learn best from their interactions within the marketplace, not with public agencies. Businesses become familiar with new market opportunities, new technologies, better ways to manage capital and advanced skill requirements chiefly from their engagements with other firms—suppliers or customers, partners or competitors. Economic development strategies can help accelerate this learning by facilitating the flow of information and by strengthening key private market mechanisms.

The Choice of Supply or Demand. State economic development strategies have focused predominantly on the supply side—building the stock of public programs—instead of concerning themselves with the demand side—building and articulating the need for services among firms. Traditional economic development largely has created more public sector programs that directly *provide* services or assistance to businesses or correct some market limitation. While these programs may have laudable purposes, many have not been very successful. And taken together, they comprise a bewildering array of small, fragmented, poorly coordinated and underfunded programs that not only are marginal to the needs of the very small manufacturers they seek to help, but also are virtually unknown to the

vast majority. Meanwhile, there are very few efforts to spur a higher awareness of the need to modernize and more demand for services they can help.

Bob Friedman of the Corporation for Enterprise Development expresses concern that the concept of promoting inter-firm cooperation, which embodies a demand-side policy, is being implemented around the United States as just another supply-side program. If networks continue to be developed merely as extensions of existing supply-oriented programs by existing economic development institutions, he contends, their potential will be largely squandered. The power in the potential of networks lies in their ability to transform, through peer example and influence, the values, beliefs and behaviors of the people—owners, managers and workers—within the firms. Minnesota Technology's Jacques Koppel notes further that the attitudes and experience of traditional economic development practitioners present important limitations to government policy. Many, he observes, come out of the old-school approach of economic-development-as-real-estate-dealmaking; they discount the notion of inter-firm collaboration as merely another fad in a field sharply influenced by fads. Consequently, it continues to be very difficult to introduce ideas about industrial modernization within a system staffed by people who see their role as running programs and making site location deals.

Transforming Policy. This situation calls for "networks as transforming policy." If encouraging network approaches is adopted as thoroughgoing government development policy rather than pursued in a simple, discrete program or project, networks have the potential to alter general business culture and practice, and may leave a panoply of joint ventures and a new private sector infrastructure in their wake. Pursuing networks as a transforming policy, according to Friedman, involves at least five major components:

- *Broad-based state leadership* that includes both the public and private sectors.
- *An intensive media campaign* to clarify the relationship between global economic challenges and collaborative solutions.
- *A multi-agency campaign* to stimulate demand for networks and to create the private sector infrastructure to foster them.
- *Better information* for firms, especially performance benchmarks.
- *Consolidation* of public funding streams and programs.

As mentioned earlier, many in the U.S. are implementing networking as "another program," not a process or overall strategy. If this does not change, networking will have limited impact on development. On the other hand, a networking strategy that emphasizes inter-firm cooperation cannot substitute for comprehensive industrial modernization; rather, it is a fundamental element of a sound modernization strategy and can help shape the approach. Networks can develop a greater awareness of the need for change, foster a collective vision about how to make that change, accelerate demand for crucial modernization services, and help firms learn about them and then acquire ideas and services from each other.

A Federal Agenda

Action for the New Administration

The federal government has begun to advance many of the fundamental aspects of collaboration put forth in the Aspen meeting—but aimed almost exclusively at large corporations. Among our nation's big firms, forms of cooperation that do not violate anti-trust laws are no longer anathema to national policy; indeed, they are actively encouraged. The National Cooperative R&D Act, federal support for Sematech, and funding for Advanced Technology Programs all are founded on the principle that U.S. business cooperation will enhance competitiveness. Yet few if any of these policies and programs target SMEs.

What should the federal government do to advance collaboration among SMEs? Up until now, the burden has been carried by private foundations and a few states. It is time, this group believes, for the federal government to step into the forefront. The Aspen group suggests the following seven steps that use the power of the federal government to stimulate more competitive, cooperative actions by SMEs.

1: *Use the Power of Persuasion.* The president and other national political leaders can, by their use of persuasion alone, inspire and influence the attitudes of agencies and businesses toward cooperation. They can make it clear that collaboration among SMEs need not minimize competition; indeed, it will accelerate modernization and allow smaller firms to flourish in the global economy. Including modernization and addressing the value of cooperation in deliberations over economic issues will help SMEs overcome their reluctance to trust government and each other. Adding collaboration as a criterion for Malcom Baldrige awards, for example, or establishing a special award for networks. Also would send a clear message that networking is accepted and encouraged.

2: *Establish a Network Agenda.* Closely related to the first, a new National Commission on Cooperation and Industrial Competitiveness, if created by the President, could draw SME owners and their representatives into the national industrial policy debate, and help formulate a shared agenda for fostering SME networks that will take on world markets.

3: *Educate Your Own.* The federal government should educate its own field staff, housed in federally-funded services and centers, about network development—so that they can serve as network brokers or refer

businesses to potential network opportunities. Cooperative extension agents, and the staff of small business development centers, NIST's Manufacturing Technology Centers, and regional planning districts like the Appalachian Regional Commission would especially benefit from learning about collaborative approaches to industrial modernization.

4: Target Dollars to Networks. Portions of existing federal program resources can be rededicated to fostering networks. For example, federal grant programs could set aside a percentage of available dollars to fund proposals submitted jointly by three or more small or medium-sized firms, as many European nations and the European Commission have done. Ripe for this strategy are the Small Business Innovation Research Program or the Community Development Block Grant program. A new incentive-based Advanced Technology Program for SMEs likewise would send a message that collaboration is desirable.

5: Spark State Action. The federal government should offer states matching grants to spur networking. Specifically, incentives modeled on the State Technology Extension Program (STEP) of the National Institute of Standards and Technology (NIST) would likely steer states toward network modernization activities.

6: Demonstrate, Demonstrate, Demonstrate. Nothing convinces like experience—if it's visible. The federal government could launch and partially fund network demonstrations, evaluate them, disseminate the knowledge, and conduct ongoing research to learn more about the value of networks. Demonstrations can test assumptions about various forms of networks, determine the conditions under which they operate most effectively, provide evidence to SMEs interested in exploring networks, and leverage state and local support.

7: Make it Legal. Legal issues—like anti-trust and shared liability—frustrate and confuse many embryonic network efforts. The federal government can examine these concerns and then lead the legislative reform or clarification effort.

None of these recommendations is intended to be costly—or permanent. Each aims to put the federal government in a leadership role, helping it become an active catalyst for networks instead of a passive on-looker.

It is, of course, difficult and perhaps impossible to strike just the right note that captures the thinking of the twenty-eight people that participated in the Aspen discussions. Our diverse perspectives fueled disagreement more often than they sparked collective epiphany. Still, we believe that the concept of inter-firm cooperation has the power to accelerate the modernization of small firms. It can speed their learning, pool their problem solving, increase their productive capacities and enhance their market power.

Development theorists and practitioners should continue to encourage the demonstration of networking among small firms. We need to be a little more thoughtful and strategic as we do so. We also need a little more theory and a lot more practice. We ought to focus more clearly on the objective of modernization and we ought to act as though we are in the networking business because it is a smart strategy in the long run, and not because it's a faddish program in the short run. We need our federal government to get in the act, but we need it done with a deft touch. We need public policy to promote and enhance networking as a private sector phenomenon.

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Regional Technology Strategies, Inc. (RTS), is a tax-exempt non-profit organization with main offices in Chapel Hill, North Carolina and a New England Office in Providence, Rhode Island. The organization designs, develops, pilots, and assesses technology related policies and programs that will enhance industrial competitiveness, economic development, and technical employment opportunities, and pays special attention to least advantaged areas and populations.

The Rural Economic Policy Program

The Rural Economic Policy Program (REPP) of The Aspen Institute, seeks to stimulate fresh thinking, collaborative leadership and learning in the field of rural development policy. To carry out this mission, REPP engages policymakers, practitioners and critical thinkers from local, state and federal governments and the non-profit development community. Established in 1985, and currently supported by the Ford Foundation and the W. K. Kellogg Foundation, the REPP encompasses all grants and activities previously directed by State Policy Programs (SPP). For more information about the program, write Rural Economic Policy Program, 1333 New Hampshire Avenue, N.W., Suite 1070, Washington, D.C. 20036.



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