

**The Evaluation of USNet:
Overview of Methods, Results and Implications**

Final Report

Dr. Philip Shapira

School of Public Policy, Georgia Institute of Technology
Atlanta, GA 30332-0345, USA
email: ps25@prism.gatech.edu

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Regional Technology Strategies, Inc.
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Manufacturing Extension Partnership
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Executive Summary

This report summarizes the aims, methods, and principal findings from the evaluation of USNet. The USNet project was a pilot initiative to build the capacity of its partners to promote inter-firm collaboration, with the ultimate aim of enhancing the competitiveness of small and mid-sized manufacturing enterprises.

USNet's partners comprised a consortium of state-based manufacturing assistance organizations, along with the Manufacturing Extension Partnership of the National Institute of Standards and Technology (NIST). Regional Technology Strategies, a nonprofit economic development organization based in North Carolina, served as the managing partner of USNet. Federal funding for USNet was granted through the federal Technology Reinvestment Project, under the administration of NIST. The federal funds were matched by state and local funds and in-kind contributions provided by each partner.

The implementation of the USNet evaluation involved a networked group of evaluation specialists from three different organizations – Georgia Institute of Technology, the University of Georgia, and Nexus Associates, Inc. The report discusses the findings of the major USNet evaluation studies undertaken by members of the evaluation team. The evaluation results from USNet's Foundation Forum training initiative are reviewed, including both end-of-session and long-term outcomes. There is an assessment of the impacts on firms of participating in inter-firm business networks and a review of what the available case-study literature tells us about how to promote inter-firm networks. The report also highlights the findings from an evaluation of USNet's technical assistance services and special projects and reviews USNet's impacts in partner states. Finally, there is a concluding section, in which insights and recommendations for further action are offered.

The principal findings of the evaluation are:

- Firms who collaborate in inter-firm networks report positive net benefits, while greatest private impacts are associated with strong industry leadership of networks
- USNet's original network promotion goals were too ambitious, given the resources available
- Judged against more realistic expectations, USNet has performed well
- USNet's training programs have generated widespread awareness about inter-firm collaboration
- USNet special projects demonstrate the value of explicit follow-on initiatives to promote inter-firm collaboration
- USNet policy and organizational impacts at the state level were modest
- Federal support can strengthen efforts to promote inter-firm collaboration at the state level and aid shared learning

We found that local MEP service providers are interested in efforts to promote inter-firm collaboration. There remains a valuable opportunity for a focused organization outside of the MEP or a renewed program within the MEP to promote the concept. Within the MEP, stronger encouragement for inter-firm collaboration by NIST management would assist MEP service providers in extending local network activity. Additional special project funding to support demonstration networking efforts by local MEP centers would also be worthwhile. At the very least, opportunities for inter-state exchange and sharing should be sustained, drawing on the positive experiences reported from the USNet Partners' Learning Network.

Contributors to the USNet Evaluation Component

Philip Shapira is an Associate Professor with the School of Public Policy, Georgia Institute of Technology, Atlanta, GA, and co-director of the Georgia Tech Policy Project on Industrial Modernization. He directed the evaluation component of USNet and supervised the design, implementation, and analysis of all USNet evaluation studies.

Jan Youtie is a Senior Research Associate with the Georgia Tech Economic Development Institute, Atlanta, GA, and co-director of the Georgia Tech Policy Project on Industrial Modernization. Dr. Youtie analyzed the USNet Foundation Forum end-of-session evaluations, assisted in two USNet state benchmark studies, and participated in the business impact and special project studies.

Mary Alabanza Akers has a joint appointment with the Institute of Community and Area Development and the School of Environmental Design at the University of Georgia, Athens, GA. Dr. Alabanza Akers conducted the second Foundation Forum follow-up study, the assessment of USNet special projects, and the second USNet state benchmark study.

Gordon Kingsley is an Assistant Professor with the School of Public Policy, Georgia Institute of Technology, Atlanta, GA. Dr. Kingsley conducted the first follow-up evaluation of the USNet Foundation Forums, and the review of case studies of inter-firm networks.

Hans Klein is an Assistant Professor with the School of Public Policy, Georgia Institute of Technology, Atlanta, GA. Dr. Klein participated in the review of case studies of inter-firm networks.

Eric Oldsman is the President of Nexus Associates, Belmont, MA. Dr. Oldsman guided and contributed to the study of business impacts from inter-firm collaboration.

Doug Welch was a lead researcher in the study of business impacts from inter-firm collaboration while at Nexus Associates, Belmont, MA. He is now with CMI Vantage Partners, Cambridge, MA.

Julie Lee is with Nexus Associates, Belmont, MA. She contributed to the study of business impacts from inter-firm collaboration.

Krassimira Paskaleva is a Senior Researcher with the Georgia Tech Research Institute, Atlanta, GA. Dr. Paskaleva assisted in database development for the USNet Foundation Forum end-of-session evaluations.

Definitions

Business network	A group of three or more companies who have joined together - mutually or through an association or other hub organization - for common business purposes, such as production, marketing, technology, or learning.
Hub organization	A service center, agency, or group that seeks to stimulate and support business networks.
Inter-firm collaboration	Explicit initiatives to promote cooperative enterprise strategies, including shared strategies for production, marketing, training, learning about new business practices or advanced technologies, or addressing other mutual needs and opportunities.
Network broker	Individuals who actively seek to catalyze networks and who facilitate the on-going work of those networks. Brokers may come from the public or private sectors.
SME	Small and medium-size enterprise - generally with fewer than 500 employees.

1. Introduction

This report summarizes the aims, methods, and principal findings from the evaluation component of USNet. The USNet project was a pilot initiative to build the capacity of its partners to promote inter-firm collaboration, with the ultimate aim of enhancing the competitiveness of small and mid-sized manufacturing enterprises (SMEs).

USNet's partners comprised a consortium of state-based manufacturing assistance organizations, along with the Manufacturing Extension Partnership (MEP) of the National Institute of Standards and Technology (NIST). Regional Technology Strategies (RTS), a nonprofit economic development organization based in Chapel Hill, North Carolina, served as the managing partner of USNet. Federal funding for USNet was granted through the federal Technology Reinvestment Project, under the administration of NIST. The federal funds were matched by state and local funds and in-kind contributions provided by each partner.

In its initial TRP proposal, USNet aimed to provide six specific types of services to state partners to upgrade their capacities to promote inter-firm collaboration. These services comprised technical assistance, training, the development of learning groups, information and resources, assessment tools and performance metrics, and assistance with international connections. Services were to focus on a consortium of ten partner states, with the aim of fostering up to ten networks per year per state, or about 300 networks each involving 20 to 25 firms over the life of the project. A series of related goals were also planned, including the number of people completing broker training, requests for clearinghouse for information, and the use of networking techniques among industrial extension agencies.¹

As the project began to get underway, it was soon realized that some of USNet's quantitative goals were too ambitious for the resources available and needed to be recast. It turned out that the states involved in the project were at disparate stages in the process of developing capabilities for inter-firm collaboration, and that each state had distinct and different needs. Rather than a broad multi-state approach, USNet subsequently worked with each individual state to develop customized activities and projects within the six categories of service defined by the proposal.

Ultimately, fifteen states participated in a formal way with the USNet project.² USNet's principal activities with these state partners occurred over roughly a three-year period

¹ Regional Technology Strategies, Inc., *USNet: An Enabling Service for Manufacturing Networks*, Proposal submitted to the Advanced Research Projects Agency, Technology Reinvestment Project, July 1993. See especially page 21.

² Organizations from these states participated in USNet: Connecticut, Delaware, Florida, Illinois, Kentucky, Louisiana, Massachusetts, Minnesota, New York, North Carolina, Oklahoma, Oregon, Virginia, Washington, and West Virginia. Some states participated for less than the full three years.

from mid-1994 through to the end of 1997. In the project's first year, there was an emphasis on customized strategic planning with state partners and on the design and delivery of training programs ("Foundation Forums") to foster an increased understanding of inter-firm collaboration. In year two, there was a continuation of training services and strategic planning assistance, with additional thrusts to provide technical assistance to particular networks, briefings for company executives, and resource and marketing materials. In year three, USNet emphasized firm-level services, through challenge grants to individual networks, technical assistance, and tool-kits and case studies to assist in network development. USNet also continued to offer training and basic capacity-building services.

USNet's cumulative three-year federal funding was a relatively modest \$973,000. In Year 1, a 50 percent match was required from the state partners, which rose to 60 percent and 70 percent in Years 2 and 3 respectively. Each state contributed approximately \$25,000 per year of membership plus in-kind funds, with this amount then matched by federal TRP funds, based on the allowable ratio. The total of all federal and state funds, including state cash and in-kind contributions, to USNet over three years was about \$2.4 million. Each state was able to draw on an individual federally-augmented "state account" to fund specific USNet services and activities. Some state and federal funds were allocated to USNet development costs and general activities.

The evaluation element of USNet judged the project's performance in terms of the effects on state capabilities to promote inter-firm collaboration, which continued as the overall goal of the project, and the quality and impact of the various types of services offered. In the next part (section 2) of this report, the evaluation procedures used to evaluate USNet's services and impacts are described. Following this, the balance of the report discusses the findings of the major USNet evaluation studies. The evaluation results from USNet's Foundation Forum training initiative are reviewed (section 3), including both end-of-session and long-term outcomes. There is then an assessment of the impacts on firms of participating in inter-firm business networks (section 4) and a review of what the available case-study literature tells us about how to promote inter-firm networks (section 5). The next section highlights the findings from an evaluation of USNet's technical assistance services and special projects (section 6), followed by a review of USNet's impacts in partner states (section 7). Finally, there is a concluding section, in which insights and recommendations for further action are offered (section 8).

The individual studies on which this report draws are available and published separately. A list of USNet evaluation publications is contained in the appendix. Most of these studies can be obtained in an electronic document format through the worldwide web at <http://www.cherry.gatech.edu/ifc>.

2. USNet Evaluation Design

The mission of USNet was “to build the capacity of its partners to promote inter-firm collaboration that strengthens and accelerates the competitiveness of small and medium-sized manufacturers”.³ USNet set out to do this through providing training and technical assistance, sharing experience, diffusing knowledge, developing tools and performance measures, and promoting supportive industry-driven services and policies.

The parallel evaluation component that was designed to track USNet’s activities by necessity focused on assessing the activities and performance of the program. In addition, the evaluation component was also designed to strengthen and advance strategic learning about inter-firm collaboration. The intent was to apply scarce evaluation resources to better understand inter-firm collaboration and its motivation, organization, and impact – and to feed this knowledge back into policymaking and network development strategies.

As part of this multiple-approach, the USNet evaluation effort was structured around three themes:⁴

- **Effectiveness of USNet activities and services.** We wanted to assess the performance of USNet in delivering training, technical assistance, shared learning experiences, tools, and other services to its principal partners, the member states.
- **Impacts on partner capabilities, services, and policies.** Here, we examined the extent to which USNet built the capabilities of its partners states and organizations to promote inter-firm collaboration through industry-driven services and supportive policies.
- **Impacts on collaborating small and mid-size firms.** We were concerned to learn more about why firms became involved in inter-firm collaboration and to probe the effects of collaboration on firms’ business strategies, competitiveness, and economic performance.

Probing these themes was essential to understanding the benefits, costs, net impacts, and policy lessons from efforts to build capacity for inter-firm collaboration. Yet, at the same time, it was recognized that the kinds of evaluative questions raised by the themes noted above would be intrinsically difficult to answer. For example, many factors influence how states structure their business and economic development strategies, and USNet had

³ Regional Technology Strategies, Summary and Response to the USNet Meeting in Washington on April 27, 1994, memo, May 19, 1994.

⁴ For further details on the initial design of the USNet evaluation component, see: Philip Shapira, *USNet – An Enabling Service for Manufacturing Networks: Evaluation Strategy*, USNet Evaluation Working Paper 9401, June 1994.

relatively few resources at its disposal to influence such decision-making. Since USNet was a rather small initiative, it was not realistic to expect massive results. Moreover, the evaluation was complicated by the fact that USNet was itself an intermediary organization. It delivered services to geographically and industrially diverse partner states and organizations. This meant that impacts at the level of firms, local economies, and state policies could only be achieved if those partners subsequently took action. Nonetheless, we did hope to identify insights that could be useful to USNet members and stakeholders and to the broader communities interested in inter-firm collaboration and economic development.

Several different measurement and evaluation methodologies were used. We tracked the activities and services that were delivered, observed the partners learning network meetings, and conducted end-of-session assessments with trainees and trainers at USNet Foundation Forums and other training events. These end-of-session assessments provided immediate feedback on trainees' satisfaction and learning and on their implementation plans. We also completed two follow-up studies of Foundation Forum trainees to assess the longer-term effects of training on participant's organizations and efforts to promote inter-firm collaboration. Case studies were undertaken of special USNet projects, including technical assistance to specific states and challenge grants. A benchmark survey of participating states was conducted at the start of USNet in 1994; a second state benchmark was completed early in 1998, at the end of the federally sponsored USNet project. This helped to measure changes and developments in state policies and programs for inter firm collaboration during the period of USNet's operation. We also sponsored a meta-case analysis of more than 120 case studies of industrial networking. Finally, we conducted our own study of network brokers and network member companies, to provide information on the organization of inter firm collaboration and the business impacts associated with it.

Deliberately, these methodologies employed a mix of quantitative and qualitative measures. As necessary, we pioneered new tools, as with the survey of network member companies. Plans and methods for individual studies were discussed at meetings of the USNet Partners' Learning Network and included in the annual operating plans submitted to NIST. As they were completed, individual studies were made available to USNet partners and to other interested parties (see the appendix to this report for the full list of USNet evaluation studies). Presentations on the results were again made at meetings of the USNet Partners' Learning Network, NIST annual reviews, and at other meetings involving evaluators and policymakers. Dissemination also occurred through *Firm Connections* (particularly a special issue on the evaluation of USNet, published in December 1997) and the worldwide web. Additional publications are planned.

The implementation of the USNet evaluation element involved a networked group of evaluation specialists from three different organizations – Georgia Institute of Technology, the University of Georgia, and Nexus Associates, Inc., under the direction of the

USNet evaluation coordinator (Philip Shapira). The full roster of those involved in the USNet evaluation element is included at the front of this report. Different combinations of members from this group contributed to particular studies. In following sections, the findings of the major USNet evaluation studies are discussed, beginning first with the USNet Foundation Forum.

3. The USNet Foundation Forum – Effectiveness and Outcomes

The Foundation Forum program was a USNet education and training initiative for presenting the fundamentals of inter-firm collaboration and network formation. Between November 1994 and October 1997, nearly 700 participants attended USNet Foundation Forum workshops and associated Executive Briefings (Table 3-1). These participants represented public agencies, economic development organizations, manufacturing extension programs, educational institutions, private consulting firms, and business enterprises.

Some thirteen of the USNet workshops were “full” Foundation Forums, targeted mainly to business assistance providers, extension agents, and network program staff. These were offered for at least a full day and, in six cases, extended for a second day of hands-on planning. Four other shorter events were held (usually for about one half of a day), targeted at business executives and program managers.

USNet Foundation Forums were usually planned and taught by experienced outside consultants, with assistance from staff of Regional Technologies Inc., and the local co-sponsor. Owners and managers from businesses engaged in industrial networking were involved as presenters in several of the sessions.

The Foundation Forum was designed as an introductory course that presented the fundamentals of inter-firm collaboration. Each Forum offered a conceptual framework for thinking about inter-firm collaboration, an inventory of the resources and methods available for forming networks, information and materials on how to communicate inter-firm collaboration with small manufacturers, and examples of existing inter-firm networks. There was customization of the curricula and content of each Foundation Forum event, although most events included these core items:

- What is inter-firm collaboration?
- What are the benefits of inter-firm collaboration?
- Network mind-map.
- Case studies of inter-firm collaboration.
- What role can I play and what resources are available?
- Key opportunities and barriers.
- Action steps.

Table 3-1 USNet Foundation Forums and Briefings

Location	Start Date	Days	Co-sponsor with USNet	Part.*
Foundation Forums (13 workshops, 568 participants)				
Albany, NY	11/10/94	1	New York Department of Economic Development	
Waltham, MA	11/19/94	1	Bay State Skills Corporation	63
Seattle, WA	12/2/94	1	Washington State – Corporation for Product Development	75
New Britain, CT	12/13/94	1	Connecticut Flexible Manufacturing Network Center	60
Oklahoma City, OK	1/19/95	1	Oklahoma Alliance for Manufacturing Excellence	58
Lafayette, LA	2/20/95	2	Louisiana Department of Economic Development	27
Minneapolis, MN	4/11/95	1	Minnesota Technology, Inc.	60
Orlando, FL	10/19/95	2	Florida Enterprise	16
Wilmington, DE	10/25/95	2	Delaware Manufacturers Alliance	32
Charleston, WV	6/8/96	2	West Virginia Development Office	47
Bloomington, IL	7/6/96	2	Illinois Department of Commerce & Northern Illinois University	27
Durham, NC	9/11/96	1	North Carolina Alliance for Competitive Technologies	26
Lisle, IL	10/16/96	2	Illinois Department of Commerce & Northern Illinois University	12
Executive Briefings and Other Forums (4 briefings, 65 participants)				
Milwaukee, WI	2/13/96	2		65
Durham, NC	9/12/96	1	North Carolina Alliance for Competitive Technologies	22
Rockford, IL	11/13/96	1	Illinois Department of Commerce & Northern Illinois University	10
IL	10/1/97	1	Illinois Department of Commerce & Northern Illinois University	30
Total (17 Events, 695 Participants)				

Note: Part* = Number of participants.

Two different types of evaluations were conducted of the USNet Foundation Forums. First, at the end of each workshop, participants were given an end-of-session questionnaire to provide immediate feedback. Lead instructors at each workshop were also asked to provide their own views, in writing. Second, we conducted longer-term follow-up assessments with Foundation Forum participants, at about 6 to 18 months after participation. We anticipated that – at the end of the training session – participants might overestimate the actions they would pursue as a result of Forum participation. Our longer-term follow-up allowed sufficient time to elapse for the actual impact of the workshop participation to be realized. We conducted two follow-up studies, focused on the thirteen full Foundation Forum workshops. One study, which was completed in November 1995, followed-up on a first group of six Forums. The second study, completed in October

1997, follow-up on a second group of seven Forums. The results from the end-of-session and follow-up studies are considered in the following sections.

3.1 Foundation Forum End-of-Session Assessments

A questionnaire survey was implemented at the end of each forum and workshop session. For the thirteen full Foundation Forum workshops, questionnaires were returned by 339 of 568 participants, a response rate of 59.7 percent. Analyses of returned questionnaires were conducted for each full Foundation Forum and for Executive Briefings, with individual feedback reports provided to Regional Technology Strategies, lead trainers, and local co-sponsors.⁵

The responses from the survey provided a profile of the Foundation Forum attendees.⁶ Public agencies or economic development organizations employed more than two-fifths of the participants. About one-fifth of the participants were from manufacturing extension programs.⁷ Nearly as many (18 percent) of the participants were from private consultants, businesses, or industrial associations.⁸ (See Table 3-2)

About one-half of the participants were recruited to attend the Foundation Forum through their employing organization, generally as a result of outreach conducted by the local co-sponsor (or, in several cases, through attendance by staff members of the co-sponsor). Recruitment through flyers, advertisements, or direct mail and through colleagues or

Table 3-2 Employment of Foundation Forum Participants

Type of Organization	Percent of Respondents
Public agency, economic development organization	44.1%
Industrial extension program	20.7%
Educational institution	12.1%
Private consulting firm	9.9%
Business enterprise	5.7%
Industry, trade, business association	2.5%
New organization to promote networking	2.5%
Other (private non-profit)	2.5%

Source: End-of-session evaluations of 13 USNet Foundation Forums (N=343)

⁵ Philip Shapira and Jan Youtie supervised the end-of-session evaluations of the Foundation Forums, including survey design and analysis. Krassimira Paskaleva assisted in initial data entry.

⁶ Results reported in this section are for the 13 full Foundation Forums, where consistent data is available.

contacts in other organizations each stimulated a further one-fifth of enrollments. The majority of participants (82 percent) described their prior experience with inter-firm collaboration as low to medium.

Generally, participants viewed the Forums as useful training sessions. On a 1 to 5 (low to high) scale, participants rated the trainers at 4.1 – a favorable assessment. Individual Forum topics that dealt with case studies and practical issues or that introduced manufacturers engaged in networking were among the most highly rated sessions. Where second-day hands-on sessions were offered, these were mostly viewed positively, although some respondents felt that one day would have sufficed.

Respondents were asked what actions they were likely to take as a result of participating in the Forum. Most respondents replied that they would try to establish inter-firm collaboration among specific groups of companies (mean score of 4.0) and promote improved policies or program for inter-firm collaboration (mean score of 3.7). Slightly fewer respondents indicated that they would request further training (mean score of 3.4).

Overall, USNet's Foundation Forums achieved the objective of promoting awareness of inter-firm collaboration among a relatively large number of individuals and organizations in participating states. Industrial extension personnel were represented among the participants, although other business assistance and economic development organizations were also appropriately represented. End-of-session evaluations were mostly favorable, with the majority of participants prompted to consider subsequent actions to promote inter-firm collaboration in their localities.

3.2 The Foundation Forum Follow-up Studies

While the end-of-session evaluations of the Foundation Forum's were mostly favorable, the true impact of these training events can only be assessed after some time has elapsed. Good training sessions motivate and enthuse, so it is to be expected that participants will over-emphasize their likelihood of acting and minimize the real barriers they face. In addition, once participants get back to their home organizations, they may find that existing or new organizational priorities take precedence over their plans to promote inter-firm collaboration.

For such reasons, we judged that we needed to undertake post-session follow-up evaluations with Foundation Forum participants. A significant period needed to pass so these participants could make a more measured assessment of what they had gained from the Forum and what actions had resulted. Two follow-up evaluations were undertaken of

⁷ Scaled up to the total of 568 participants, this result implies that around 120 manufacturing extension staff participated in USNet Foundation Forums. In addition, a further unspecified number of participants were employed by public and private sector affiliates of manufacturing extension organizations.

⁸ Business participation was greater in the Executive Briefings.

particular Forums, the first in 1995, and the second in 1997. Similar questions were asked in each follow-up study, although selected questions were posed differently and there were distinctions in sample design and stratification (discussed below).

Study Methodologies

The first follow-up study evaluated the impacts on participants of Forums conducted in New York, Massachusetts, Washington, Connecticut, Oklahoma, and Louisiana in 1994 and 1995.⁹ The evaluation was conducted by telephone interviews with participants six to ten months after their attendance at a Foundation Forum. Lists of those attending the Forum were provided by the state programs that co-hosted the event. We hypothesized that the training was likely to have a large impact on small number of individuals but modest impact for most others. It was thus important to ensure that we identified and interviewed the “high impact” participants. So, the respondent lists were stratified in that the state programs were asked to nominate five individuals attending their Forum who were likely to have had a positive learning experience. Another set of respondents was randomly drawn from each state. The research design sought a set of five nominated respondents and five randomly drawn respondents for each state.¹⁰ While this was not achieved, complete interviews were conducted with 47 people. Of those 27 were from nominated individuals and 20 were from those randomly selected.¹¹

The second study gathered participants’ feedback about the impact of workshops held in Delaware, Florida, Illinois, Minnesota, North Carolina, West Virginia, and Wisconsin in 1996 and 1997.¹² Forty participants were interviewed by telephone. For the purpose of comparison and impact analysis, the respondents were stratified into two groups: participants who were associated with affiliates of the U.S. Manufacturing Extension Partnership (MEP) and those associated with other groups. Eighteen of the 40 respondents (or 45%) were MEP-associated.

The full reports contain details about the design used for each study and the variations in results that were obtained. Complete tabulations of results are also presented, along with survey questionnaires and analyses of interviews with participants, trainers, and state sponsors. The following sections aggregate some of the main findings.

⁹ Gordon Kingsley, *Establishing the Building Blocks: A Follow-up Evaluation of USNet's Foundation Forums on Inter-firm Collaboration*, USNet Evaluation Working Paper 9504, November 1995.

¹⁰ The first objective of this research design was to capture best cases, i.e., individuals that sponsors felt received the greatest impact from the training. This permitted a test of the hypothesis that training had at least a significant impact on a few people. The second objective was to provide a comparison group of other (“typical”) participants, whose experience might be compared against the best. This permitted a test of the hypothesis that the impact of the training was more broadly dispersed.

¹¹ The first follow-up study also assessed feedback from trainers and state sponsors.

¹² Mary Anne Alabanza Akers and Philip Shapira, *Inter-Firm Collaboration to Improve Competitiveness: An Evaluation of USNet's Foundation Forum Workshops*, USNet Evaluation Working Paper 9702, October 1997.

Awareness, Usefulness, and Changes in Attitudes

Both Foundation Forum follow-up surveys sought to determine the longer-term impacts on participant awareness about inter-firm collaboration. The surveys also assessed whether participation in the Forum had changed participants attitudes towards inter-firm collaboration.

The Forums were designed to present the fundamentals of the topic, although it was apparent that participants with varying levels of prior experience had been attracted to attend. In the first follow-up study, nearly two-thirds of the respondents (29 out of 47) had been involved in either the promotion or formation of a network of small manufacturers prior to the Forum.¹³ The prior experience level was lower in the second group of Forums, where about two-fifths of the 40 respondents mentioned that they had heard or read a little about inter-firm collaboration prior to Forum participation. Of the ten individuals who had prior networking experience, six (60 percent) were MEP-associated.

Respondents mostly gave positive feedback on the quality and usefulness of the information presented at the Forum workshops. The respondents interviewed in the first study were generally satisfied with the quality of presentations (giving a mean score of 4.0 out of a maximum of 5.0). This study observed that “respondents clearly remembered and understood the terminology and the philosophy of networking that had been presented”. However, the appropriateness of the curriculum was less highly regarded (mean score of 2.9 out of a maximum of 5.0). Several of the more experienced respondents in the first group of workshops reported that the level of information was pitched too low for their needs. This was much less of a problem in the second group of workshops. Thirty-eight of the 40 respondents in the second group reported that the knowledge gained at the Forum was either moderately or very useful in their jobs. Only two respondents admitted that the information given at the workshops was not useful at all.

Most significantly, there were positive changes in attitudes toward inter-firm collaboration because of the Forum. Among the first set of respondents, the Forum prompted a positive shift in enthusiasm towards the concept of inter-firm collaboration. (See table 3-3.) Before the Forum, 25 out of 47 respondents (53 percent) were enthusiastic about the concept. After the Forum (and after several months had elapsed), 34 were enthusiastic (72 percent). A similar result was found among respondents to the second survey (although the question was worded differently). Some 17 of 40 respondents (43 percent) had very positive attitudes towards inter-firm collaboration prior to Forum participation. This increased to 24 respondents (60 percent) after Forum participation. Analyses were conducted to determine whether MEP-associated participants had different attitudes compared to those from other organizations. No significant statistical evidence was found.

¹³ Several of the states, including Connecticut, Massachusetts, and Oklahoma, in the first group of USNet Foundation Forums had pre-existing programs to promote inter-firm collaboration.

Overall, the responses from both follow-up surveys indicated that the Foundation Forums increased understanding of the concepts and practice of inter-firm collaboration, despite concerns among some experienced participants that parts of the Forum were introductory.¹⁴ Participants' attitudes towards inter-firm collaboration also became more positive due to Forum participation. The next section examines whether these positive changes in understanding, awareness, and attitude were translated into action by Forum participants.

Table 3-3 Attitudes Towards Inter-Firm Collaboration or Networking, Before and After the Foundation Forum

Attitude	Before the Forum	After the Forum	Change in Attitudes	
	Respondents	Respondents	Respondents	Percent
First Foundation Forum Follow-up Study (6 Forums, 47 Respondents)				
Enthusiastic	25	34	9	36%
Interesting idea	17	11	-6	-35%
Skeptical	5	2	-3	-60%
Second Foundation Forum Follow-up Study (7 Forums, 40 Respondents)				
Very positive	17	24	7	41%
Moderately positive	12	15	3	25%
Neutral	11	1	-10	-91%

Source: 1995 and 1997 follow-up surveys of USNet Foundation Forum participants.

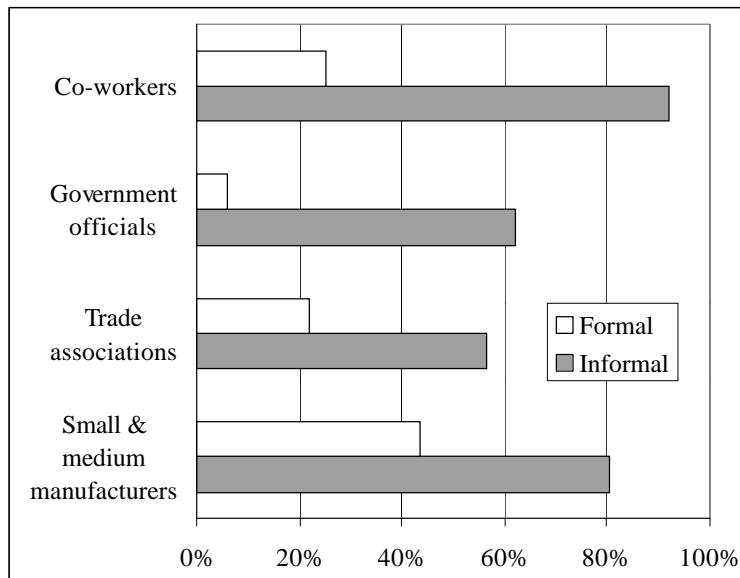
Impacts of the Forum

The follow-up studies examined the extent to which Foundation Forum participation had resulted in participants taking subsequent action. First, to probe the diffusion of information obtained through the Forum, we asked whether participants had informally discussed the Forum with others or had made formal presentations on what they had learned. Second, to determine resultant changes, four categories of impacts were probed: actions within the participants' organizations, effects on government policy and programs, effects on trade and business associations, and effects on relationships with small and medium enterprises.

Forum participants frequently used what they had learned at the Foundation Forum in informal and formal communication. As might be expected, Foundation Forum participants most frequently discussed the Forum informally with co-workers (see figure 3-1).

¹⁴ Respondent comments about the strengths and weaknesses of particular Forum elements are reported in detail in the full studies.

Figure 3-1 Foundation Forum Participants – Informal Discussions and Formal Presentations Following the Forum



Source: 1995 and 1997 follow-up surveys of USNet Foundation Forum participants (N=87).

However, four out of every five respondents reported that they also had discussed the Forum informally with small and medium-sized manufacturers – a very positive result. Informal discussions with government officials and trade associations were undertaken by around 60 percent of participants. There was a lower level of formal presentation drawing on what had been learned at the Forum. Nonetheless, two out of every five respondents reported that they had made formal presentations to small and medium-sized manufacturers. Relatively few formal presentations were made to government officials. Indeed, five times as many respondents made formal presentations to manufacturers than to government officials, suggesting that the Forum material was most useful in helping practitioners explain inter-firm collaboration to firms.

Participants said that actions occurred within their own organizations as a result of the Forum. Over two-fifths of respondents (44 percent) reported changes in their organizations' work programs. Many of the respondents mentioned that their organizations were already engaged in networking prior to attending the workshops (thus, changes in work plans were not necessary). Participants were also asked whether their organization was engaged in specific networking activities that were prompted by the Forum. Almost two thirds of respondents reported that they were undertaking initiatives to promote inter-firm collaboration, with nearly one-half engaged in identify candidate firms for networking. Respondents rather less frequently reported undertaking data collection or network training programs. (See table 3-4.)

Table 3-4 Activities within Respondent’s Organization Prompted by Foundation Forum Participation

Activity	Number	Percent
Promotion of inter-firm collaboration among firms	54	62.1%
Identification of candidates for networking	43	49.4%
Identification of brokers, scouts, network facilitators	24	27.6%
Gathering data to show connections among firms	15	17.2%
Group training programs for brokers, scouts, network facilitators	10	11.5%
Other activities	6	6.9%

Source: 1995 and 1997 follow-up surveys of USNet Foundation Forum participants (N=87).

The Forum had moderate impacts on government policies and trade association activities (table 3-5). Respondents were asked about the type of changes they had requested from government agencies or elected officials to promote network activities. About one-third of respondents had sought additional resources or increased service coordination, while about one-fifth had pursued changes in agency work plans. Only a handful of respondents sought changes in state policy. Participants in the first group of Forums were rather more likely to seek government support (this result may reflect the greater representation of industrial extension practitioners in the second survey sample). Participants were also asked about activities related to inter-firm collaboration with trade and business associations that were prompted by the Forum. The most common activity was promoting inter-firm collaboration among association members, reported by 37 percent of respondents.

Table 3-5 Impacts on Government Policy and Activities with Trade Associations, Prompted by Foundation Forum Participation

Changes requested from government agencies or elected officials to promote network activities, as a result of the Forum	Number	Percent
Additional resources	29	33.3%
Increase in service coordination among public sector agencies	28	32.2%
Changes in agency work plans	18	20.7%
Changes in state policy	3	3.4%
Activities with trade associations, prompted by the Forum	Number	Percent
Promotion of inter-firm collaboration or networking among firms.	32	36.8%
Identification of candidates for networking.	26	29.9%
Group training programs for brokers, scouts, network	20	23.0%
Gathering data to show connections among firms	17	19.5%
Identification of brokers, scouts, network facilitators	14	16.1%
Jointly lobbying for changes in state policy	3	3.4%

Source: 1995 and 1997 follow-up surveys of USNet Foundation Forum participants (N=87).

Significant impacts on collaborative activities of small and medium-sized enterprises were reported by Forum participants. (See table 3-6.) Many respondents initiated activities with firms after the Forum. They identified candidates for networks (49 percent), distributed information on inter-firm collaboration (48 percent), and formed or were in the process of forming networks (31 percent). Initiating a training program was an infrequent response. Among respondents to the second survey, those involved in network formation were likely to be MEP-associated participants.

Table 3-6 Collaborative Activities with Small and Medium-sized Enterprises Prompted by the Forum

Activity	Number	Percent
Identify candidates for networking	43	49.4%
Distribute information about inter-firm collaboration to SMEs	42	48.3%
Form networks	27	31.0%
Start training programs for inter-firm collaboration	9	10.3%
Other	2	2.3%

Source: 1995 and 1997 follow-up surveys of USNet Foundation Forum participants (N=87).

3.3 Observations and Recommendations

The combined results of end-of session evaluations and the two follow-up studies generally showed that participants benefited from the Foundation Forum workshops in terms of learning more about inter-firm collaboration. There was also considerable dissemination of information acquired at the Forum to others, particularly through informal communication. The subsequent application of networking concepts was more varied. Participants and their organizations were prompted to increase initiatives to promote inter-firm collaboration, including identifying candidates for networking and distributing information about networking to firms. Modest impacts were reported in leverage change with other government agencies and with trade and business associations.¹⁵ Nonetheless, some efforts were made to increase resource allocations and to improve the coordination of service providers.

Respondents provided a series of suggestions to improve future Forums. The most commonly cited suggestions related to the content of the workshops. Several respondents suggested additional topics, such as how to secure cooperation from firms, practical aspects of getting started with a network program, and how to solve typical problems of network activities. Some would have liked to hear more from presenters who were ac-

¹⁵ This finding is consistent with the mix of participants at Foundation Forums, who tended to be more interested in providing business services than changing policy, and the content emphasis in the sessions on forming networks.

tual network facilitators and members of successful networks. Others recommended that the application of inter-firm collaboration be geared to small home-based businesses, service sectors firms, rural communities, and economic development organizations (as well as small and mid-sized manufacturers).

USNet was advised (in the first study) to review the match between Foundation Forum content and participation, to avoid some of the concerns by more experienced participants over the curriculum.¹⁶ Both studies also recommended attention to the length of the Forum. In the second set of Forums, there was greater use of two-day events. Although trainers provided us with very positive feedback on these two-day Forums, we did not find any significant difference between the number of days attended and the way respondents used the knowledge in their jobs

Overall, we found that the Foundation Forums were an effective way to introduce the fundamental concepts of inter-firm collaboration to both a large number and a wide range of participants. The Forums clearly addressed an area where there is a much interest and great demands for learning about how to successfully promote inter-firm networks. Even those with some disappointments about the Forum expressed strong desires for more information. However, most participants indicated favorable attitudes, and many reported that they were subsequently prompted to act on what they had learned at the Forum.

4. Business Consequences: Impact of Inter-Firm Networking on Firms

The immediate aim of USNet was to build the capacity of its partners to promote inter-firm collaboration, through activities such as the Foundation Forum discussed above. However, USNet's partners and sponsors recognized that the ultimate tests of efforts to promote inter-firm collaboration were the effects on business performance, competitiveness, and industrial communities. It was realized that USNet had neither the mandate nor the financial resources to directly form a substantial number of business networks (although, in a small number of pilot cases, individual networks were assisted). The time horizon of the project (3 years) was also too short to expect significant and robust business network results from the efforts of the state partners. Yet, the "bottom-line" question remained: what were the business consequences of efforts to promote inter-firm collaboration? State partners could be motivated to sponsor initiatives to further inter-firm collaboration, but were such initiatives worthwhile from a business perspective?

¹⁶ USNet offered an Advanced Capacity Building workshop to representatives from five USNet member states in Amherst, Massachusetts, in 1995. This aimed to provide higher level training. The feedback from this workshop was mixed, in part because attendees had varied experiences, expectations, and state contexts, and it proved difficult to address these different needs.

We were able to identify numerous *qualitative* case studies of inter-firm collaboration, with most suggesting that these efforts were worthwhile. (These case studies formed the basis for the meta-case analysis reported in section 5.) However, in the existing literature, there were few *quantitative*, survey-based studies available. Thus, we initiated our own study, focusing on existing inter-firm networks in USNet member states.

Other factors also influenced our decision to initiate a quantitative, survey-based study. First, NIST and other evaluators had developed survey-based quantitative studies of the business impacts from individual MEP projects. There was a desire by NIST staff and other stakeholders, including state partners, to have similarly robust quantitative studies of the business impacts of inter-firm collaboration. Second, we anticipated that a consistent quantitative study across a range of business networks could provide useful feedback to USNet's efforts to improve its services and provide a model that could be built upon in subsequent evaluation studies. Finally, several principals in the USNet evaluation team had conducted an earlier quantitative study of the performance and impacts of two networks in Ohio. The experience from this study gave the evaluation team confidence that quantification of the impacts of inter-firm collaboration could be undertaken and would be useful, despite concerns by some networking advocates that important "soft" impacts could not be captured.¹⁷

4.1 Study Methodology

In developing the sample, survey approach, and questionnaires for this particular study, we consulted with representatives from USNet partner states and conducted a pilot survey with network leaders and companies. We focused the study on *already existing* networks in USNet member states. We examined existing networks, generally those that had been active for two years or more, so that the benefits and costs could be realistically assessed by participating firms. USNet states formed the basis of the study because we needed contacts and assistance in identifying and approaching networks, to secure approval from participating businesses to participate in the study. The networks in the USNet member states had not necessarily been assisted directly by USNet. Indeed, most had not – but this was not an issue, as the objective of the study was to assess the impact of inter-firm networking on participating firms (rather than the impact of USNet per se).

Thirteen business networks in five different states agreed to participate in the study.¹⁸ Two types of surveys were administered in early 1997: one survey of the leaders of the 13 networks and another survey of 99 members of these networks. The 99 network

¹⁷ Soft business impacts from collaboration include effects on trust, relationships, and knowledge flows. In fact, we shared many, although not all of these concerns, about how these could be measured – but we also believed that there was scope for improved quantification of at least some of these soft impacts.

¹⁸ Doug Welch, Eric Oldsman, Philip Shapira, Jan Youtie, and Julie Lee, *Net Benefits: An Assessment of Manufacturing Business Networks and Their Impacts on Member Companies*, USNet Evaluation Working Paper 9701, October 1997.

members responding to the survey represent a 25 percent response rate from the 395 firms to which surveys were mailed.¹⁹ The evaluation team involved researchers from Georgia Institute of Technology and Nexus Associates, Inc., an independent consulting firm. In addition, USNet's program administrator, Regional Technology Strategies, Inc., aided the survey administration process. The main findings of the study are discussed below.²⁰

4.2 Characteristics of the Responding Network Businesses

With a few exceptions, the network members responding to the survey were small manufacturers. Half had 40 or fewer employees and sales of under \$4 million in 1996. However, most of the companies were not *micro*-enterprises. While most of their operations were limited to a single state, only a handful operated from the homes of entrepreneurs. In addition, the firms reported a fair number of contacts with other organizations aside from the network, suggesting they were not isolated from the outside world. The great majority of responding network members were manufacturers, but, given the diversity of networks in which they were involved, these firms reflect a variety of industries. In addition, while the majority of survey respondents were small firms, a few were much larger than the others. Seven of the firms had over 500 employees.

4.3 Networks and Their Activities

Most of the thirteen surveyed networks were young, urban organizations with limited staff resources. The typical (median) network had its first official meeting between 1994 to 1996. It was initially organized by an external public or non-profit organization and currently has no legal status. The typical network had a total annual budget of about \$100,000, including a small proportion of member fees. Most also received non-financial support from an outside agency. Two-thirds of the networks supported a very small staff and all had a network coordinator.

The networks' most common primary objective was information sharing. Most (nine) of the network leaders reported that "information sharing" was a primary network objective. The networks also had other primary objectives that were more diversified, such as quality, productivity, or supply chain development or direct cost reduction.

Rating their level of satisfaction (or dissatisfaction) on a five-point scale, 31 percent of network company respondents were very satisfied with "the network's organization and activities" and an additional 52 percent are satisfied. There was slightly less enthusiasm

¹⁹ This response rate is comparable to that obtained in other recent research surveys of businesses.

²⁰ This discussion draws on Doug Welch, "Summing-up: The Impacts of Networks on Member Companies," *Firm Connections*, vol. 5., no. 6, November-December 1997.

concerning the participation of other member firms, hinting at the fundamental importance of contributions by all member companies to a network's success.

The study found that networks provide valuable opportunities for firms to interact with other firms that would not occur without the network. Network members were asked to indicate whether they engaged in a variety of activities before joining the network, and whether they currently engage in such activities through the network. It is important to identify activities firms currently engage in as a part of participating in their networks. However, to identify the impacts of networks themselves, it is more valuable to isolate network-related activities that firms currently undertake but which they did *not* do prior to joining the network. These results are summarized in table 4-1.

While varied activities were described in the survey, the most common responses concerned increased interaction and information sharing with other companies. More than half of the companies held informal discussions with other companies through the network but did *not* do so before joining the network. Similarly, 36 percent attended seminars, and 35 percent made visits to other plants but did not do so before joining the network. In short, networks provided valuable opportunities for firms to interact with other firms that did not occur prior to their involvement with the network.

We also observed that some companies moved beyond information sharing, developing more involved links with other firms. Network leaders reported that the relationships of their members often followed a path of increasing intensity. This path might start with introductions, moving progressively to mutual trust, information sharing (such as advice and leads), or even legal business alliances.

As shown on table 4-1, some companies report cooperative activities such as work to develop standards for suppliers, joint marketing, and sharing sales leads. A few companies cite even more intensive business relationships through the network, such as group purchasing of materials, joint bidding, and collaborative R&D. These sorts of activities may have greater potential rewards than information sharing, but may also have higher risks which may explain why they occur less frequently.

Table 4-1 Network Activities Reported by Participating Companies.

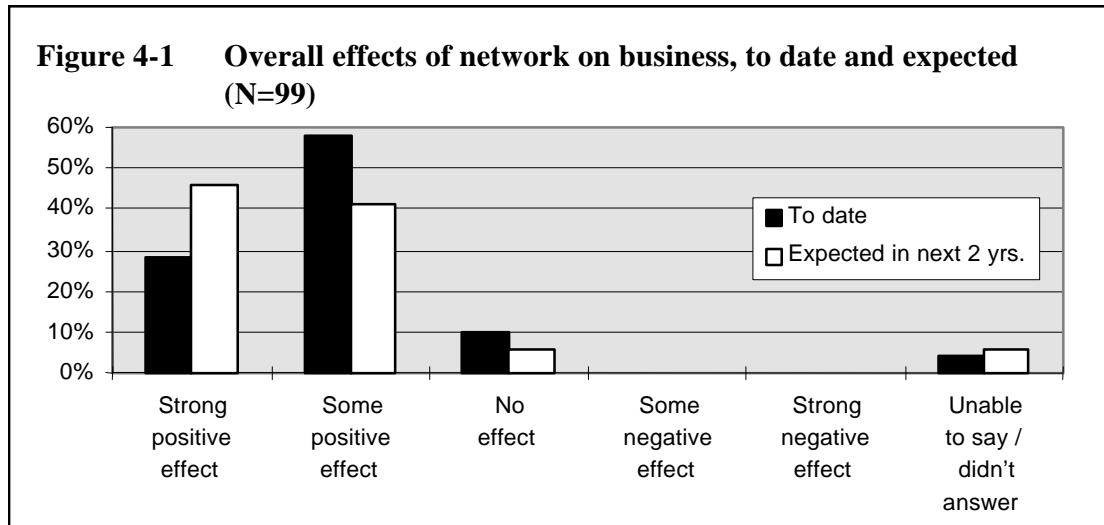
Network-related activities	All firms ^a	New activity ^b
	Percent	
Hold informal discussions with other companies	76	53
Attend seminars with invited speakers	68	36
Visit plants of other companies	64	35
Share special technical capabilities with other companies	46	28
Cooperate with other companies to develop common procedures, including standards and certification, for suppliers	34	28
Prepare joint marketing materials for products or share the cost of trade shows with other companies	31	27
Share leads for potential sales with other companies	39	26
Cooperate in training programs	37	26
Cooperate with other companies in meeting the procurement, design or quality requirements of larger customers	32	24
Purchase raw materials and services on a group basis	19	17
Bid on contracts with other companies	21	16
Cooperate with other companies in collaborative product research, product development, or product design	24	16

Source: Survey of members companies of manufacturing business networks, 1997 (N=99). In rank order of responses indicating firms currently do the activity but did not do so before joining the network. Note: ^aPercentage of *all* firms that currently undertake the activity as part of network. ^bPercentage of firms that currently undertake the activity *but never did before network*

4.4 Business Impacts

Most member companies reported positive effects on the firm to date and expected even larger effects in the future. (See figure 4-1.) When asked to summarize the network’s impacts to date, 28 percent of respondents indicated that the network has already had a “strong positive effect” on the company. An additional 58 percent have experienced “some” positive effect. Looking ahead, firms were even more optimistic with 46 percent expecting strong positive impacts in the next two years.

To further analyze the generally positive effects reported by networked firms, we asked managers about the specific business impacts that had occurred or were expected to occur due to their network involvement. The most common impacts on the firm concern improving product quality and supply chain enhancement. As a result of network activities, 38 percent of responding companies said they improved the quality of their own products. In addition, many noted changes in their customer and supplier bases. Thirty-eight percent of companies found new customers outside of the network; 36 percent found new



Source: Survey of members companies of manufacturing business networks, 1997 (N=99).

suppliers inside the network and 32 percent found suppliers outside the network. Development of new products, companies, and export sales were the impacts least frequently cited. (See table 4-2.)

Companies also experienced positive business attitude changes through participating in networks. Qualitative research leading up to the USNet survey suggested that a company's degree of involvement in a network depended on a certain level of comfort on the part of a company in working with and trusting other member companies. That is, companies needed to develop a degree of comfort and camaraderie with their peers before they were willing to share mutually valuable information, resources, or risks.

In an effort to define and measure possible attitudinal precursors to working with others, four measures were developed and assessed as part of the company survey.

- **Flexibility:** "Confidence in your own company's ability to deal with changing market needs".
- **Trust:** "Belief in the integrity of *other firms* and your ability to rely on them".
- **Partnership:** "Willingness to work with *other firms* on projects or activities of mutual interest",
- **Community:** "Willingness to work with other *local organizations*".

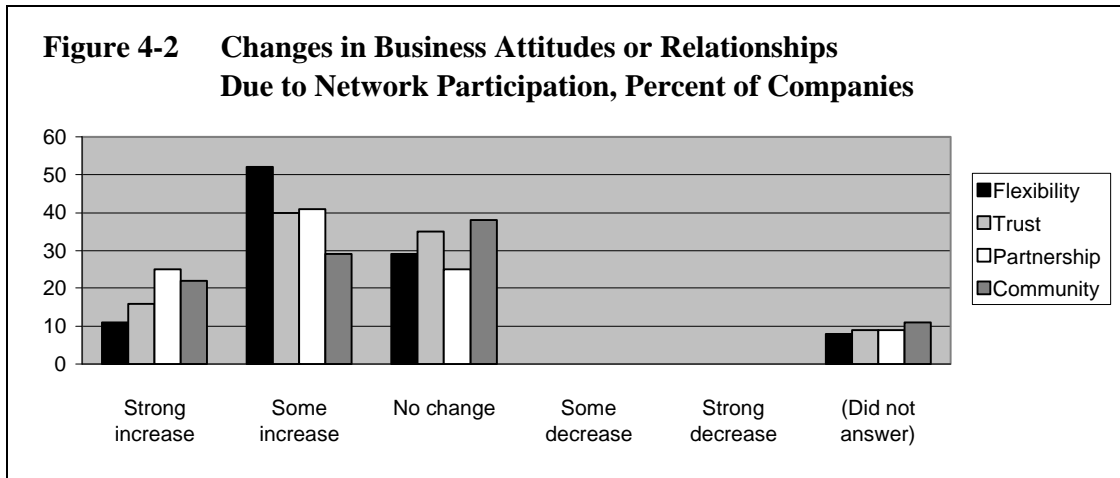
Table 4-2 Business Impacts on Firms Resulted or Expected to Result from Involvement in the Network

Impact	Result- ed ^a	Ex- pected in the next 2 years ^b
	Percent	
Improved the quality of your own products	38	28
Found new customers outside the network	38	23
Found new suppliers inside the network	36	20
Found new suppliers outside the network	32	25
Increased sales in the U.S.	31	27
Increased profitability	30	36
Improved an existing manufacturing process	30	22
Improved relationships with major customers	27	19
Adopted new technologies or new manufacturing practices	25	28
Realized an improvement in supplier quality	24	26
Saved money by group purchasing, marketing or equipment sharing	24	22
Found new customers inside the network	23	25
Developed a new product or service	19	23
Increased export sales outside the U.S.	7	27
Established a new company or business venture	4	14

Source: Survey of members companies of manufacturing business networks, 1997 (N=99). Note: ^a Percentage of all firms reporting the impact *has* resulted. ^bPercentage all firms where the impact is *expected* in the next 2 years but has *not* occurred yet

Companies were asked whether they had experienced a change in any of these attitudes. Depending on the measure, between one-half to nearly two-thirds of respondents reported at least some improvement due to network participation (figure 4-2).

All network members were asked to estimate the total benefits and costs they had experienced as a result of participating in the networks to date. In addition, benefits were broken out in terms of “sales benefits” versus cost savings; costs were broken out in terms of personnel (time) costs versus technology, training and R&D costs. It is to be noted that it is often difficult for managers to place a specific dollar value on the benefits and costs of network participation. Indeed, not all companies reported this information to us. Nonetheless, for those companies that did report, survey respondents indicated an impressive \$5.5 million in benefits to date from their work with thirteen business networks.



Source: Survey of members companies of manufacturing business networks, 1997 (N=99).

Subtracting total costs from total benefits resulted in the *net* benefits to the firm of participating. The typical net benefit of network participation to the firm was \$10,000 to date; the average net benefit was \$224,000, indicating that the lion's share of net benefits was accrued by relatively few companies. (See Table 4-3.)

Table 4-3 Summary Measures of Benefits, Costs, and Net Benefits Resulting from Company Participation in Networks (Per Company)

Per Company	Last 12 months	Total since start of network membership
Mean (Average)		
Total Benefits	\$118,445 (n=47)	\$334,553 (n=45)
Total Costs	\$14,359 (n=58)	\$103,099 (n=58)
Net Benefits	\$106,220 (n=45)	\$224,085 (n=43)
Median		
Total Benefits	\$15,000 (n=47)	\$30,000 (n=45)
Total Costs	\$3,000 (n=58)	\$10,000 (n=58)
Net Benefits	\$9,300 (n=45)	\$10,000 (n=43)

Source: Survey of members companies of manufacturing business networks, 1997.

4.5 Employment and Skill Impacts

On average, companies experienced a net increase in their employment levels as a result of network participation. On average, the firms reported a net increase of 4.7 jobs as a result of the network. Importantly, however, the majority of respondents did *not* report any net change in employment levels. The bulk of net employment changes have occurred at a small handful of plants. Looking to the future, the majority of respondents

still did not anticipate a net increase or decrease in their employment level, but the group as a whole anticipates creating an average of 6.3 jobs.

Companies were asked to report on impacts on their employees and management staff. They reported improved skills resulting for *both* groups, particularly managers. Fifty-one and 38 percent of respondents said that network participation has enhanced the skills of their managers and employees, respectively.

4.6 Nature of Network Participation and Business Impacts

As we have seen, companies described participating in a variety of activities through their networks (see table 4-1). These activities could be described along a spectrum from ‘soft’ to ‘hard,’ where soft activities required less commitment and involved little risk and vice versa. Many commonly cited network activities were softer, such as informal discussions and seminars. In general, many network leaders believed that it would take positive experiences in these softer activities before a firm would be willing to enter harder, riskier inter-firm relationships. On the other hand, the latter relationships have more potential to generate large impacts on member firms.

The survey confirmed that the risks associated with harder networking activities do pay off. On average, some harder relationships *do* correspond to greater impacts. Companies that reported 1) visiting other companies, 2) sharing special technical capacities with other firms, or 3) working with other firms to develop common procedures for suppliers through the network were about three times more likely to have reported “strong positive impacts” than firms that have not engaged in these activities.

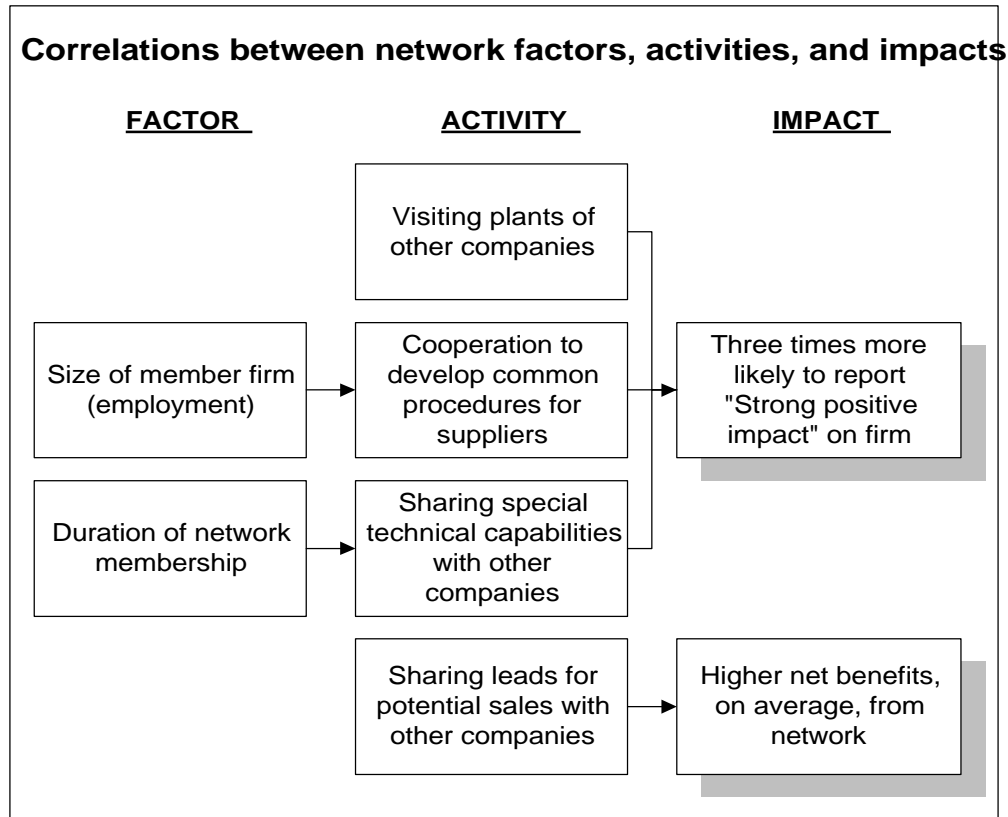
Similarly, companies that shared leads for potential sales leads with other member firms reported higher net benefits of network participation. The average company that reported sharing leads also reported significantly larger financial benefits from network participation – about \$570,000, as compared to about \$120,000 for firms that did not share leads.

We also observed that network activities, relationships and impacts were also influenced by time and firm size. Companies that had been in networks longer were more likely to report sharing technical capabilities with other network members. Reflecting the notion that relationships develop progressively over time, companies that “share special technical capabilities with other companies” tended to have been involved in networks about four years longer than companies who did not share technical capabilities.

Firm size was also an important variable. On average, companies that “cooperate with others companies to develop common procedures for suppliers” or “cooperate with other companies to meet the procurement, design or quality requirements of larger companies” employed about 800 people on average. This is significantly more than the 100 or so workers employed on average by firms that did not participate in such activities

Thus, a number of items concerning network members, activities and impacts were significantly linked. These relationships, summarized in the figure 4-3 (below), may be significant not only for the 13 networks involved in this study but other networks as well.

Figure 4-3



4.7 Conclusions from the Network Impact Study

The study found a variety of positive effects on a group of small manufacturers that have joined collaborative business networks. Most of these firms have joined the network in the past few years and expect the impacts to continue and increase over the next couple of years. To date, the average total net benefits per firm from network participation were positive. Most firms obtained modest net benefits, although a few had much greater returns. Additionally, almost one-fifth of firms reported a net job increase – although the majority of firms either did not experience or could not estimate a net change in their employment levels as a result of network participation. Network participation improved skills of both employees and management. Respondents also cited increases in business attitudes such as flexibility, trust, and partnership. A few more ‘intensive’ network activities were associated with stronger overall impacts.

The results from the network assessment were reported back to USNet, at a Partners Learning Network Meeting in 1997, through the dissemination of the final report, and via *Firm Connections*. A special tabulation of the results for Massachusetts (which was represented by five networks) was also undertaken.

5. Learning about the Promotion of Networks

The promotion of inter-firm collaboration has become a major tool of business and technology assistance providers in both the public and private sectors. A diverse range of inter-firm networks has emerged in the United States and other industrial countries in recent years. Over time, sponsors and other organizations have sponsored numerous case studies of these networks. In addition to the quantitative survey of the impacts of network participation, the USNet evaluation element initiated – as part of its mission to promote learning within the project – a review of available qualitative case studies on inter-firm collaboration.²¹

The aim of the USNet case study review was to see what could be learned from the existing case literature to aid the formation and ongoing development of new networks. We anticipated that the case study review would be an effective approach to assimilating and understanding the experience of others who have formed networks. It also had the advantage of low-cost, since we would analyze existing work (rather than commission new case studies).

5.1 Study Methodology

Typically, individual case studies have a short life as a management tool, after which they receive little further attention. However, when large numbers of cases are analyzed collectively using a consistent and focused case review method, these studies can provide many valuable insights. The USNet case review method mixed two methods: survey and case study. Instead of conducting a survey directly in the field, investigators applied a survey questionnaire to a collection of case studies.

The procedures used included the following. First, we selected a group of existing case studies of inter-firm collaboration. Second, we designed a survey through which qualitative case descriptions were converted into quantified variables. Third, several reviewers

²¹Gordon Kingsley, *Case Studies of Inter-firm Collaboration: A Survey*, USNet Evaluation Working Paper 9605, December 1996. Gordon Kingsley and Hans Klein, *Lessons Learned from Inter-firm Collaborations: A Survey of Case Studies*, USNet Evaluation Working Paper 9703, October 1997. The discussion in this section draws on these two reports and on Gordon Kingsley, “Lessons Learned from Inter-firm Collaboration: A Survey of Case Studies,” *Firm Connections*, vol. 5., no. 6, November-December 1997.

read and coded each case to see if a similar interpretation of the study could be established. Finally, the case review data was statistically analyzed.

Each case was surveyed to examine the presence and direction of four groups of factors. The first group comprised *origin factors* – including the problems stimulating the formation of the network, the industrial, market, or geographical characteristics of members, the nature of network initiator, prior collaboration, and seed funding. The second group comprised *activity factors* – a series of possible activities undertaken by the network. The third group comprised *structural factors* – including variables on the mix of network participants, number of participants, enterprise size, ongoing funding, network structure, legal organization, and staff. The fourth group comprised *impact variables*. Here the case survey identified different types of impacts from inter-firm networks. These were business expansion, bottom line savings, an increase in the number of projects performed by the network (project increase), membership increase, and an increase in other benefits from collaboration (benefits increase).

After an extensive search, some 123 case studies of inter-firm collaboration were identified. These case studies were written by authors with four types of institutional affiliations (table 5-1). Some of the cases were written by authors associated with USNet/Regional Technology Strategies, and these are separated from other types of consulting organizations because they account for a large block of the cases. (These cases typically provided the richest details about networks.)

Table 5-1 Inter-firm Collaboration Cases, by Authors and Impacts Reported

	Business expansion	Bottom line savings	Project increase	Membership increase	Other Benefits
Cases reporting impacts	57	41	67	46	55
Authorship (Percent of column total)					
USNet/RTS	37%	46%	36%	33%	45%
State Agency	21%	5%	10%	11%	18%
Consultants	28%	24%	33%	37%	24%
University	14%	25%	21%	19%	13%

Source: Survey of inter-firm collaboration case studies, 1997 (N=123). Note: An individual case may report more than one type of impact.

We selected only those case studies in which the inter-firm network was designed for some commercial or competitive purpose to benefit the participating firms. Case selection was *not* limited to networks formed at the impetus of, or in association with, a public program. We also required that there be sufficient detail with regards to the origins, activities, structure, and impacts of the network. These were among the topics that were converted into variables through the survey. We found that the different reviewers were

in agreement 89 percent of the time in their interpretation of the cases. Disagreements in coding were resolved through rounds of discussion by the reviewers.

A calculation was also made of the difference between when the network was initiated and when the case study was written. It was assumed that longer the passages of time, the greater the likelihood that impacts will have occurred. Distinct differences were found. State agencies were by far the quickest to begin writing about networks. The typical state case was written about 1.5 years after the network was created. The other types of authors were more likely to write their cases after a longer interval following the creation of the network – 3, 4, and 6 years respectively for university, USNet/RTS, and consultants. While consultants had the longest time interval between initiation and case write-up, this reflected a bimodal distribution. The median difference was three years.

5.2 Findings and Lessons Learned

Although the case study review looked for five different types of impacts from inter-firm networks, in the process of conducting the study it proved possible to cluster the impacts into three distinct groups. These were (1) business expansion; (2) other benefits and membership increase; and (3) bottom line savings and project increases. The origin, activity, and structural factors associated with each of these three outcomes were analyzed. The resulting models of network impacts were suggestive of strategies for the effective operation of inter-firm collaboration networks. Not surprisingly, these strategies differed according to the impact that was pursued.

Business expansion presents distinctive managerial challenges to an inter-firm network. The factors associated with this impact differ from those found in the other impact models. In expanding a business the network must be focused on the commercial endeavor and organized as a for profit operation. There must be a clear market opportunity that brings the partners together. Strong private-sector leadership is critical. Even better is a strong commitment from each of the participants. Preferably, committed relationships should be forged among the chief executive officers of the respective organizations. Great attention should be paid at the front end of the project to whether partners have comparable and complementary skills. Procedures for qualifying network members are helpful in the expansion of a new business and should be applied ruthlessly. Similarly, there must be a clear understanding of each organization's responsibility in the network. It helps if partners already have customers in common. (See table 5-2.)

Table 5-2 Business Expansion Model

Factors		Significance	Direction of Influence	
Origin Factors	Market Opportunities	.001	+	
	Shared Customers	.001	+	
	Private Firm Initiation	.002	+	
Activity Factors	Information Sharing	.003	-	
	Marketing and Sales	.000	+	
	Hardware	.004	+	
Structural Factors	Sources of Funds	.002	+	Private Sector
	Legal Status	.001	+	For Profit

Source: Survey of inter-firm collaboration case studies, 1997 (N=123). Note: Significance of relationship is highest where significance = .000. See full report for details on coefficients.

However, there is less need to spend a great deal of time on the structure of the network. Legal standing as a for-profit enterprise seems to be more important than formalizing the network organization. It is best if the source of on-going monies is from the private sector. However, a mix of on-going funds from the public and private sectors also has a positive, if somewhat less effective, association with business expansion.

In contrast, for growth impacts such as *increasing benefits* and *increasing membership*, structural variables are critical. (See table 5-3.) The pursuit of these goals requires the creation of a central organization that has a dedicated staff. Networks that employ a flat organizational structure will likely fail to achieve the desired growth. Strong administrative leadership is required to coordinate the efforts of network members. Greater ambiguity can be tolerated in the creation of the network as the members negotiate the extent of activities in which they will engage. However, for the network to operate coherently, clear responsibilities and goals need to be specified early.

These impacts tend to be associated with “soft” activities of information sharing, human resource development, and responding to community needs. Requiring members to “buy-in” to the network was found to create a stronger commitment towards working with each other. Impacts are more likely to be achieved when the on-going funds for the network come from the private sector or foundations. Public funding is almost never the sole source of on-going funds. Rather they are used as leverage for private sector funds.

Table 5-3 Increase in Membership and Other Benefits Models

Factors		Significance	Direction of Influence	
Increase in Membership Model				
Origin Factors	Local Agency Initiation	.005	+	
	State Agency Initiation	.004	-	
Activity Factors	Human Resource Activities	.001	+	
Structural Factors	Frequency	.005	+	
	On-going Funding	.000	+	
	Source of Funds	.000	+	Mixed & Foundations
	Network Staff	.000	+	
	Network Structure	.000	+	Central Organization
Other Benefits Model				
Structural Factors	Size of Participants	.002	+	Mixture of Sizes
	On-going Funding	.000	+	
	Source of Funding	.000	+	Private and Mixed
	Network Staff	.011	+	
	Network Structure	.000	+	Central Organization

Source: Survey of inter-firm collaboration case studies, 1997 (N=123). Note: Significance of relationship is highest where significance = .000. See full report for details on coefficients.

Bottom line savings and *project increases* were affected by a wider range of factors and appear to be a hybrid between the other two models. Origin and structural factors had the strongest influence. Networks seeking these impacts tended to strive for sustained collaboration. To achieve this end, it was important to have positive experiences early in the life of the network. The leadership of a trained broker was found to be of particular help in networks seeking bottom line and/or project growth impacts. However, it is best that this individual be drawn from the private sector. Public sector initiation by a state agency was more often associated with cases that result in failure. Interestingly, both are associated with previous collaborations, but not in the anticipated direction. For both impacts, previous collaboration does not increase the likelihood of success. Both impacts are helped when there is a strong central organization running network activities and when the sources of on-going funding are from the private sector. (See table 5-4.)

Bottom line savings and *project increases* also differ in some significant ways. Networks seeking *bottom line savings* are, in most cases, trying to reduce and control their costs. They are similar to *business expansion* networks in a preference for being organized on a

for-profit basis. These impacts are more likely to be associated with seed funding that comes from the private sector or foundations. *Project increases* are more likely to be facilitated by the presence of a staff dedicated to network activities.

Perhaps most importantly, this study finds that the factors that produce successful networks vary with the type of impacts being sought. We find that business expansion is associated most strongly with factors related to the origins of projects. Increases in membership and other benefits are most strongly associated with structural factors. Finally, bottom line savings and increases in projects are most closely associated with both origin and structural factors. This argues for flexibility in the implementation of programs to account for these different objectives.

5.3 Conclusions

A mixed message emerges from these case studies regarding the role of the public sector in promoting IFC networks. On the one hand, the fact that so many networks have been formed is an indicator of success. The strategy of using small grants to link small firms together through the efforts network experts seems to produce the desired result. A few of these networks are even beginning to sustain themselves as evidenced by the growth in the number of projects they pursue collectively. Further, there is strong evidence that public sector organizations effectively disengage from the network once it is up and running.

On the surface, the findings seem to imply that public agencies should avoid initiating networks. In most cases, networks built through such efforts fail to achieve any impact. This negative association extends to cases in which public monies are the sole source for seed funding. From this perspective, the public sector is more likely to be a hindrance than a facilitator.

However, the negative relationship is merely an indication that the cases authored by state agencies as a rule do not provide detail on impacts. Recall that state agencies write case studies within a year and a half of the initiation of the network. Thus, it is not the case that state agency initiated projects are more likely to fail. They simply are less likely to be in a position to report results. To a certain extent, there is a disjunction between the rhetoric of the case and the actions of network participants. While public funds are lambasted as cumbersome and unhelpful, fully 90 of the networks used these resources as seed capital. However, the evidence from the cases indicates that public agencies should avoid being the primary initiator of the network because the likelihood of achieving a successful impact is low. The cases suggest that successful business impacts are more likely when businesses or other private associations take the lead in organizing networks.

Table 5-4 Bottom-line Savings and Project Increase Models

Factors		Significance	Direction of Influence	
Bottom-Line Savings Model				
Origin Factors	Shared Suppliers	.002	+	
	Initiators	.000	+	Firm and Not for Profit
	Private Sector Initiation	.003	+	
	Public Sector Initiation	.001	-	
	State Agency Initiation	.002	-	
	Previous Collaboration	.000	-	
	Seed Funding Source	.001	+	Private Sector
Activity Factors	Direct Cost Reduction	.008	+	
Structural Factors	On-Going Funding	.001	-	
	Source of Funds	.000	+	Private Sector
	Network Structure	.000	+	Central Organization
	Legal Structure	.008	+	For Profit
Project Increase Model				
Origin Factors	Firm Initiated	.002	+	
	Public Sector Initiated	.007	-	
	State Agency Initiated	.000	-	
	Previous Collaboration	.001	?	
Structural Factors	On-going Funding	.000	+	
	Source of Funds	.000	+	Private, Foundation, Mixed
	Network Staff	.007	+	
	Network Structure	.000	+	Central Organization

Source: Survey of inter-firm collaboration case studies, 1997 (N=123). Note: Significance of relationship is highest where significance = .000. See full report for details on coefficients.

This study is less ambiguous in recommendations regarding the management strategies for promoting inter-firm networks. Perhaps most importantly, this study finds that the factors that produce successful networks vary with the type of impacts being sought. This argues for flexibility in the implementation of programs to account for these different objectives.

6. Field Services and Special Projects

USNet has provided field services and participated in special projects (including offering challenge grants) to promote the capability to support inter-firm collaboration in member states. These services and projects were agreed in consultation with partner state organizations and drew on resources from each state's USNet account, with additional matching resources in most cases. Three major categories of activities were undertaken.

1. **Capacity building within the economic development and industrial extension communities.** USNet conducted strategic planning support to enhance policies and programs for inter-firm collaboration with a number of state partners, including Connecticut, Delaware, Florida, Illinois, Louisiana, Massachusetts, Minnesota, New York, North Carolina, and West Virginia. USNet also undertook industry cluster analysis studies in three states, and undertook detailed case studies of particular networks. Presentations were made to business groups, economic development professionals, and public officials in ten states. In addition, USNet organized and sponsored meetings for trade associations, manufacturers, state officials, and industrial extension personnel to meet with European counterparts.²²
2. **Network Technical Assistance.** USNet provided technical assistance and, in some cases, funding support for the development of inter-firm networks in partner states. USNet staff and consultants were involved in these projects. Activities included assistance to food processing, machining, marine, and software networks in Massachusetts, a sewn products network in Minnesota, a designer network in Manhattan, New York, product development networks in Oklahoma and Connecticut, and a hosiery network in North Carolina. Technical support was also provided to an aerospace alliance in the state of Washington and to two networks in Louisiana. USNet also participated in the development of a manufacturers and innovation network in Delaware and a feasibility analysis of developing OEM supplier networks in south Florida.
3. **USNet Challenge Grants.** USNet further provided matching cash challenge grants for the development of specific networks and network projects. USNet challenge grants were initiated to support the development of three networks in Oklahoma, a product development and supplier alliance in Florida, five networks or projects in Illinois, and a product development network in Louisiana.

Most USNet field service and special projects were relatively small (involving between \$5,000 to \$10,000 of USNet funds). It was not realistic or cost-effective to design dedicated procedures to individually evaluate all of these diverse activities. However, we did implement two methods to assess what was accomplished through these field service and

²² For meetings in Europe, travel costs were supported in full or part by other organizations.

special projects. First, we organized an overall benchmark survey of partner states to gather overall feedback about the quality and impact of USNet services and projects. Results from this benchmark study are reported in section 7. Second, we conducted an assessment to examine the experience of five states that were engaged in special projects with USNet. The methodology and findings from these case studies are reported below.

6.1 Methodology for Assessment of USNet Special Projects

The assessment of USNet Special Projects was undertaken to gain detail information and insights about the services provided by USNet and their impacts on network formation, organizational change within the sponsors' organization, and policy. The study also reviewed lessons learned.²³ Five states where USNet implemented special services or projects were examined in the study: New York, Illinois, Oklahoma, Florida, and Louisiana.

For each state case, we examined the history, context, and client, as well as tracking the services provided by USNet. The case studies were based primarily on telephone interviews conducted with key participants in fall 1997 (see appendix of full report for list of individuals interviewed). The interviews were supplemented by a review of written project-related materials and progress reports. Combined together, these data sources allowed judgements to be made about outcomes and lessons learned.

In addition to special projects, USNet also provided other services and assistance to the case study states, including Foundation Forum training events and other briefings, strategic planning assistance, and resource materials. As appropriate, these other services are documented as part of the state case studies to understand the linkages and full impacts of USNet interactions in particular states.

6.2 The Five State Cases

The following section outlines the five state cases probed as part of the assessment of USNet special projects. (See the study report for full details of these cases.)

- ***New York***

Following a Foundation Forum in New York state in 1994, USNet held a series of customized technical assistance meetings on promoting inter-firm networking with staff of the New York Industrial Technology Assistance Corporation (ITAC). ITAC is a non-

²³ For the full report of the study, see Mary Anne Alabanza Akers, Jan Youtie, and Philip Shapira, *Building Capacity and Support for Inter-firm Collaboration: An Assessment of USNet Special Projects in Five States*, USNet Evaluation Working Paper 9802, April 1998. The discussion in section 6 draws on this study.

profit organization associated with the MEP that provides industrial services primarily in the New York City metropolitan region.

The USNet special project involved a series of five meetings to discuss the concept, processes, and activities that are important to successful networking among firms. These meetings took place in a nine-month period with the last meeting held in October 1997. The cost of USNet's service to ITAC was close to about \$5,000, which included travel expenses of the USNet staff and consultant fees. The USNet staff person's time of 30 hours spent on the project was charged separately to New York's USNet state allocation.

In the training meetings, USNet consultants discussed different approaches to inter-firm collaboration. This knowledge promoted ITAC staff to review the strategies they were using in promoting inter-firm collaboration. The involvement of USNet came as ITAC was identifying additional services it could provide to assist companies become more competitive. Although ITAC staff had some prior awareness of networking, the series of meetings with the consultants gave them a better understanding of what it takes to facilitate networks. Interviewed staff said that the USNet involvement helped to improve awareness of the process of inter-firm collaboration and its applications to their work with small and medium-sized firms in New York. Specific follow-on projects were still at the discussion stage at the time of the assessment.

- *Illinois*

In Illinois, USNet supported a matching challenge grant to stimulate new networking projects by firms in the state. The project was developed in conjunction with the Center for Governmental Studies (CGS) at Northern Illinois University and the Illinois Department of Commerce. CGS is a public service, applied research, and public policy development organization. The USNet challenge grant project followed four Foundation Forum workshops in Illinois during 1996 and 1997. These workshops targeted field agents of the Illinois Manufacturing Extension Partnership program (MEP), chief executive officers of firms, and other economic developers. The USNet challenge grant aimed to build on the awareness created by the Forums to promote specific network projects.

The challenge grant proposal intended that USNet and state funds be used to sponsor support a minimum of seven inter-firm projects in cooperation with manufacturing associations in Illinois. Grants were to range from \$5,000 to \$10,000, with applicants required to obtain matching funds in cash or in-kind. Five projects were actually funded, with a total commitment of \$25,000 in USNet funds. We examined one of these projects in detail – the Chicago Biotech Network (CBN). This network involved four young, small emerging biotech firms housed in a business incubator at the University of Illinois Medical Center. The network was organized by a private consultant-broker who had applied for a \$7,500 USNet challenge grant, on CBN's behalf. CBN conducted workshops on partnering with other biotech companies in the Chicago metro region, and roundtable

discussions and one-on-one meetings with potential partners. The grant also supported marketing assistance in upgrading their corporate portfolios and web sites.

The USNet challenge grants helped to build on the Foundation Forums by sponsoring specific network activities. This experience suggests that it is important that educational workshops be followed by additional services (i.e., technical assistance, funding). The CBN case further demonstrated the role of an active broker and facilitator in soliciting participation from firms. Participants interviewed in the study said that the challenge grant project had stimulated the individual CBN firms to strengthen ties and collaboratively explore new market opportunities.

- *Oklahoma*

In Oklahoma, USNet supported matching challenge grants for three inter-firm projects. USNet's partner was the Oklahoma Alliance for Manufacturing Excellence (The Alliance), a statewide industrial services provider and MEP affiliate. The Alliance had a prior history of work in inter-firm collaboration, beginning in 1991. A USNet Foundation Forum was held in Oklahoma City in 1995. This was followed, later in 1995, by a request from the Alliance for technical assistance from USNet to assist in organizational development and to train extension staff in the concepts and practice of inter-firm collaboration. We examined the outcomes of this training, looking at the example of the Grand Lake Manufacturers' Council – a local partnership of the Alliance in rural northeast Oklahoma. The Council (whose members include small manufacturers) sponsors a broker/agent who works with individual companies and who engages firms in collaborative activities.

To augment individual staff technical assistance, about \$12,500 was also committed through three USNet challenge grant projects for networks dealing with product development, ISO 9000, and a virtual factory. We investigated one of these challenge grant projects – a grant of \$3,080 awarded in 1997 to Virtual Enterprise, Inc., a network of about 45 firms associated with the defense industry. The network's lead firm was Small Business Innovation Research Engineering (SBIR Engineering), a 15 employee company with close ties to Oklahoma State University. SBIR Engineering contributed matching funds and laboratory space and coordinated the participation of other companies. The USNet challenge grant aided the development of an inspection and calibration tracking system for hand tools used in defense production. Inter-firm collaboration was desirable, as individual small firms did not have the resources to develop their own inspection capabilities. By September 1997, the tracking system was operational, and 11 firms in the network had used the system. The momentum created through this project was reported to have aided further collaboration on an aircraft procurement contract. Again, direct funding from USNet promoted the development of a network. SBIR Engineering not only used these funds to implement a collaborative project but also tapped into other knowledge and resources offered by USNet program.

- *Florida*

In Florida, USNet helped to finance the strategic planning and testing of a new supply-based management initiative led by the Southern Technology Applications Center (STAC) – a NASA-affiliated regional technology transfer organization at the University of Florida. The project aimed to demonstrate the concept of supplier alliances by showing how supplier and service provider collaboration in design and manufacturing could lower total product costs and reduce product development time.

USNet provided a challenge grant of \$21,000 to a supply-based management project involving an anchor firm that sought to develop and make a new laser range-finder for the commercial and defense markets. STAC and the MEP-affiliated Central Florida Manufacturing Technology Center (CMTC) provided matching support. The project sponsored market research and a product development plan. With assistance from a Massachusetts consultant, SBM² Inc., a qualification, certification, and training system for potential supplier firms was established. A process to allocate work between the anchor firm and suppliers was developed. By September 1997, eight companies were involved in the supplier alliance. STAC estimates that the product will go to market six to 12 months faster with production costs 30 to 50 percent less than originally expected. Building on this experience, STAC now aims to develop further supplier alliance networks.

- *Louisiana*

In Louisiana, USNet provided technical assistance to support state policy development for inter-firm collaboration, conducted a cluster analysis, and supported a challenge grant to a product development network. USNet's principal state partners were the Louisiana Department of Economic Development (DED) and the Louisiana Partnership for Technology and Innovation (Louisiana Partnership). Prior to USNet, Louisiana had no formal policy supporting inter-firm collaboration initiatives.

A USNet Foundation Forum was held in Louisiana in 1995. This was followed by the cluster analysis project. The analysis explored the potential of industry cluster-based approaches in the state, by defining, profiling, and analyzing sectors and regional (sub-state) economies. Eleven industry segments were examined, and recommendations made on strategies and priorities for state policies based on these industry clusters. The study was completed early in 1996. However, a subsequent gubernatorial election diminished implementation possibilities, leading USNet and DED to refocus assistance toward local-level economic development organizations. In 1997, the Louisiana Partnership assumed the leadership role in supporting inter-firm collaboration in the state, and USNet worked with the Partnership to establish a challenge grant program. A \$4,000 award was made to the EV-Mar product development network, in addition to USNet funds allocated to the cluster analysis and to the Louisiana Partnership. In addition, refocusing of state strategy

and USNet support to the local-level resulted in new projects to create networks of metal fabricators in north Louisiana and shipbuilders in south Louisiana. These efforts led to new state funding proposals to solve workforce shortages in these companies and to identify groups of firms in north and central Louisiana to supply components or products to the shipbuilders.

USNet's experience confirms that considerable time and commitment is needed to introduce inter-firm collaboration to a state with little pre-existing infrastructure for such efforts. USNet's Foundation Forum, cluster study, and strategic planning assistance raised awareness. Subsequently, USNet's ability to award small grants stimulated concrete actions to form networks and leverage other funds and resources. USNet's activities have spawned some new network promotion initiatives, although it is perhaps still too early to judge how durable and effective these networks will be, and whether other networks will be encouraged to form in Louisiana.

6.3 Lessons Learned from the State Case Studies

The five case studies examined the types of special services and projects USNet provided to its partner states. (See also table 6-1.) All five states were involved in either one-on-one consulting, strategic planning and educational activities through the Foundation Forum and other briefings.²⁴ USNet's experience in implementing follow-on special projects illustrate the importance of working with local sponsors who understand inter-firm collaboration and are willing to apply further resources to pursue the concept. In two cases, USNet provided applied research, with mixed results (one positive, the other neutral) influenced by the local conditions for implementing research recommendations.

USNet's challenge grants had the most direct impacts on network formation and development. These modest awards, supplemented by state and local matches, built on the awareness created by educational events and stimulated organizations, brokers, and firms to develop specific network projects. Many of the contact people interviewed mentioned that the outcomes of the challenge grants demonstrated the viability and value of inter-firm collaboration. These examples helped to promote the concept of inter-firm collaboration in their respective states. The challenge grant networks also showed the importance of supporting committed lead firms and brokers, who are then able to garner further inter-firm support.

²⁴ Although not noted in the case summaries, individuals and organizations were also been aided by USNet publications. Especially mentioned during the interviews were USNet's *Network Toolkit* and the newsletter *Firm Connections*.

Table 6-1 Case Studies of USNet Special Services and Outcomes

Organization and State ^a	Types of USNet service				Outcomes
	Technical assistance ^b	Applied research	Challenge grants	Education ^c	
ITAC, New York	✓			✓	Better understanding of inter-firm collaboration
CGS, Illinois	✓		✓	✓	Formation and expansion of bio-tech network; partnering meetings
The Alliance, Oklahoma	✓		✓	✓	Virtual factory network calibration tracking system; formation of manufacturing council
DED/ Louisiana Partnership, Louisiana	✓	✓	✓	✓	Promotion of inter-firm collaboration; assistance network formation – product development, fabricator & ship-building, and other networks
STAC, Florida	✓	✓	✓	✓	Formation of network for supplier and product development

Notes: ^aSee text for explanation of acronyms. ^bOne-on-one consulting, strategic planning. ^cFoundation Forums, other presentations.

USNet’s special projects also generated other leveraging effects, through encouraging state and local organizations to review their work programs to emphasize inter-firm collaboration. Tangible and intangible benefits were also promised, if not actually realized, by the enterprises that participated in the networks stimulated by USNet’s activities. Although it is difficult to predict what would have happened in the absence of the network projects stimulated by USNet, at the very least these projects appeared to accelerate the learning, product development, and change processes essential to business competitiveness. Yet, while USNet did influence the development local networks, by itself USNet had too few resources to stimulate any fundamental redirection of state policies towards inter-firm collaboration. Where states were unwilling to make strategic commitments to inter-firm collaboration, USNet usually found it more productive to de-emphasize strategic policy and to focus on local projects.

Overall, USNet’s special service projects demonstrated the value of adopting *specific follow-on projects* to build on the broad awareness of inter-firm collaboration created through general workshops and education. Also demonstrated was the utility of external sponsorship (through consortia like USNet) in providing the additional specialized resources and expertise that states and local manufacturing assistance agencies need to motivate local inter-firm collaboration networks.

7. State Impacts

A final element in the USNet evaluation was an end-of-program survey-based assessment that sought data and perceptions from state partners about the quality and impact of US-

Net services. In this section, the methodology and results from this assessment are summarized and discussed.²⁵

7.1 State Assessment – Methodology

The USNet 1997 State Assessment requested information about networking activities in partner states, changes since 1994, attitudes towards inter-firm collaboration, and feedback on the USNet program. A questionnaire was developed that probed more than 30 questions on these topics. The assessment was completed in early 1998. The 1997 survey paralleled a questionnaire that was implemented in 1994, at the beginning of the USNet project.²⁶

Contacts were made with USNet representatives from twelve states who were members of USNet in 1997 or who had been past members. Telephone follow-ups were made with these representatives. Eight respondents completed the questionnaire sent or faxed to them. The states that responded were Connecticut, Illinois, Massachusetts, Minnesota, Washington, Oklahoma, Louisiana, and New York.

7.2 Survey Findings – Extent and Context for Inter-firm Collaboration

The 1997 state survey indicated that there had been significant growth in network formation and in the number of firms involved in networks compared with the situation three years earlier. In 1994, there were some 42 networks reported in the eight responding states. By 1997, the number rose to 119, an increase of 77 networks. Significant increases occurred in Massachusetts, Illinois, New York, Oklahoma, and Washington. Furthermore, a total of more than 2,446 firms were added to the number of firms connected with networks. The greatest increases were evident in Massachusetts, Illinois, New York, and Oklahoma. State respondents were asked to determine the size of firms that were members of networks. The majority of network firms were either small- or medium-sized, most with fewer than 100 employees. (See Table 7-1.)

²⁵ For the full report, see Mary Ann Alabanza Akers and Philip Shapira, *Networking Initiatives in the States: USNet's Involvement in Promoting Inter-firm Collaboration*. Report of 1997 USNet State Benchmark Assessment, USNet Evaluation Working Paper 9803, June 1998.

²⁶ Philip Shapira and Jan Youtie, *USNet Baseline Assessment - USNet Member States, 1994*, USNet Evaluation Working Paper 9402. Initially, we planned to use the 1994 and 1997 surveys to track each state's progress over the life of the USNet project. However, it proved difficult to obtain a valid number of consistent same-state responses due to changes in the state membership of USNet, personnel changes among USNet state representatives, variations in survey response, and modifications in the program's activities. Nonetheless, the 1997 survey did ask questions about the position in 1994, thus allowing some retrospective comparisons to be made.

Table 7-1 Number of Networks by State in 1994 and 1997

States	Networks in 1994	Networks in 1997	Change in number of networks formed (1994-97)
Connecticut	4	12	+8
Illinois	5	20	+15
Louisiana	2	2	0
Massachusetts	10	30	+20
Minnesota	1	1	0
New York	9	21	+12
Oklahoma	8	19	+11
Washington	3	14	+11
Total	42	119	+77

Source: USNet 1997 State Assessment.

Sixty-nine of the networks organized in the last three years were aided by grants or other financial incentives, the state respondents reported. Colleges, public agencies, or non-profit groups helped to launch thirty-nine networks, while some thirty-eight networks were initiated by brokers or other network champions. The number of brokers reported in the eight states had increased by 108 individuals between 1994 and 1997.

Table 7-2 Firms Involved in Networks by State in 1994 and 1997

States	Number of firms involved in networks 1994	Number of firms involved in networks 1997	Change in number (1994-97)
Connecticut	20	80	+60
Illinois	75	500	+425
Louisiana	20	20	0
Massachusetts	300	1,200+	+900 or more
Minnesota	30	30	0
New York	350	800	450
Oklahoma	100	500	400
Washington	14	225	211
Total	909	3,355+	2,446+

Source: USNet 1997 State Assessment.

It should be emphasized that this reported growth in inter-firm collaboration among the eight responding states is *not* necessarily attributable to the activities of USNet. Indeed,

given USNet's modest resources, the *a priori* expectation is that USNet's contribution is likely to have been small (although see the section 7-3 for state perspectives on the performance of USNet). However, there does appear to have been a favorable shift towards the concept of inter-firm collaboration in these states between 1994 and 1997. State respondents judged that the attitudes of firms towards inter-firm collaboration increased positively between 1994 and 1997.

The organizational climate for inter-firm collaboration has also improved positively. Respondents were asked to describe the attitudes of a series of organizations that are influential in creating the context for inter-firm collaboration.²⁷ In general, attitudes were reported to be more favorable in 1997 than in 1994 (table 7-3), with local economic development groups perceived as making the greatest change. Nevertheless, there were significant variations in current attitudes. Manufacturing extension partnership programs, state and local economic development organizations, and statewide business associations had the most positive attitudes towards inter-firm collaboration in 1997. Weaker attitudes were reported among educational institutions, governor's offices, and professional societies.

Table 7-3 Attitudes of Organizations Towards Inter-firm Collaboration

Organizations	Attitude in 1994 (mean score)	Attitude in 1997 (mean score)
Statewide trade and business associations	1.9	2.8
Local/industry sector business association	2.0	2.6
MEP	3.0	3.3
Lead state economic development agencies	2.4	2.8
Lead economic development groups	1.9	3.0
Educational institutions	1.6	1.9
Professional societies	1.3	1.6
Governor's office	1.6	1.9

Source: USNet 1997 State Assessment (N=8). Respondent is state USNet coordinator. See text and footnote for discussion of scale.

However, the generally favorable shifts in attitude toward inter-firm collaboration did not necessarily mean that all states had well-developed policy and program infrastructures to sustain specific network projects. Of the eight states, Connecticut, Massachusetts, New York, and Washington were the only ones that had legislation or formal policies to promote inter-firm collaboration. Incentive grants were more widespread, with availability reported in Connecticut, Illinois, Louisiana, Massachusetts, Minnesota, and Washington.

²⁷ The scale used to measure organizational attitudes towards inter-firm collaboration was as follows: 1 = no or very low identifiable awareness or expressed interest; 2 = some awareness but little leadership or action on the issue; 3 = moderate level of interest, with several initiatives underway; and 4 = strong and widespread awareness: many robust initiatives established.

Broker training programs were supported by state governments in Illinois, Massachusetts, Minnesota, and Oklahoma.

Moreover, the positive changes in attitude towards inter-firm collaboration reported among state organizations did not necessarily translate into increased financial support. In terms of financial support for inter-firm collaboration initiatives, the eight states received approximately \$6.3 million from all sources in 1997 – only a modest increase of about \$0.4 million since 1994. Two states received the bulk of public funding for inter-firm collaboration in 1997 – Minnesota (\$3 million) and Massachusetts (\$1.1 million).²⁸ Oklahoma received the most funding from private sources (\$0.3 million).

7.3 State Perceptions of USNet's Performance and Impact

The 1997 state survey also asked for state partner feedback on USNet's performance and impact. Respondents were asked thirteen different questions about various aspects of USNet's services and activities during the period 1994 to 1997. Overall, the state feedback was positive.

Among the activities that we probed was the USNet Partners' Learning Network. This network involved key personnel from participating states, USNet staff and consultants, NIST staff, and a series of invited network specialists, brokers, and business participants. Meeting three to four times a year, the Partners' Learning Network was designed to provide opportunities for information sharing, best practice dissemination, and partner review of the project. For the eight states, at least 32 individuals were reported to have participated in meetings of the Partners' Learning Networks. The respondents' assessments of these learning networks were good (see table 7-4). No negative responses were received. Participants confirmed they had gained new information and increased awareness of other states' experiences and practices. New contacts were also made. However, respondents less strongly agreed that the Learning Networks had given them ideas to resolve problems or bottlenecks.

We also asked respondents for their overall views on the USNet Foundation Forum. All eight states had hosted Forums. Again, state respondents were generally satisfied with the quality and content of the Forums. Two respondents said that they were very satisfied, three were satisfied, and two were neutral. One respondent did not attend the Forum in his state. Views on subsequent Forum impacts were also positive. The state respondents said that the strongest Forum impact was on changes in attitudes towards inter-firm collaboration, with modest effects on changes in policies and programs and the creation of new networks.

²⁸ The Minnesota respondent used a broad definition of inter-firm collaboration, resulting in an expanded budget estimate.

Table 7-4 State Assessment of the USNet Partners Learning Networks

Statements (About the Partners' Learning Network)	Strongly agree	Agree	Neutral
Learned new information useful to promoting networking in my state	4	3	1
Made new contacts which I have subsequently called upon	3	4	1
Became aware of experiences and practices in other states	4	4	-
Able to get ideas to resolve problems or address bottlenecks	-	6	2
Became aware of tools	2	4	2

Source: USNet 1997 State Assessment (N=8). Respondent is state USNet coordinator. Note: No one disagreed with the statements.

We probed whether state participation in USNet provided tools, information, or other resources that helped to create, maintain, or improve the operations of inter-firm networks in respondents' states. Again, the answer was affirmative. The state respondents said that at least 71 networks were assisted in some way through state participation in USNet. This was equivalent to about 60 percent of all the networks reported by the eight states in 1997. USNet participation most aided state networks in three states - Illinois, New York, and Oklahoma. In addition, the eight states reported that their participation in the project resulted in USNet tools, information, or other resources being provided to 89 organizational "hubs" that promoted inter-firm collaboration.

We also asked a series of questions about the usefulness of the publications and toolkits developed by, or in association with, USNet. Seven of the eight respondents indicated that they read the newsletter *Firm Connections* and found the articles relevant. Five respondents reported that they circulated the newsletter to others in the state. Most of the respondents were aware of and had used the networking tool kits developed by USNet. Six of the eight respondents circulated these kits to others in their states. However, when asked whether the kits were used as models for networking activities in the state, only four respondents said yes.

Half of the sample had made requests from the USNet's Resource Center. Of these four, two were very satisfied, one was satisfied, and the other was neutral. Two respondents did not know whether their state had made requests, while two others were sure that requests had not been made.

Six of the respondents mentioned that they consulted with USNet resource specialists. Visits by these specialists were made in five states. Four states reported that these visits led to action in policy and program areas.

Overall, state respondents were satisfied with USNet. Six of them found USNet very useful to their state, while two said somewhat useful. A series of additional written and verbal comments were made by state respondents. Several respondents indicated that they would like to see a continuation of the Partners' Learning Network meetings. One state requested a better integration of the concepts of regional industrial clusters and inter-firm networking. Another respondent suggested that greater attention should be paid to the external economic benefits generated through inter-firm collaboration. Finally, suggestions were made for greater emphasis and leadership within the MEP system to promote networking and inter-firm collaboration.

8. Conclusions

The USNet project involved multiple states in a series of diverse activities to promote inter-firm collaboration. There were changes in the membership and goals of USNet during the program's operational life. There were also significant differences in the state and local contexts, which affected what the project could achieve. It was intended that USNet should serve as a demonstration effort and promote learning and best practice dissemination about inter-firm collaboration. At the same time, USNet was also expected to achieve concrete results – albeit with modest resources.

This mixture of goals, methods, and membership complicated the evaluation of the USNet, although it also resulted in a richly textured project that presented many opportunities for learning and feedback. We drew on these opportunities to undertake a series of distinct studies and assessments of USNet's performance and impacts. In addition, aware that USNet had a fixed time horizon, we also made efforts to contribute to broader debates about the effectiveness and outcomes of strategies to promote inter-firm collaboration.

Although there were variations in some results of the different USNet evaluation studies, there was a much greater degree of consensus. What are the principal findings from the evaluation effort?

1. Firms who collaborate in inter-firm networks report positive net benefits, while greatest private impacts are associated with strong industry leadership of networks

Our studies showed that firms who collaborate in inter-firm networks report positive net economic benefits, as well as valuable effects on information sharing, know-how, and business strategy. In most instances, these impacts are relatively modest; however, the net impacts seem to be greater for those firms and networks that are engaged in more intensive collaborative activities over longer periods of time. Strong industry leadership of

networks also appears to be associated with the greatest private impacts. The implication is that public efforts to promote networks should ensure that these networks are industry driven.

2. USNet's original network promotion goals were too ambitious, given the resources available

It is apparent that USNet's original goals were too ambitious. For example, in its proposal for funding to the Technology Reinvestment Project, USNet set a performance benchmark "that the ten partner states would establish, on average, ten networks per year". This implied a three-year goal of about 300 networks.²⁹ This has not been achieved. USNet never had the necessary resources to sustain this level of effort. Moreover, as it turned out, the partner states, although committing small amounts of matching funds to USNet, had not incorporated this strategic objective into their own individual economic development and industrial modernization strategies. Mostly, the partner states were at a much earlier stage of conceptualization, learning, and exploration about inter-firm collaboration and looked to USNet for more diffuse and customized assistance.

3. Judged against more realistic expectations, USNet has performed well

To its credit, USNet flexibly adapted itself to the realities of the state situation, and restructured its program to offer customized services to its state partners. Thus, judged against more realistic expectations of what was possible, it does seem that USNet has performed well. The state partners' generally report favorably on USNet's services, resources, publications, and special projects. This does not mean there were not criticisms. State partners did not always find the practical tools or models they were looking for (although, in USNet's defense, it is not clear that such tools or models were anywhere available – but depended on local action to forge). At the same time, the commitment of some states to the project fluctuated, with changes in policies and personnel outside of the control of USNet. In several cases, USNet had to start again with a particular state organization. In other examples, plans and programs had to be modified, with the loss of prior resource investments.

4. USNet's training programs have generated widespread awareness about inter-firm collaboration

One of the greatest impacts of USNet has been through the training of nearly 700 individuals across 13 states through Foundation Forums, CEO briefings, and other training

²⁹ In the eight states responding to the 1997 state assessment, there was a reported increase of 77 networks over three years – an average of about 3 new networks per state per year. These networks were not necessarily aided by USNet – although the states reported that about 60 percent of the networks operational in 1997 had benefited in some way from USNet-provided tools, information, or other resources.

events. Two-fifths of the trainees were from public agencies and economic development groups, one-fifth from manufacturing extension programs, and the balance from educational institutions, consulting firms, private business, and industry groups. Our longer-term studies showed that these sessions increased knowledge about inter-firm collaboration, disseminated best practices, and – for some participants – stimulated follow-up activities with firms.

5. USNet special projects demonstrate the value of explicit follow-on initiatives to promote inter-firm collaboration

USNet's special projects also seem to have been useful, although for several it was still too early to determine the full effects. While research and planning efforts had mixed results, greater effects were reported with the USNet challenge grant program. This challenge grant program confirmed that modest amounts of money could leverage other resources and motivate firms and brokers to form networks. Furthermore, USNet's special projects demonstrated that general education and awareness building programs need to be followed by specific network promotion activities.

6. USNet policy and organizational impacts at the state level were modest

USNet's policy and organizational impacts at the state level were generally modest. This is not surprising given the modest investment allocated to USNet. Nonetheless, there were variations in policy impact by individual states. A few states with established structures for inter-firm collaboration have effectively leveraged USNet services to strengthen their initiatives. Some states have had personal and policy changes (outside of USNet's control) that have limited their returns from USNet. In other states with less developed policies and organizations for inter-firm collaboration, USNet has sponsored several useful pilot projects, planing studies, and forums. It is again too soon to tell whether these pilots will lead to more substantive and durable state-level and industry investments.

7. Federal support can strengthen efforts to promote inter-firm collaboration at the state level and aid shared learning

The USNet project was initiated through federal action that then attracted matching state funds. Although the total amount of funds contributed is modest, the existence of an inter-state consortium strengthened efforts to promote inter-firm collaboration in participating states, particularly in terms of action if not always through substantive policy changes. The USNet consortium allowed the sharing of experience and information, the dissemination of best practice and new models, and the development of specialized resources and programs that states could draw upon. Unnecessary duplication was avoided (e.g. by each state developing its own basic training courses). Some states were more advanced than others in developing policies and structures to promote inter-firm collabo-

ration, although all benefited at some level from the exchange opportunities and specialized resources made available by USNet. It is our judgement that without ongoing support from USNet or another national or federal organization, there is a reduced likelihood that efforts to promote inter-firm collaboration will develop consistently and to their full potential across the states.

With the ending of the USNet project, the MEP program could and should continue to exercise leadership by giving greater emphasis to inter-firm collaboration among its network of industrial extension providers. We found that local MEP service providers are interested in efforts to promote inter-firm collaboration. There remains a valuable opportunity for a focused organization outside of the MEP or a renewed program within the MEP to promote the concept. Within the MEP, stronger encouragement for inter-firm collaboration by NIST management would assist MEP service providers in extending local network activity. Additional special project funding to support demonstration networking efforts by local MEP centers would also be worthwhile. At the very least, opportunities for inter-state exchange and sharing should be sustained, drawing on the positive experiences reported from the USNet Partners' Learning Network.

USNet has enabled the sharing of learning about what works (and what does not) in promoting inter-firm collaboration. It is apparent that network promotion is not easy. It has not always been clear how inter-firm networks can or should be built. USNet has prompted considerable discussion about experiences with different models, the role of industrial associations, links with supply chains, relationships with industrial extension, appropriate forms of policy, and the effectiveness of different methods and approaches to stimulating networks. Indeed, there has been debate about whether industrial networks should be seen as permanent or impermanent structures. Throughout, the dialogue has been driven by pragmatic experience and a concern with industry needs. Ideas and concepts about networks have changed among USNet's participants. We view this as a positive development in a still emerging field where experimentation about how best to promote collaboration needs to be fostered. Hopefully, rather than reinvent the wheel, future efforts will build on the experiential base, tools, and insights that USNet has developed.

Appendix – USNet Evaluation: Publications and Tools

Firm Connections Special Issue

Special USNet review issue of *Firm Connections*, vol 5., no 6., November-December 1997. Articles by Trent Williams, Stuart Rosenfeld, Brian Bosworth, Philip Shapira, Gordon Kingsley and Hans Klein, Mary Ann Alabanza Akers, and Doug Welch.

Evaluation Working Papers

1998

- 9805 *The Evaluation of USNet: Overview of Methods, Results, and Implications. Final Report.* Philip Shapira, July 1998.
- 9804 *USNet's Foundation Forums: Final Summary Participant Evaluation.* Philip Shapira and Jan Youtie, July 1998.
- 9803 *Networking Initiatives in the States: USNet's Involvement in Promoting Inter-firm Collaboration.* Report of 1997 USNet State Benchmark Assessment. Mary Ann Alabanza Akers and Philip Shapira, June 1998.
- 9802 *Building Capacity and Support for Inter-firm Collaboration: An Assessment of USNet Special Projects in Five States.* Mary Ann Alabanza Akers, Jan Youtie, and Philip Shapira, April 1998.
- 9801 *Analysis of Participant Evaluations – Illinois Executive Briefing.* Jan Youtie, January 1998.

1997

- 9703 *Inter-firm Collaboration as a Modernization Strategy: A Survey of Case Studies.* Gordon Kingsley and Hans Klein, November 1997.
- 9702 *Inter-firm Collaboration to Improve Competitiveness: An Evaluation of USNet's Foundation Forum Workshops.* Mary Ann Alabanza Akers and Philip Shapira, October 1997.
- 9701 *Net Benefits: An Assessment of a Set of Manufacturing Business Networks and their Impacts on Member Companies.* Doug Welch, Eric Oldsman, Philip Shapira, Jan Youtie, and Julie Lee, October 1997.

1996

- 9606 *Analysis of Participant Evaluations of the North Carolina Foundation Forum, 9.96.* Jan Youtie and Philip Shapira, December 1996
- 9605 *Case Studies of Inter-firm Collaboration: A Survey.* Gordon Kingsley, December 1996.

- 9604 *Analysis of Participant Evaluations of the Illinois Foundation Forum 11.96 and the Illinois Executive Briefing on Inter-firm Collaboration 11.96.* Jan Youtie and Philip Shapira, December 1996.
- 9603 *Analysis of Participant Evaluations: Bloomington, IL, July 8-9, 1996.* Jan Youtie and Philip Shapira, July 1996.
- 9602 *Analysis of Networking Organizations,* RTS Database of July 1996. Philip Shapira, July 1996.
- 9601 *Analysis of Participant Evaluations: West Virginia Foundation Forum, Charleston, WV, May 8-9, 1996.* Philip Shapira and Jan Youtie, June 1996.

1995

- 9506 *Annual Review: Evaluation Approach, Year 1 Findings, Year 2 Initiatives.* Philip Shapira, December 1995.
- 9505 *Manufacturing Extension and Inter-Firm Cooperation: Is There a Match? Or, Does Anyone Have a Match? Report of a Survey of MEP Centers.* Brian Bosworth, December 1995.
- 9504 *Establishing the Building Blocks: A Follow-up Evaluation of USNet's Foundation Forums on Inter-firm Collaboration.* Gordon Kingsley, November 1995.
- 9503 *USNet Network Member Benchmark Study: Initial Findings and Potential Measures, 1995.* Nexus Associates, Inc.
- 9502 *Case Study Methodology for USNet.* Daniel Broun, March 1995.
- 9501 *Summary Participant Evaluations of USNet Training Events* (updated through December 1995). Philip Shapira and Jan Youtie.

1994

- 9402 *USNet Baseline Assessment - USNet Member States, 1994.* Philip Shapira and Jan Youtie.
- 9401 *USNet: An Enabling Service for Manufacturing Networks: Evaluation Strategy.* Philip Shapira, June 1994.

Measurement and Evaluation Tools

- T9702 Second Foundation Forum Follow-up Protocol
- T9701 USNet 1997 State Assessment
- T9601 Second Day, Foundation Forum, Participant Evaluation.
- T9505 Network Coordinator Benchmark Tool (revised 1.97)
- T9504 Network Member Benchmark Tool (revised 1.97)
- T9503 MEP Networking Survey (Brian Bosworth and Dan Broun)
- T9502 Foundation Forum Evaluation Survey (Follow-up)
- T9501 Advanced Broker Capacity Training Evaluation Survey
- T9402 Foundation Forum Evaluation Survey (End-of-Session)
- T9401 USNet 1994 State Baseline Assessment Tool

Evaluation Project Briefs and Updates

B9503 Networking Meta-Case Analysis - Project Brief.

B9502 USNet Evaluation Element - Year 1 Status and Updated Year 2 Plans

B9501 Network Benchmark Study - Project Brief

Internet Access

Many USNet evaluation papers are available in electronic document format through the internet at this worldwide web address: <<http://www.cherry.gatech.edu/ifc>>.