



98033

**Award Number 39-60-98033
Project Evaluation Report**

Submitted by ACEnet

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I. Evaluation summary

Our major accomplishment in the evaluation arena was our realization that the most important aspect of evaluation in a prototype project such as the *Teleworkforce Project* is the capacity to gather feedback, so that the program can evolve to best meet the needs of workers and the community. This report is as much about the evaluation system we are setting in place as about the results of the evaluation. We feel that we now have in place a highly effective continual improvement system, and that the effect of continual improvement practices has already been dramatic. We spent most of the grant period developing an evaluation system that would provide feedback to help us to shape the workforce development project as well as to show the impact of the project on the students, teachers, businesses, and community.

This process was slowed down by turnover in personnel serving as evaluators and by the fact that the project was continually evolving, thus requiring us to modify our evaluation system. We had three evaluators involved in this project. The first had to withdraw due to a sudden increase in other commitments. The second did some good work with the project and helped us identify some critical issues but then increasingly did not fit with the direction in which we were going. The third continues to work with us to develop the innovative network evaluation system.

The most innovative aspect of the evaluation system is a web-based site that will enable participants to identify and evaluate their personal networks and analyze the network on a community level as well. Our recent study of literature on the *New Economy* indicates that a crucial characteristic of organizations and individuals who are successful in this new economic scene is that they have built high-quality networks that introduce them to innovations and enable them to collaborate with others to gain new capacities. This report describes how we are developing tools and processes so that all the participants in workforce development projects can assess and improve the effectiveness of their networks—and, as a result, increase the impact of those projects. We believe this will be a major new tool to increase the impact of community technology efforts around the country.

This report will first summarize the three different—but overlapping—aspects of evaluation that we now include in our evaluation and improvement efforts: outcome and impact assessment, network analysis, and continual improvement. Next, we will examine how we evaluated each of the four components of the project *1) high school workforce preparation, 2) basic computer skill training, 3) sector-specific workforce training, and 4) employer-driven workforce training*. Evaluation plans for each of the components are detailed as they relate to the project outcomes from our initial proposal. In this section we will also discuss the results of the evaluation of each component. Although the total evaluation system seems huge, we are close to embedding the evaluation process in the regular operations of each program so that they will be neither time-consuming nor arduous.

II. The Evaluation System

During this project we came to recognize the need for several different types of tracking and evaluation, described below and summarized in Chart 1.

A. Outcome and impact assessment. First, we need to be able to track the effectiveness of the project by identifying the difference the project makes in the lives of individuals and upon communities' workforce development efforts. We increasingly are looking for impact (long-term system changes) rather than just outcomes (more simple, short-term changes), which has led us to increased interest in network analysis and continual improvement (see below).

Originally, we set in place tracking mechanisms to capture the numbers of people and businesses involved in various aspects of this project. However, we are trying to move beyond numbers to assess impact. For example, we are now starting to track the long-term career directions of the young people who take the COP high school class by making sure we have parents' phone numbers (with their permission, of course) so that we can check in on the student once they have graduated from high school to see if their career options have expanded and to get more feedback on how they see the COP program once a few years have passed. We are also increasingly interested in the long-term changes in how employers implement training for their workforces, and are tracking these over time through a combination of interviews, annual surveys, and more informal feedback (as well as through the network analysis described below).

(1) Tools for outcome assessment of outcomes and impact.

a. Annual or pre/post surveys. We use annual surveys for students, businesses, and community organizations (see attached). The current student survey is web-based and has questions addressing each of the outcomes (or objectives) in Chart 2. (A fascinating example of impact is that one of the students is using the code from this online survey to develop a new unit for the class on how to create an online survey!)

The results of these surveys are aggregated into another web-based form, so that we can see the difference, for example, in the number of students planning to attend college in all seven schools at the beginning and end of the class and can test the accuracy of students' assessments by tracking specific steps they have taken to apply to colleges. In business surveys we are trying to track specific implementation of new systems that will increase profitability and implementation of new workforce development components, which include benefits provided as well as training.

b. Portfolios and checklists. We are continuing to develop the ability to accurately assess the increased skill or competency level of people involved in these programs, as an indication of long-term change in capacities. This includes specific computer skills but also, in the case of students and teachers, important social skills such as leadership or interactive teaching skills. Patrick Finn developed a self-assessment instrument (see attached) but we found it very inaccurate and are developing a competency checklist that a teacher or trainer can use to check off a skill after the student or trainee shows proficiency in it through specific activities included in his/her portfolio. We have set up a separate server with space

for all students to have substantial portfolios, which at the end of the class are revised to become the students online resume and/or business website which they can continue to use for a year after the program ends. We want to apply this multi-purpose assessment tool to other components of the teleworkforce project as well.

Chart 1. How outcomes in components are measured

Teleworkforce Project Component	How?	When?
COP		
Student Outcomes		
Purpose: to assess the competencies of students in the 5 areas below.		
1. Computer skills	Survey Modular Checklist and modular survey Portfolio	Pre & Post After each module
2. Entrepreneurship skills	Survey Portfolio	Pre & Post
3. Networking	Inspiration Diagram/Network Builder	Pre & Post
4. Leadership/consulting skills	Teacher observation Self-Assessment (to be modified) Portfolio	Pre & Post
5. Career options	Survey Interview Portfolio	Pre & Post 1 year, three year
Teacher Outcomes		
Purpose: to track increase in interactive, student focused teaching style and increased quality of learning and innovation networks		
1. Changes in teaching style	Teacher interviews	Pre & Post
2. Improvement in networks	Network survey and analysis	Pre & Post
Program Evaluation		
Purpose: to gather feedback to improve the program design and delivery		
Continual improvement	Focus group - SGID Teacher-trainer interaction Module feedback questions Exit Interview	Mid and Post Weekly Throughout Post
Each One Teach One Transitional Workforce Training		
Purpose: to track impact on participants		
1. Increased skills 2. Feedback for program improvement	Survey (to be developed)	Post
Sector-focused		
Purpose: to track impact on sales		
1. Increased sales 2. Increased implementation of workforce development 3. Feedback for program improvement 4. Worker skills	1. Financial statements 2. Annual Surveys, interviews 3. Annual Surveys, interviews 4. Skill surveys (to be developed) 5. Network Builder and survey	1. Monthly, quarterly, annually (depends on firm) 2. Annually 3. Annually 4. Pre/post 5. At least annually

5. Innovation and learning networks		
Business-driven		
Purpose: to determine the impact on skill level of employees		
Employees	Skill assessment	Pre/Post

b. Network assessment. As important as it is to record immediate outcomes, we now feel that it is even more important to record progress that individuals, organizations, and the community make in building effective networks so that they can flourish in the New Economy. Studies have shown that the key to success in the New Economy has to do with the quality of the networks built. If people and organizations are not drawing in innovative ideas, if they are not processing those ideas with others, if they are not building relationships with others so that they can collaborate for mutual gain—they will not be able to stay on the front edge of economic activity. See <http://www.mande.co.uk/documents/perrin.htm>; <http://www.swan.ac.uk/cds/rd/ccdb.htm>. <http://www.emmanuel-rosen.com/other/content.html>. See also draft bibliography on networks, innovation and the New Economy, attached. The most exciting aspect of networks is that some of them operate according to the Power Law. When the network arrangements are optimal, changes can cascade through the system, bringing transformation. This means that community projects could have much greater impact if they were structured as networks with certain qualities. See, <http://www.nytimes.com/2000/12/26/science/26WEBS.html?pagewanted=all>

Much of the success of the Teleworkforce Project came from linking individuals and organizations that had not been connected before, and enabling them to collaborate. For example, none of the teachers in the seven schools knew each other before this program. Now several are staying in contact, helping each other with problems. Schools were very isolated from businesses and from their local economies and the issues that face them. This project saw numerous businesses providing guest speakers and sites for tours, thus letting students know about businesses in the community where they might work. The project had students research telecommunications policy and present their findings to representatives from the PUCO and telecom companies; one set of students found out from the PUCO how they could request changes in long distance areas, and have submitted a petition to the PUCO to change those areas in their communities so that they did not have so many long distance calls.

Businesses involved in the food sector were able to amplify their network connection through the use of the Foodnet listserv, where they could share information and plan collaborations. For example, just last week a number of businesses started talking online about their interest in working together to deliver their products collaboratively in the state. A group of people in the next county became interested in developing a Kitchen Incubator in their community with assistance from ACEnet. Participants in that project were able to connect to our network through the Food Sector Web pages where they were able to get a detailed picture of what was involved when working with small food processing businesses. This network now consists of a

foundation, a non-profit CDC, a Small Business Development Center, a local Fair Board, and about 25 farm families. Much of the planning for that facility and the accompanying training has occurred through the use of a small listserve. ACEnet coordinates 12 different listserves, one with almost 300 participants and others with only a handful of participants in each, but all used to build networks.

Our entrée into transitional workforce development was only possible due to previous network linkages. ACEnet is partnering with a local volunteer group—Each One Teach One—which has now raised additional funds and become an innovative program within ACEnet. The local Jobs and Family Services partnered with ACEnet/EOTO to provide funding and a second space for the program at their literacy lab/one stop center.

E-commerce is an area where local organizations and businesses need to develop more sophisticated understandings of the field. ACEnet and Hocking College co-convened a network e-commerce study group where ideas such as idea viruses, buzz, online community, etc., were discussed and examples observed on the Web. We hope this will lead to a regional strategy for stimulating effective use of e-commerce by area businesses.

Tools for network assessment. Valdis Krebs, one of our evaluators (see <http://www.orgnet.com> and draft of a paper to introduce participants to the importance of networks, attached), is working with our staff to design software and websites for ACEnet (see attachment S), where participants in the workforce project can construct their own networks, see their network's network, and then get an analysis of the qualities of their networks, with suggestions on how to improve those networks.

There are two parts: a Network Builder, where individuals build their network on a website; and a Network Analyzer that takes the results of network questions on the Annual Survey and analyzes the entire community network. Scales that will be used will be taken from the work of Wayne Baker (Building Social Capital, see <http://www.humaxnetworks.com/books.html>) and Ron Burt (Structural Holes, see, <http://gsbwww.uchicago.edu/fac/ronald.burt/research/>). They will identify density, diversity, and position in the network for individuals as well as identify certain leadership that introduces new ideas to the network (Innovators) and leadership that is extremely influential (Influentials) and takes Innovators' ideas and introduces them to many more people in the network. ACEnet staff and other trainers will be able to support this leadership, by making sure that they have sufficient venues to share innovations with others in the network, as well as to assist individuals in improving their networks.

When all these individual networks are combined, a community can see how well it is bringing in innovation, and how well groups within the network are collaborating. We expect to have a pilot run of this network evaluation system operational this spring. We are convinced that this software/web site will be one of the most important evaluatory tools for community groups in the future.

c. Continual improvement. Projects such as the teleworkforce program are "rapid prototypes"—bold innovations that are developed without much experience to draw on. Because of this, they tend to be rough drafts, and they require that feedback processes be included in the

project from the beginning. An article in the most recent *Harvard Business Review* (February 2001), *Enlightened Experimentation: the New Imperative for Innovation*, explains how important it is to “frontload” development of new programs by involving diverse groups to provide feedback early on in the process of program development. We found that we had to make substantial changes in the COP project and the CTC training format, for example, based on feedback we collected from students and teachers and principals. We continue to learn how to embed feedback processes in all of our programs.

One of the major issues is how to build a culture that is supportive of brutally honest but not nastily negative feedback. We are raised to see negatives, but to be less aware of positives. We don't have much skill in presenting feedback in a way that doesn't make people feel bad. As a result, many people will simply not bring up things that they feel don't meet their needs. We are continuing to learn how to frame feedback to participants in our programs.

Tools for continual improvement. ACEnet uses three different types of tools to obtain feedback for continual improvement: post program feedback through surveys and exit interviews; short feedback forms for just-in-time feedback on short modules or workshops; and informal reflection.

a. Surveys and exit interviews. Opportunities for feedback are included in the annual surveys given to students, teachers, businesses and resource organizations and in the exit interviews with students and teachers.

b. Just-in-time feedback forms. Short feedback forms are given to students at the end of each module. These are continually being revised. For instance, students have been filling out the feedback forms halfheartedly. One of our VISTA volunteers, not long out of school, gave us feedback on our open-ended questions. She said it is too easy for students to provide general statements or leave questions blank when they are open-ended. We have redesigned the modular evaluations and put them into a web-based format. Students must check items they have learned and fill in text boxes. Our technology consultants (including a student intern) have designed the scripting so students have to fill in the text boxes in order to submit the survey, or otherwise get an error message. See the old and revised modular checklists for the students, attachment Q. We will modify these forms to use with workshops in the CTCs.

c. Informal reflection. Definitely the most powerful tool for improving programs, however, is informal reflection that is casually embedded in day-to-day activities. For example, the teacher trainers sent an e-mail to all staff on the team after each visit to a school, noting any issues or insights. These were then discussed and incorporated immediately to improve the program. For example, when several visits identified the inability of school tech coordinators to provide adequate service to the teachers due to overload, ACEnet decided to set up a training program for students so that they could assist teachers with network administration and troubleshooting. Many other examples are presented throughout this document.

Also, too many teachers were not completing the modular checklists where they and the students check off competencies they have mastered. These checklists were quite long and complicated, but were intended to give the teacher an indication as to whether students have mastered

applications in order to move forward in the curriculum. We used feedback to shorten the checklists to the most important items the student will need to know, cutting the length of the lists down considerably.

IV. Evaluation of the Suite of Workforce Development Components

This section will review the original outcomes and the way each was tracked. Next, it will look at each of the final components in the Teleworkforce System, describing the evolution of the evaluation process and reviewing the outcomes.

A. Original Outcomes

Project Outcome: 1) **At least 100 potential or existing workers will participate in the project upgrading skills and helping to increase job responsibilities and/or wages.**

Evidence Outcome (1): Number of people using the Community Technology Centers - measured through a computerized log-in program at each of the centers. Number of people enrolled in classes – class database. Number of people using web pages - log on. Number of people trained by COP students - journal, portfolio. Annual business survey.

Project Outcome: 2) **At least 40 specialty food businesses will report increased sales and new high-quality jobs through participation in the project.**

Evidence Outcome (2): Financial reports - sales, number of employees. Annual survey. Business' modernization plan. Business web pages.

Project Outcome: 3) **At least 200 teachers, principals, students, and business owners will be involved in the start-up, operation and/or utilization of four CTCs in the schools.**

Evidence Outcome (3): Number of high school computer centers open to the public and staffed by students. Number of people using the centers - log on at centers. Data from training evaluations.

Project Outcome: 4) **Model for a community-supported workforce development system. (see below)**

Evidence Outcome (4): At least twenty groups of community members outside of Athens county will be informed and possibly adapt this model for a community-supported workforce development system which will last beyond the duration of the grant period, utilizes a community network as its platform, and includes public access, training, content, and support. Evidence: Community Network survey. Number of hits on web pages. Number of requests for information from other organizations.

Project Outcome: 5) **Seventy-five low-income high-school students will participate in the project which will result in either employment in a tech-related position or higher ed.**

Evidence Outcome (5): At least seventy-five low-income high-school students will participate in the two-year project which will result in either employment in a technology-related position or going on to higher education in a technology based field. Evidence: Baseline: pre-COP survey. Number enrolled in the class. Employment/education tracking: Post COP survey(s)--end of class, graduation, portfolio/COP web page.

Project Outcome: 6) **At least 100 potential or existing workers and owners will participate in a series of workforce development opportunities (see below).**

Evidence Outcome (6): At least 100 potential or existing workers and business owners will participate

in a series of workforce development opportunities including face-to-face sessions, on-line workforce development resources, and an on-line learning network among teachers, students, and specialty food firm workers and owners. Evidence: Number on online learning networks. Existence of industry web pages. Existence of COP web pages. Evaluations of face-to-face sessions. Analysis of on-line interactions. Number of hits on web page.

Component #1 -- High school workforce preparation (measured by Outcome #5):

Our goal is for every student who completes the COP course to graduate and either move on to postsecondary education or obtain employment in a high paying technology position. Because the project is still in its infancy, some of the first year students have just graduated. Of the 9 seniors in the first year of the COP program, 6 said they had considered college or had spoken to someone about college. We do not have specific numbers for the first year of those who went on to college and still remain in school. During the second year of the COP program (1999-2000), 13 of the 16 seniors went on to college; we do not have information on the other three seniors.

To help us better track the impact of the program, we created a student survey, given at the beginning of the year to give us a better sense of how many students were actually taking concrete steps towards attending college so that we had baseline figures. At the end of the year (this May) we will then give the students a post survey to see whether that number increased, and then collect phone numbers so that we can follow-up at the end of 1 and 3 years to check in with students to see if they remain in college, improve their work situation, or continue to operate the businesses they set up during the class.

The computer skills, entrepreneurship skills, and leadership skills were originally measured only through a student checklist created by our evaluator. The first year's use showed that students felt they had improved their computer skills significantly but actually had decreased their leadership skills. This later decrease was most likely due to students increase awareness of their lack of skill in these areas. We decided that self-assessment was not a very accurate way to measure change in skill levels and developed a new instrument which asked questions in each skill area to determine competencies, combining this with a checklist for each module completed by the student and teacher after specific evidence of competence was shown through class work. This still needs more work. We have the pre tests, but of course the post test will not be given until May.

Patrick Finn completed an interim evaluation of the COP program in the spring 2000, providing important insights into the program, which was still very much in a prototype stage (see attachment F). Fortunately, we received follow-on funding which enabled us to hire two experienced curriculum and training specialists. Our initial less experienced trainer, who had not been able to develop a clear curriculum on her own, which led to confusion on the part of students as to the direction the class was going, moved on. These two new staff, in addition to a new Tech Ventures director and the program coordinator, addressed virtually all of the issues raised in the evaluation:

- After problems with a difficult teacher, ACEnet insisted on a role in selecting teachers so unqualified teachers are not "dumped" on the program.
- Staff spent more time with principals and teachers to clarify expectations and roles.

- Staff developed a much more intensive teacher training program that started the spring before classes began so that teachers were much more prepared.
- Staff developed a much more detailed curriculum that included all the activities needed by busy teachers to adequately teach the class and gave both students and teachers a clear sense of class direction.
- Goals and objectives of the classes were provided to teachers and students upfront (see below).
- Students are now given the opportunity for feedback after each module; informal feedback is gathered from teachers on an ongoing basis and immediately incorporated into the curriculum; teachers provide feedback in the training sessions as well.
- Teacher trainers spend more time modeling interactivity.
- The course is marketed more clearly as “An entrepreneurship class where students start businesses that use e-commerce as part of the business strategy.” This has lessened confusion about the purpose of the class among students. It is no longer seen as simply a web page design class.
- The curriculum is an entrepreneurship class that uses the Internet and online communication as a means to learn entrepreneurship rather than a technology class.
- Staff began an advanced training so that one student in each class is trained in network administration and can assist the teacher with the network.
- The program now offers many explicit mentoring opportunities: advanced mentoring by ACEnet tech staff, mentoring in class, mentoring with an entrepreneur, and online mentoring.

In conclusion, our evaluation of this component is that it needs to move to a highly measurable, outcome-driven program, with more accountability placed on the teachers and students to follow the curriculum and assessment as it was designed. Because we really want to foster constructivist techniques, we are trying to walk a fine line between allowing teachers to take ownership of the curriculum and having teachers teach the course the way we want it taught. We are also talking more about grades than before, when we focused on the importance of the project. Students who have grown up with a grade as a measure of performance instead of the completion of a satisfactory project, need some determination of how they are doing. Though we are still focusing on the importance of the project, rubrics provide the student with a grading system with which to gauge their work.

More frequent check-ins with teachers and principals, as well as additional communication outlets (see newsletter, attachment T) will keep everyone updated on programs and progress of the COP program.



Vinton High School student JR helping out Laura

Chart 2. Cop Curriculum Evaluation Goals

STUDENTS

Student will develop and/or increase the following skills:

A. Leadership skills

- Increase planning and organizational skills
- Increase critical thinking skills
- Increase creative thinking: brainstorming,
- Increase self-esteem
- Increase skills at taking charge of a small group project
- Improve interpersonal communication skills (listening, etc)
- Ability to present self to others as credible and competent

B. Teamwork skills

- Practice successfully completing team projects
- Practice group problem-solving
- Practice group decision-making

C. Entrepreneurship skills

- Practice the skills needed to start a business: developing a business idea, selecting a legal form, calculating break-even, developing a business budget, developing business goals, identifying funds, developing a business identity, building a business network, marketing the business, etc.
- Develop a consultant resume and portfolio
- Negotiate and develop contracts
- Develop skills in training/teaching others
- Present the business idea to others
- Develop opportunity seeking skills
- Develop customer service skills
- Develop interviewing skills
- Develop a database of clients

D. Computer and e-commerce skills

- Increase computer technology skills
 - ◆ Develop marketing materials, business card, ecommerce site using Hot Metal and graphics software
 - ◆ Use of Inspiration for planning and creative thinking
 - ◆ Use excel for business spreadsheets
 - ◆ Use database for customer databases

III. Student will become a lifelong learner, capable of continual improvement:

- A. Students will maintain a journal and a Draft folder to build capacity to reflect on projects and self
- B. Students will gain the ability for self-assessment
- C. Students will elicit feedback from others

IV. Students will build effective networks:

- A. Students have a successful individual career network of students, teachers, business owners, community members etc.
- B. Students use this network to get jobs, internships, start businesses, consult, and learn, etc.
- C. Students will develop a mentor

V. Student will explore career options:

- A. Research colleges
- B. Research businesses hiring
- C. Research volunteer and internship activities
- D. Student will generate business activity and/or income

TEACHERS

Teachers will develop/increase the following skills:

- 1. Increased knowledge and use of variety of computer programs
- 2. Increase in student-centered learning
- 3. Increase in use of authentic assessment
- 4. Increased willingness to learn (shown by attendance at workshops and training sessions)

Teacher will build effective networks:

- 1. Teachers have a successful professional network of education professionals, community members and business owners.
- 2. Teachers access this network to enhance their classroom

Component #2 – Basic computer skill training

(measured by project outcome #1): Originally, we wanted to target the needs of food sector businesses for computer and Internet training for their workforce, and would provide courses for them. However, during the project we found that we needed to divide that generic training into 3 different components, both to get sufficient demand and to meet demand. The needs for basic training morphed into the Each One Teach One Program. The need for sector based training morphed into our online food sector Web site and listserv. In addition, we are just now setting up a program that will provide workforce development courses to any individual or set of businesses. As a result of these shifts, we are basically tracking numbers who received training, which we include below. However, a more sophisticated impact based evaluation is currently being set in place for each component.

Many of the classes taught in the CTC are basic classes, but getting low income citizens to pay \$15 for a class when they are already underemployed is not feasible. The solution to this is Each One Teach One. Each One Teach One (EOTO) is a free course, provided by volunteer community members to friends, neighbors, and other community members. EOTO began in January 2000 as a response to the need for basic skill training for area workers. Currently, four classes are taught in a casual "Tupperware party" atmosphere. Participants are encouraged to bring snacks, and during a break, they talk, share resources, and get to know one another. Participants include people aged 20-70. Almost all lack a computer at home, or are just deciding to buy a computer and want basic skills. Participants often are afraid they will 'break' the computer and don't want to touch one until they have some practice.

The most significant breakthrough with EOTO is that participants who are intimidated by taking classes at a college or school are more likely to attend classes at ACEnet. The instructor leads the participants through the class, first by talking about how to complete a task, then modeling how to complete a task, then having the participants practice. Classes consist of courses in word processing one and two, spreadsheets, and databases. Participants learn how to complete a household budget in the spreadsheets class and learn how to input state representatives in the database class. An Internet class will be added in 2001, to show people how to search the Internet, and send e-mail and photos.



Each One Teach One Community Classes at Alexander High School's CTC

Component #3 – Sector specific workforce development (measured by project outcomes #1 and 2):

Outcome #1: We have only what we consider first stage evaluation measured for this component, as it is so new. Currently, we track the number of computer users in the Community Technology Center and those taking classes. Over the project period we designed a web-based survey to track the number users in the CTC and the reasons users were coming to our centers. Two problems developed from this web-based system: 1) The paper-based log-in sheets remained in the lab and users complained they had already signed in on paper and 2) many users

were automatically closing the web-based survey without answering questions, arguing it invaded their privacy. Although we did not require answers to specific applications that users were selecting, they perceived a lack of privacy. We are, however, moving back to a web-based system, with people completing an intake document then using an ID number each time they check in. Long-term, we will develop a method for tracking long-term impacts especially with the Each One Teach One classes, to identify those who have obtained jobs or made career ladder moves as a result of the classes. Over the project period, over 325 people used the CTCs for Internet searches, e-mail, and applications such as word processing. Over 200 people have been trained in classes held in the CTCs. Since we did not disclose to our users the possibility of sharing their names with others, we will not include a listing of those names. We do however have the information on file and, if needed, can provide a first name and town for each. Classes offered by ACEnet are listed in the chart below.

Chart 3. Computer Courses Offered by ACEnet

Planning for Web Commerce

Intro to Southeastern Ohio Regional Freenet
Windows 98 Basics:
Introduction Word 97
Intermediate Word 97
Advanced Word 97
Internet Basics
Using the Net for Research, Marketing, and Commerce
E-Commerce Basics
Basic Accounting
QuickBooks
Web Page Design
Desktop Basics
Basic/Intermediate Excel 97
Advanced Excel 97
Filemaker Pro
Computer Hardware Basics
Design Principles
Desktop Publishing using Microsoft Publisher 97
Label Workshop Series
Intro to Word 2000
Intro to Excel 2000
Intro to Publisher 2000
Sending Photos via email
Intermediate Word 2000
Intermediate Excel 2000
Intermediate Publisher 2000
Advanced Word 2000
Advanced Excel 2000
HTML basics
Web page design with HTML
Intermediate HTML
Advanced HTML
Web page design with Hotmetal Pro
Turbocharge your profits using the web
Market your business on the Internet

Outcome #2: Information about businesses receiving technical assistance and training from ACEnet staff is kept in a set of files, spreadsheets, and database. We are now adding a webpage counter to the food sector website. These will be combined, during 2001, into a linked system including database, spreadsheets, and portfolio management software. Aggregations of data from all the businesses will be presented in graphical form on a Webpage.

For the 40 businesses that we tracked using the sector-based online workforce development program, sales increased from \$2.8 million in 1998 to over \$13 million in 2000. More than 100 new jobs were created. Staff developed a business modernization matrix that was used by business owners and staff to create modernization plans each quarter (see attachment).

An example of a business modernization plans in action is Big Chimney Bakery, which used ACEnet Ventures funding to increase retail space and seating area. Three businesses doubled their sales each of the last two years: Millie's Munchies, a low-income couple, added a delivery van and additional employees; Jose Madrid, hired a secretary, a fulltime production manager and several production workers; Frog Ranch, which hired an office manager, production manager, sales person, and 4 production workers. Business web pages developed over the project period include www.herbalsage.com, www.integrationacres.com, www.thedottybaker.com, www.josemadrid.com,

Component #4 – Employer-driven workforce training (measured by project outcomes #4 and 6):

Outcome #4: We will be sending out the annual survey to about 50 community organizations that have been partnering with us on these 4 workforce development components. These groups include

- 3 institutions of higher learning, including several branch campuses;
- 150 small food and technology businesses,
- 3 large Teleco companies
- Food sector resource organizations:
 - CIFT (Center for Innovative Food Technology),
 - OSU extension,
 - Rural Action,
- Region 5 Tech Prep Consortium;
- Ohio Department of Education;
- Public Utilities Commission;
- Athens County Chamber of Commerce;
- 3 economic development organizations;
- Appalachian Media Access Center;
- ReUse Industries;
- Community Action Agencies;

- Small business development centers;
- National Business Incubator Association;
- Athens County Department of Jobs and Family Services;
- job placement agencies;
- 5 Athens county banks;
- 2 loan funds;
- 2 venture funds;
- 15 high schools;
- 5 industries in Athens, Meigs, Lawrence, Jackson, and Washington counties; Star Machines; and
- 2 area hospitals.

Outcome #6: This is a new component, which will be operational once we get the new Tech Ventures Incubator and the CTC in the incubator up and running in March. Currently, VISTAs and the Tech Ventures Director are surveying employers to identify need. Although this is a new aspect of our workforce development model, we have discussed employer-driven training with four technology business owners in the area who employ 40 workers. In addition, we have discussed the relevance of employer-driven training to more than 50 food businesses in Athens, Meigs, and Washington counties, including the county extension agencies.

Opportunities – Sustainable Communities through Network Building

by Valdis Krebs
valdis@orgnet.com

Communities are built on connections. Better connections usually provide *better opportunities and more success*. But, what are *better* connections, and how do they lead to more effective and productive communities? How do we build connected communities that create, or take advantage of, opportunities in their region or marketplace?

This paper investigates building sustainable communities through improving their connectivity – internally and externally – *using network ties to create economic opportunities*. Improved connectivity is created through an iterative process of *knowing the network* and *knitting the network*. Improved connectivity starts with a map – knowing where you are.

Know the Net

The Appalachian Center for Economic Networks [ACENet], a regional economic development organization in Athens, Ohio has long followed the connectivity mantra – create effective networks to improve growth and vitality for individuals, groups and regions. Recently ACENet has begun to map and measure the social and economic connections around the up-and-coming natural food industry in this region of Appalachia.

Network maps provide a revealing snapshot of a business ecosystem at a particular point in time.

These maps can help answer many key questions in the community building process.

- Are the right connections in place? Are any key connections missing?
- Who is in a leadership role in the community? Who is not, but should be?
- Are communities of interest developing around key regional and economic issues?
- Who are the experts in the area?
- Who are the mentors that others seek out for advice?
- Who are the innovators? Are ideas shared and acted upon?
- Are collaborative alliances forming between local businesses?
- Which small businesses will provide a better return on investment – both for themselves and the community they are embedded in?

These are all important questions that ACENet wants to answer so that they can help build a more vibrant economy in Appalachian Ohio.

Before you can improve your network you need a map of how it is structured now. An ‘as is’ picture of your network assists you in answering the questions above. A network map shows the nodes and links in the network. Nodes can be people, groups or organizations. Links can show relationships, flows, or transactions. A link can be directional [A provides expertise to B: A → B] or non-directional [A works with B, and vice versa: A – B]. A network map is an excellent tool for visually tracking your ties and designing strategies to create new connections.

A network map is also a tool of influence. Knowing where the connections are, and are not, allows a community development organization to apply influence to key nodes in the network.

This is particularly important in policy networks where key nodes play an important role in what flows throughout the network. Influencing a small number of well-connected nodes often results in better outcomes than trying to access the top of the hierarchy or calling on random players in the policy network. If you know the network you can leverage your influence.

So what does a vibrant, effective community network look like? Since 1997, much research has been done to discover the qualities of vibrant networks. Research by large consulting firms, major universities, and research labs have all addressed the question. Sociologists, physicists, mathematicians, and management consultants have all discovered similar answers about effective networks. The amazing discovery is that people in organizations, routers on the internet, cells in a nervous system, molecules in protein interactions, and pages on the WWW all organize in efficient network structures that have similar properties.

Five general patterns are observed in all effective networks:

1. Birds of a feather flock together: nodes link together because of *common attributes, goals or governance*.
2. At the same time *diversity* is important. Though clusters form around common attributes and goals, vibrant networks maintain *connections to diverse nodes and clusters*. A *diversity of connections* is required to maximize innovation in the network.
3. Robust networks have several paths between any two nodes. If several nodes or links are damaged or removed, other pathways exist for uninterrupted information flow between the remaining nodes.
4. The *average path length*¹ in the network tends to be short without connecting every node to every other node. The power of the indirect² tie is used.

¹ The average path length in a network is a convenient measure of the network's global efficiency. The longer the average path length, the longer it takes for messages to travel between any two nodes, and the more *distorted* they are when they arrive.

² An indirect tie is a network path that connects two nodes through one or more intermediaries. Here A and B, and B and C have direct ties while A and C have an indirect tie through the intermediary B. A-B-C

5. Some nodes are more *prominent* than others – they are either hubs³, brokers⁴, or boundary spanners⁵. All are critical to network health.

In 1997, IBM became interested in how organizations were, or were not, changing in the networked information economy. They asked 15 of their world-wide customers to participate in a study. Each participant had just gone through a major organizational change. IBM management consultants evaluated each organization's 'mastery of change' – how well these organizations managed the change they experienced. The hypothesis of the study was that organizations with better human networks would adapt to and manage change better than those organizations with poor connections. After the IBM statistician crunched all of the research data, certain network patterns were highly correlated with mastery of change. The most obvious finding was that organizations with short network paths of information flow and knowledge exchange were able to adapt to change effectively. In these organizations it took only a few hops⁶ for anyone to communicate to anyone else. In non-adaptive organizations, the paths were long, involving many hops between people⁷. The longer the path, the more distorted the information, and the later it arrives. In addition to short path lengths, those organizations whose network measures revealed strong emergent leadership⁸ had an even higher correlation with adaptability.

³ Nodes with many direct connections that quickly disperse information.

⁴ Nodes that connect otherwise disconnected parts of the network – they act as liaisons.

⁵ Nodes that connect two or more clusters – they act as bridges between groups.

⁶ One link = One hop... i.e. there are two hops from A to C: A–B–C... 1) A to B, 2) B to C.

⁷ Usually a path that has more than 3 'hops' between two people is considered too long for effective communication.

⁸ Emergent leaders are found in networks that receive a high network centralization metric. Network centralization is one of the many social network metrics available in *InFlow*, a network mapping and measuring software package.

In the late 1990s research within large organizations measured the benefit of networks.

- Teams with better access⁹ to other teams inside and outside the organization finished their assignments faster.
- Teams with better connections discovered, and transferred, the knowledge they needed within the organization.
- Managers with ‘better connections’[inside and outside the organization] spotted and developed more opportunities for their departments or organizations.
- Project managers with better network connections were more successful in reaching project goals within time and financial parameters.

Even though we know several keys to building effective networks, this knowledge is rarely put to use. Networks, whether social or business, are usually left to grow without a plan. When left unmanaged, networks follow two simple, yet powerful driving forces:

1. Birds of a feather flock together.
2. Those close by, form a tie.

This results in many small and dense clusters with little or no diversity. Everyone in the cluster knows what everyone else knows and no one knows what is going on in other clusters. The lack of outside information, and dense cohesion within the network, removes all possibility for new ideas and innovations. We see this in isolated rural communities that are resistant to change. Yet, the dense connections, and high degree of commonality forms good work groups – clusters of people who can work together smoothly.

Instead of allowing networks to evolve without direction, successful individuals, groups and organizations have found that it pays to actively manage your network. A successful network

⁹ Quick access to information and knowledge found elsewhere in the organization is dependent on short path lengths between the searching team and all other teams.

has both good internal connectivity and ties to diverse external groups and resources. Using the latest research we can now knit networks to create productive individuals and communities.

Knit the Net

A vibrant community network is generally built in 4 phases, each with it's own distinct topology. Each phase results in a more adaptive and resilient network than the prior phase. Network mapping with a software tool like InFlow¹⁰ can be used to track your progress through these four stages.

- 1) Scattered Emergence
- 2) Single Hub-and-Spoke
- 3) Multi-Hub Small-World Network
- 4) Core/Periphery

Experience shows that most communities start as very small clusters organized around common interests or goals – scattered emergence. Usually these clusters are isolated from each other. They are very small groups of 1-5 people or organizations that have connected out of interest or necessity. Many of these small clusters are found in under-developed communities – see Figure 1. If these clusters do not organize further, the community structure remains weak and under-producing.

¹⁰ InFlow 3.0 Social Network Analysis software – <http://www.orgnet.com/inflow3.html>

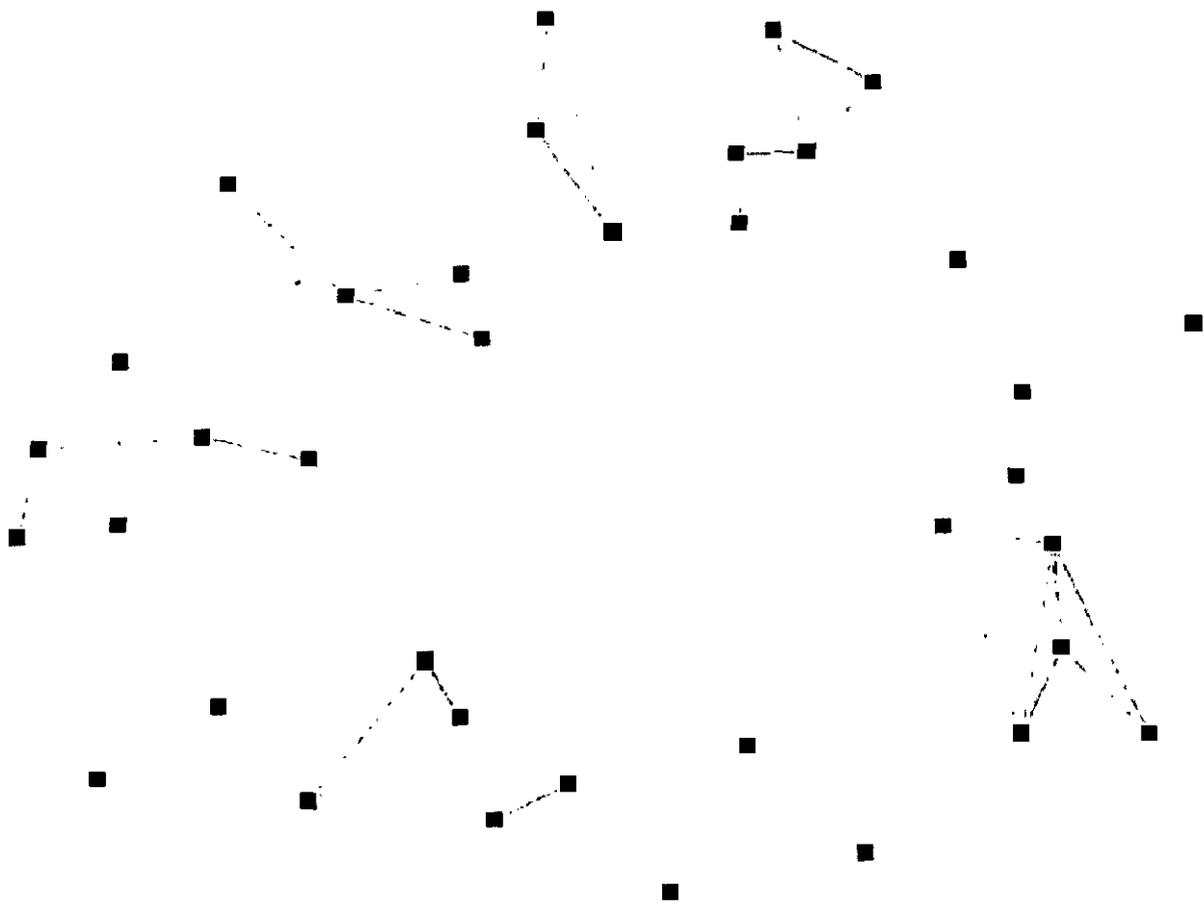


Figure 1 – Scattered Emergence

Spontaneous connections between groups rarely emerge without an active leader who takes responsibility for building a more efficient network. We call this role a *network weaver*. The initial network the weaver creates is the hub and spoke model, with the weaver as the hub. This occurs when the community consists of many isolated individuals and businesses and a few small clusters. The weaver has the vision, the energy, and the social skills to connect to diverse individuals and groups and start information flowing between them.

The weaver usually has external links outside of the community to bring in resources and innovation. This is a critical phase for community building because everything depends on the weaver who is the lone hub in the network. Figure 2 shows the weaver connecting the previously scattered clusters.

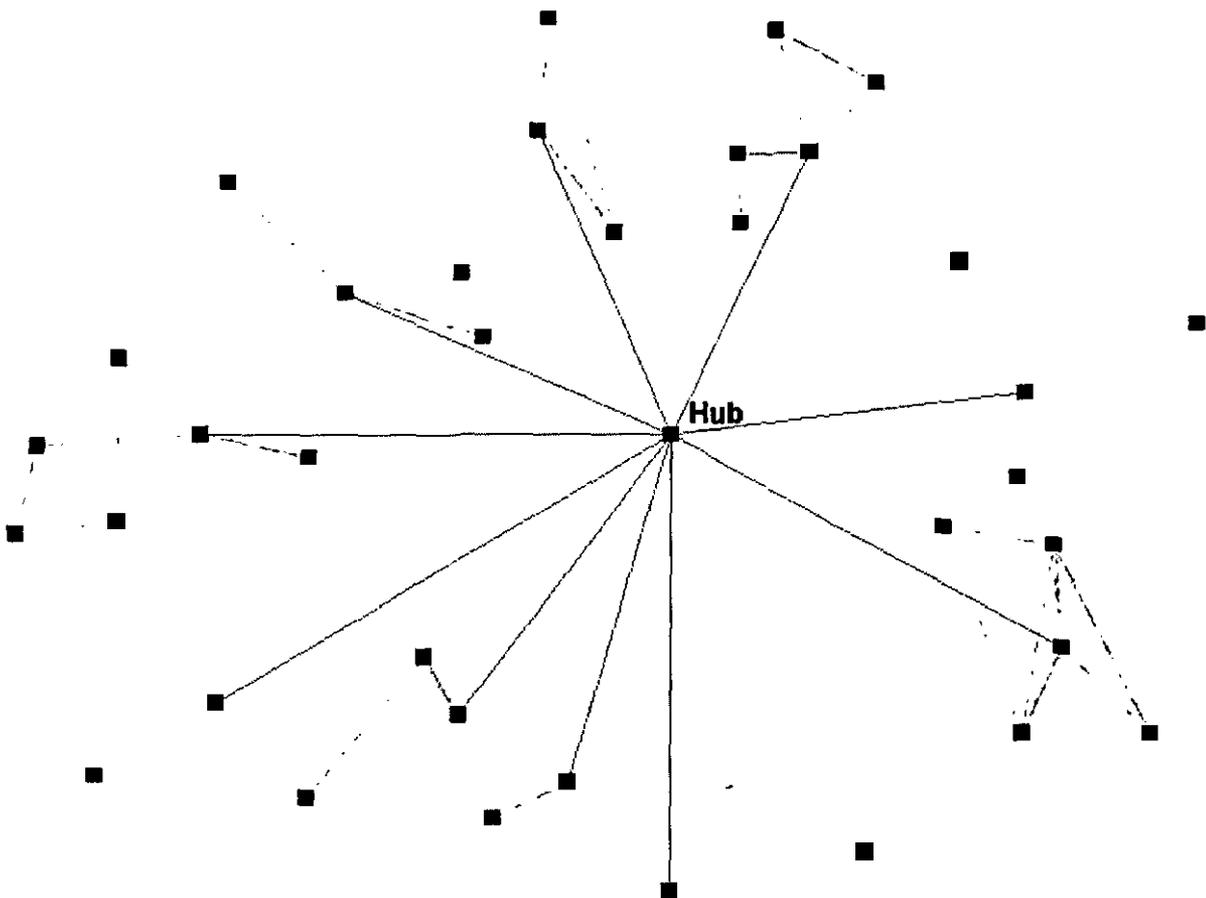


Figure 2 – Hub-and-Spoke Network

The hub enables the weaver to connect the community. Initially the network weaver forms relationships with each of the small clusters. During this phase the weaver is learning about each individual or small cluster – discovering what they know and what they need. Once the network

weaver becomes familiar with each cluster, they begin to connect those individuals and clusters who may collaborate or assist one another in some way. They attempt to create opportunities by connecting likely partners. Concurrently, the weaver begins encouraging others to begin weaving the network as well and move the whole network to a more resilient structure. The more connections that don't include the single hub, the less dependent the network is on the original weaver. Training in network building is important at this juncture. Network mapping reveals network progress and identifies new emerging network weavers.

The hub-and-spoke model is only a temporary step in community growth. It is utilized at a time when the community needs strong leadership because it concentrates both power and vulnerability in one node – the hub. If the leader fails or leaves then we are back to the disconnected community in Figure 1. The hub-and-spoke topology should be the most transient of the four phases of network development.

An community development organization with a vision, and contacts to external ideas and resources, can play the role of the temporary single hub. This is the role ACEnet took up when it saw that SE Ohio was becoming the home to many small, uncoordinated food clusters. There was the Farmer's Market crowd, the natural bakery, and worker-owned Mexican restaurant, the organic farmers and a few other individuals creating unique food products or growing the produce to make them. ACEnet brought all of these unconnected groups together around a kitchen incubator – a state of the art facility for preparing and packaging a large variety of food items. A hub-and-spoke model is the appropriate structure in the initial stages of community

building, but it should be transitory – giving way to more robust and adaptive topologies. These topologies are also more democratic, supporting several leaders.

After building the initial hub-and-spoke network the weaver will develop a reputation as a ‘community connector’. This will attract more and more individuals and groups that want to connect to the weaver. In order to accommodate new connections, the weaver must teach its early spoke links how to weave their own network. This happened with ACEnet as several of the businesses and small non-profits, began to build their own network connections, adding structure to the early Athens community network.

Once the hub-and-spoke structure is in place, the weaver can now start to introduce clusters that have common goals/interests or complementary skills to each other. This starts to decrease dependence on the original spoke links. As clusters connect, their spokes to the hub can weaken, freeing up the weaver to attach to new groups. Although the hub’s links weaken, they never disappear – they remain weaker, dormant ties, able to be re-activated whenever necessary.

As the overall network grows, the role of the weaver changes from being the central weaver, to being a facilitator of network building throughout the community. This transition from network weaver to network facilitator is critical. The network weaver now begins to facilitate the network weaving of other key individuals, groups or organizations in the network. The original weaver is creating new weavers who will eventually take over much of the network building and maintenance. If the change is not made then the community network remains dependent on the central weaver who is now probably overwhelmed with connections. At the transition point the

weaver changes from being a direct leader to an indirect leader, influencing new emergent leaders appearing throughout the community. This transition is necessary for the network to increase its scale, impact and reach.

The role change from weaver to facilitator is critical in moving from a single-hub topology to a multi-hub topology. The first advantage of a multi-hub topology is elimination of a single point of failure. ACEnet is still a dominant hub in SE Ohio, and its failure would affect the region -- but not as significantly as five years ago when the network was sparser and more dependent on ACEnet. Now ACEnet has the luxury of spending time in new pursuits such as teaching others to knit their nets and expanding the network to other areas inside and outside of Appalachia.

As the weaver connects various individuals, organizations and clusters these entities connect to each other loosely. A new dynamic is revealed here -- the strength of 'weak ties'. Weak ties are connections that are not as frequent, intense, or resilient as strong network ties. Strong ties are usually found within a network cluster, while weak ties are found between clusters. As clusters begin to connect to each other, the initial bridging links are usually weak ties. Over time weak ties may maintain their original role, or they may grow into strong ties binding previously separate groups into a new larger cluster.

Weak ties are also important in innovation. New ideas are often discovered outside the local group via weak ties. To get transformative ideas you often have to go outside of your group. Two very diverse groups that have threads in common can often help each other with these transformative ideas. *Connect through your similarity and innovate through your diversity!*

Weak ties are used to discover value outside the network while strong ties are used inside the network to implement the discovery¹¹.

Now that other hubs are appearing in the network, the weaver connects the hubs to each other, creating a multi-hub community. Not only is this topology less fragile it is also the best design to minimize the average path length throughout the network. Remember, shorter hops are better for work flow, information exchange and knowledge sharing! *Information percolates most quickly through a network where the best connected nodes are all connected to each other.* A network with many hubs is also very resilient and cannot be easily dismantled.

Figure 3 shows a multi-hub small-world network. Here four clusters [designated by the thick red links] have created many weak ties [gray links] to each other. The weak ties may, or may not, strengthen over time to create one tightly coupled larger cluster. The multiple hubs can be small businesses or other community development firms.

¹¹ Ronald S. Burt

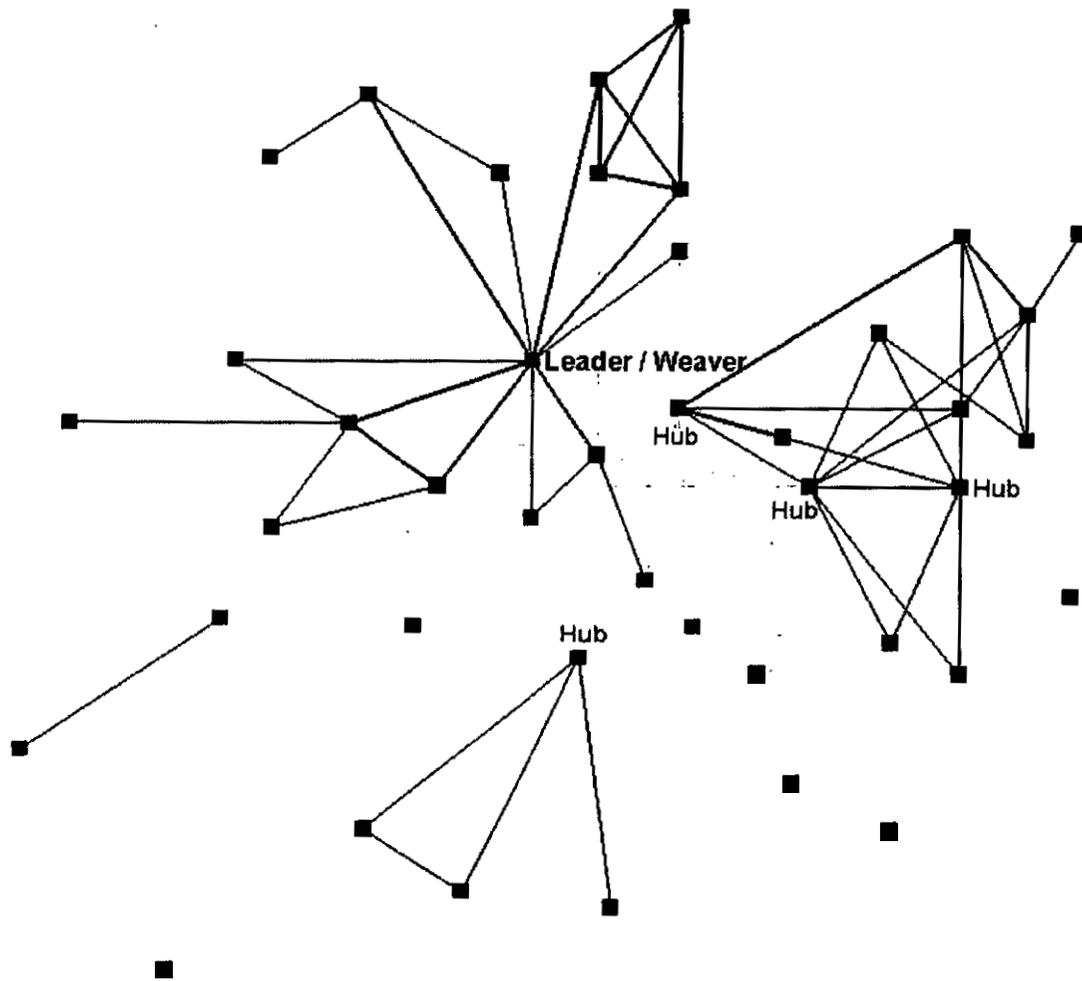


Figure 3 – Multi-Hub Small World Network

The next step may be to strengthen some of the weak ties in the network to become strong ties.

This happens after turf issues have been handled. An integrated multi-hub network may be difficult to achieve if political and ‘turf’ issues are raging through the network. If two or more community development organizations are battling over turf and control of the community then the result may be two or more competing, single hub networks, that ignore the larger community needs and just focus on survival of their own network. With the known brittleness of single hub

networks, this puts the community at risk as the networks fail to combine due intra-community competition.

The end-goal for vibrant, sustainable community networks is the *core/periphery* model. This topology emerges after many years of network weaving by multiple hubs. It is a stable structure that can link to other well-developed networks in other regions. The network core in this model contains the key community members who have developed strong ties between themselves. The periphery of this network contains three groups of nodes that are usually tied to the core through weak ties. Periphery members include:

- 1) Those new to the community and working to get to the core
- 2) Bridges to diverse communities elsewhere
- 3) Unique resources that operate outside of the community, and may span many communities

The periphery is the open, porous boundary of the community network. It is where new members come and go. It is where inflows and outflows of knowledge and innovations occur. The periphery *monitors* the environment, while the core *implements* what is useful.

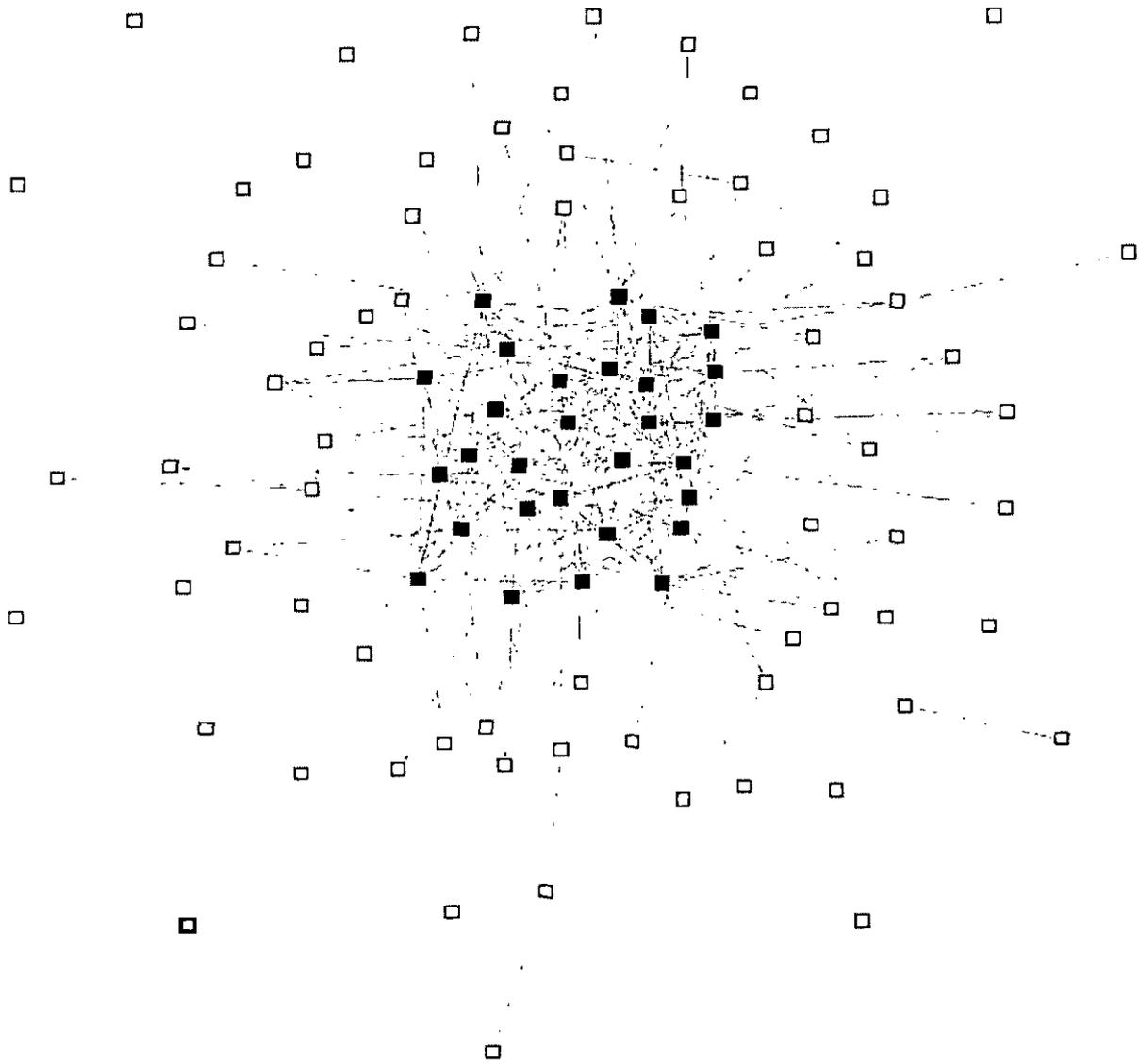


Figure 4 – Core/Periphery Network

Figure 4 shows a well developed core/periphery structure. The blue nodes are the core, while the green nodes reside in the periphery. This network core is very dense¹² -- not all cores will have as high a concentration of connections as this one. Too much density can lead to rigidity and an

¹² Network density is calculated by the number of existing connections as a percentage of the total possible. We find that most human networks of several hundred members have density between 5% and 15%.

overload of activity. Monitoring your network using social network analysis can help you see where your network structure is going wrong.

At this point the network weaver's initial task is mostly completed. Now, attention turns toward network maintenance and building bridges to other networks. The network weaver can begin to form inter-regional alliances to create new products, services and markets – or shape and influence policy that will strengthen the community or region. This happens by connecting network cores to each other utilizing their peripheries. The network weaver maximizes the reach of the periphery into new areas, while keeping the core strong.

As the community core grows, the weaver can turn attention to opportunities outside of the local community. The weaver now focuses on projects of large substance that will have major impact on the community and the region.

Conclusion

As we have seen weaving a network requires two iterative and continuous steps:

1. **Know the network** – take regular snapshots of your network for feedback of your progress.
2. **Knit the network** – follow the four (4) phase network knitting process.

All throughout this process network maps guide the way – they reveal what we know about the network and they uncover possible next steps for the weaver.

Starting with a disconnected community, a network builder can start weaving together the necessary skills and resources to build first a simple single hub network. This will be followed by a more efficient and resilient multi-hub network, finishing with a sustainable core/periphery structure. Once the network is strong, it can connect to other distant community networks to create more *opportune ties*.