Learning About Learning Networks

Results from a Cross-Disciplinary Study

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*** Draft Version ***

About This Paper

When we started Foundations of Success a few years ago, we planned to use *learning portfolios* – our word for formal research networks – as our primary means of making the field of conservation more effective and efficient. To avoid overextending ourselves, in our first business plan we said:

> We predict having an average of five to eight portfolios at any given time…[and] we foresee a maximum of 10 portfolios – provided, of course, that there are adequate financial and human resources to manage this many.

Maybe we were a bit optimistic! At the moment, we are working with one active portfolio and struggling to establish two or three others. Although this idea of a learning portfolio sounds great in theory, it has proven very difficult to implement in practice.

Practicing what we preach, we realized that if we were going to be successful at this learning business, we should try to harvest what the rest of the world has learned about learning networks rather than reinvent the wheel ourselves. All this is to say that the primary audience for this paper is us – we did this research to see if we could figure out how to improve the work that we are doing. It has made us realize that if we are interested in promoting cross-practitioner learning, we do not need to immediately jump to formal learning portfolios, but could instead perhaps start with less formal types of networks. We hope that these results will be useful to you as well.

This paper is a draft that we are circulating to peers for review. We welcome any comments or feedback you might have about this paper. Please send any suggestions that you might have to:

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Abstract

Learning is currently one of the hottest trends in conservation and other fields. To promote collaborative learning among professionals, many organizations are facilitating the creation of *learning networks.* Unfortunately, despite the best of intentions, many of these networks are proving to be very difficult to successfully and sustainably implement. One root of this problem is the lack of clarity in terminology and key characteristics, which makes it difficult for practitioners to distinguish between different types of learning networks and know what type is best suited to meet their needs.

To provide some guidance, we conducted a survey of different types of structures used to facilitate group learning. We analyzed 21 case studies of learning networks in different fields and categorized them according to 35 variables, including purpose, specificity of domain, analytical rigor, level of commitment of members, means of communication, size, coordination, budget and others.

Two of our objectives in this research were to determine if there are different types of learning networks and, if so, propose a taxonomy of the different types and determine the important characteristics of each type. Our overall result was that we found three major types of learning networks. The three types are distinguished by their primary purposes: to exchange information and solve everyday problems, to document and share best practices, and to generate new knowledge through collective research. We have named the three types of networks: I) *information exchange networks*, II) *best practices networks*, and III) *research networks*.

Our third objective was to determine the important characteristics of each type of learning network. To this end, we analyzed the correlations between the *Purpose of the Network* and criteria related to the network's focus, membership and commitment, and coordination and communication. Finally, we used these results to provide recommendations to practitioners about the basic conditions required to use any type of learning network as well as when each type might best be used.

Learning About Learning Networks

Results from a Cross-Disciplinary Study

The least of learning is done in the classrooms.

– Thomas Merton

Learning is not compulsory... neither is survival.

– W. Edwards Deming

Introduction

The concept of learning is one of the hottest trends in conservation as well as other fields of human endeavor. There is a great deal of rhetoric that focuses on promoting learning among professionals, capturing and sharing lessons learned, and creating learning organizations. In particular, it seems like almost every organization is now trying to promote some structured form of bringing people together to facilitate collaborative learning and action – to create *learning networks.* Unfortunately, despite the best of intentions, many of these networking efforts are proving to be very difficult to successfully and sustainably implement.

One root of this problem occurs because within different disciplines and organizations, there are many different terms for learning networks. Conservation organizations talk about *conservation learning networks* and *learning portfolios,* while people in the business field refer to *communities of practice* and *virtual teams,* and teachers talk about *learning circles*. In other fields, one finds *knowledge networks, emergent learning networks* and *collaborative inquiry groups*. This plethora of terms gives the impression that these are all different types of learning networks. If we look, however, at the actual applications of these terms, we sometimes find different terms used to describe similar types of learning networks. For example, the *knowledge networks* used by the weed management groups and the *learning portfolios* used by Foundations of Success have many similar characteristics. Conversely, one also finds the same term used with very different meanings. For example, although both the World Bank and the Xerox Corporation have created *communities of practice,* these two initiatives are actually very different.

This lack of clarity in terminology means that practitioners have a hard time distinguishing between different types of learning networks and knowing what type of learning network is best suited to meet their needs. To provide some guidance, we conducted a survey of different types of structures used to facilitate group learning. Our specific objectives in this research were to determine if there are different types of learning networks and, if so, propose a taxonomy of the different types and determine the important characteristics of each type. We then use the results to provide recommendations to practitioners about the basic conditions required to use any type of learning network as well as when each type might best be used.

Box 1. Types of Learning and Types of Networks

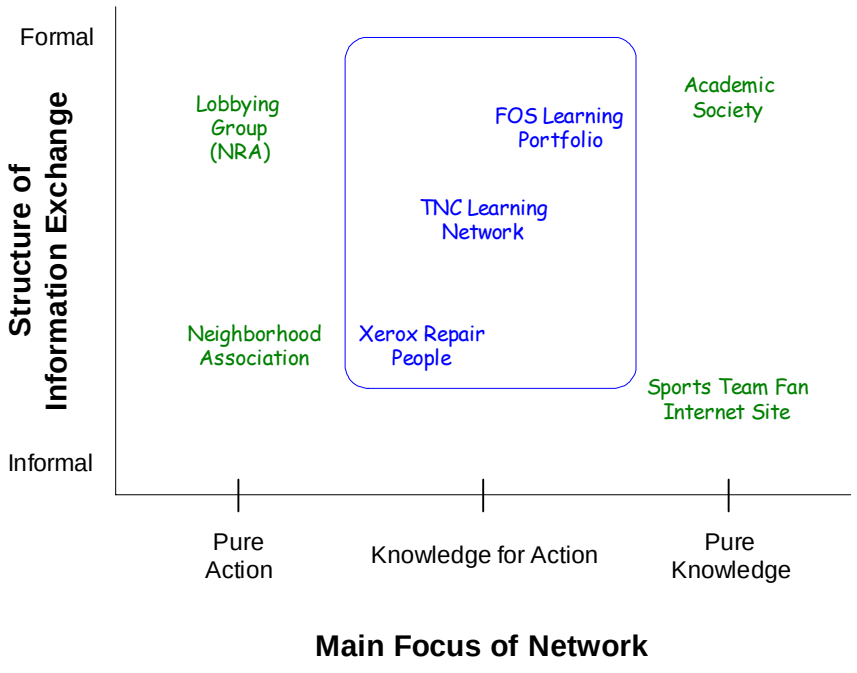
Before discussing our findings about learning networks, it is useful to define where learning networks fit within the realm of learning and within the universe of networks.

Experts in the field of education typically recognize three main types of learning:

- **Formal education** – Learning through courses offered by academic institutions as a part of a degree program.
- **Non-formal education** – Learning through educational activities organized outside of the formal classroom for specific audiences, with specific learning objectives (e.g., events such as training workshops or conferences).
- **Informal education** – The lifelong process of learning from daily experiences and the people and resources in your environment (e.g., observing others, reading publications).

Learning networks bring together practitioners to help them learn from one another in a manner that is not as structured as a formal degree program nor as unstructured as lifelong learning, so they are located within the realm of non-formal education. While some non-formal education focuses purely on training, learning networks cannot include only training – they must also provide a means for the people being trained to interact with one another.

Just as there are different types of learning, there are also different types of networks. One way to compare different types of networks is in relation to their focus and the formality of their structure for information exchange. The figure below maps out potential networks along these two axes. We defined three categories of focus: pure action, knowledge for action and pure knowledge. Learning networks facilitate exchange of knowledge to help practitioners do their work more effectively. Groups that get together purely for action (lobbying, designing a neighborhood playground) are not learning networks, nor are groups that exchange knowledge without using that knowledge to take some action (a sports team fan internet site or an academic society). Learning networks also require a minimum level of formality in structure. In the figure, we use a blue box to locate learning networks within a broader universe of networks.



Methods

Our original plan was to objectively analyze a sample of different kinds of learning networks to see if we could determine which factors might contribute to more successful networks. We defined and collected data on a measure of the success or impact of different learning networks (our dependent variable) and characteristics that may have contributed to their success or failure (independent variables). We found, however, that all of the case studies we collected were about more or less successful networks – people simply didn't write about their failures. Because of this, we were not able to analyze cause-and-effect relationships, but instead were limited to looking at correlations between independent variables to identify different types of networks.

We started our review by looking at existing analyses of learning networks including in particular, the books *Cultivating Communities of Practice* by Wenger et al. (2002) and *Virtual Teams* by Lipnack and Stamps (1997). We did not find a clear and comprehensive categorization of different types of learning networks. These analyses, nevertheless, helped us to define variables for categorizing different networks. These variables included purpose, specificity of domain, analytical rigor, level of commitment of members, means of communication, size, coordination, budget and others. In total, we defined 35 variables, most of which were qualitative. A complete list of our variables is presented in Annex 1.

We then developed a series of hypotheses about the relationship between the variables. Most of these hypotheses were based on correlations between variables and not cause-and-effect relationships. For example, we proposed that:

- Networks designed for knowledge generation will require more analytical rigor, higher commitment and more coordination than networks designed for information exchange or generation of best practices.
- Networks with a high level of analytical rigor require some screening of membership (approval process or invitation only).

To test our hypotheses, we then assembled a set of 21 case studies of learning networks, including ten examples from the field of business, five from conservation, three from development, and one from each of the following fields: education, agriculture and health care (see Annex 2 for a brief description of the cases). The first 19 cases were purposefully (as opposed to randomly) selected to represent a range of different kinds of learning networks in different fields. However, we did not deliberately stratify these cases into our three main types with the exception of the last two cases which were added at the end to ensure that we had seven of each type. We categorized each case study according to our 35 variables. In some cases, this required interpretation. In other cases, the case study did not provide enough information to assess some variables.

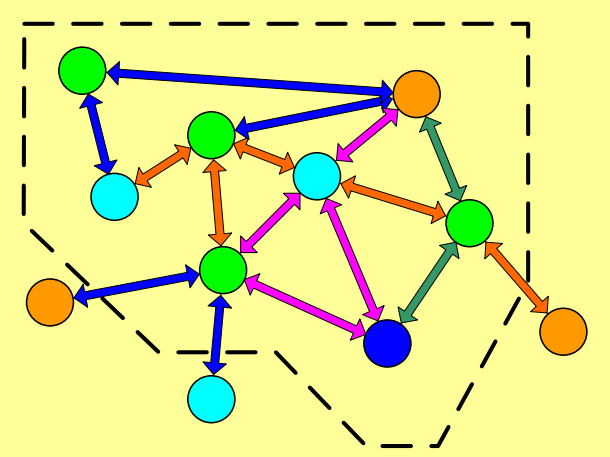
Overall Results: Three Types of Learning Networks

Our first two objectives in this study were to determine if there are different types of learning networks and, if so, propose a taxonomy of the different types. Our overall result was that we found three major types of learning networks. The three types are distinguished by their primary purposes: to exchange information and solve everyday problems, to document and share best practices, and to generate new knowledge through collective research. We have named the three types of networks: I) *information exchange networks*, II) *best practices networks*, and III) *research networks*. It is important to keep in mind that the distinctions between these three types of networks are not black-and-white and that any given network can have elements of two or even all three of these purposes over its lifetime.

Type I. Information Exchange Networks

In information exchange networks, learning is guided primarily by participants' requests for information. The group does not have common learning questions. Participants decide what knowledge to share and how to assess its value. Although these networks often have coordinators, learning needs are defined by the members. The coordinator may help to facilitate the sharing and storage of information but he or she usually does not play a strong role in guiding learning. Xerox's repair technicians provide an example of this type of learning network (Brown & Gray 1995). In the 1980s, Xerox discovered that its copier repair technicians ("tech reps") were meeting around the water cooler or in other informal ways to share their experiences about how to repair machines. The company recognized that this exchange of repair tips helped the tech reps do their job better. To encourage this informal learning, Xerox provided two-way radio headsets to the tech reps and built a knowledge database to facilitate the storage and sharing of repair tips.

Type I. Information Exchange Network

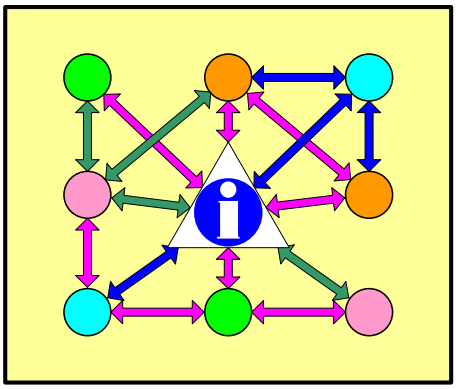


The accompanying figure provides a graphic representation of an information exchange network. The members of the network are represented by the colored circles inside of the dotted line. We use differences in color to show that the participants have different roles (managers, field practitioners, etc.) and areas of expertise. They exchange different types of information, represented by different colored arrows. Some people serve as central nodes of information and others benefit from their knowledge. Information is shared not only within the network but also with some individuals outside of the network. The boundaries of the network can shift with changes in participation and information needs. Although the network may have a coordinator, learning is not guided by a strong center.

Type II. Best Practices Networks

Participants in best practice networks define specific learning questions and collaborate to document, validate and disseminate best practices. Rather than simply exchanging or storing information, they use a particular process to verify the effectiveness and benefits of practices. One example of a best practice network is the Aspen Institute's Rural Development Philanthropy (RDP) Learning Network, a diverse group of community foundations and philanthropic organizations learning from one another's innovative strategies to improve RDP practice and outcomes (Aspen Institute 2003). The Aspen Institute's Community Strategies Group manages the network. They have defined four central learning questions. They collect RDP tools, stories and strategic lessons, analyze them and disseminate the most valuable ones to the community foundation and community development fields.

Type II. Best Practices Network

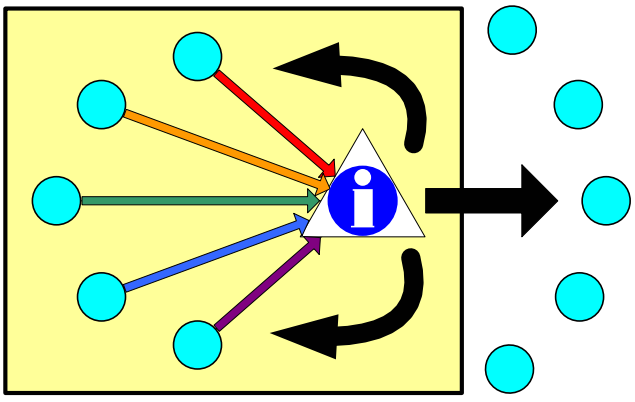


As shown in the accompanying figure, this type of network has a center that defines the learning questions, gathers information from participants, processes it and returns the processed information (best practices, lessons learned) to the participants. In addition, the participants communicate among themselves.

Type III. Research Networks

Research networks focus on answering learning questions through a systematic process of data collection and analysis to generate new knowledge. A learning framework defines the assumptions or hypotheses being tested and methods for data collection and analysis. For example, Eastman Chemicals began in the 1980s to form teams oriented toward constant improvement of their business (Lipnack & Stamps 1994). Each team uses the company's Quality Management Process (QMP) to set clear goals or "major improvement opportunities," to test hypotheses, revise them and retest them, until the team reaches a sufficiently high level of confidence and embraces change. Pilots and prototypes provide valuable laboratory results to inform large-scale implementation strategies.

Type III. Research Network



The accompanying figure provides a graphic representation of a research network. These networks have a strong center that defines the learning questions and learning framework. The center collects data and information from all the participants and analyzes it to draw conclusions. It documents the results and shares them with the participants and with outside parties interested in the topic. This type of network has greater homogeneity among the participants within the network. For example, three of the research networks we examined were composed, respectively, of the project managers of community-based marine reserves, engineers developing new products for a medical imaging firm, and agronomists and farmers working to control invasive weeds.

Box 2. *A Guide to Our Presentation of Results*

We present most of our data in this paper in the form of contingency tables showing correlations between the purpose of the network and various other variables. We present our results graphically, using both colors and numbers to show the relationship between variables. To facilitate interpretation, we divided each data cell into seven parts and shaded in the respective number of boxes (from left to right) according to the results. Our sample included seven of each type of network, so a perfect correlation would resemble Table 1, in which variable X is low for all seven information exchange networks, medium for all best practice networks and high for all research networks. If no correlation existed between purpose and another variable (variable Y), the graphic would look more like Table 2.

Table 1. Perfect correlation between *Purpose* and *Variable X*

	Variable X		
Purpose	Low	Medium	High
Info Exchange	7		
Best Practices		7	
Research			7

Table 2. No correlation between *Purpose* and *Variable Y*

	Variable Y		
Purpose	Low	Medium	High
Info Exchange	2	3	2
Best Practices	2	3	2
Research	2	3	2

Specific Results: Characteristics of Each Type of Network

Our third objective in this study was to determine the important characteristics of each type of learning network. To this end, we analyze the correlations between the *Purpose of the Network* and criteria related to the network's focus, membership and commitment, and coordination and communication (see Box 2 for a discussion of how to interpret our results). Note that although we present these specific results after our general discussion of the three types of networks, in our research, we actually used these analyses to help establish the three types.

Focus of the Network

Our analysis included two variables related to the focus of the networks in our case studies: *Specificity of Domain* and *Level of Analytical Rigor*.

Specificity of Domain – This variable assesses the degree of specialization in the network's domain of knowledge. We defined four qualitative levels for this variable, including very specific (e.g., grouper spawning aggregations), somewhat specific (marine protected areas), somewhat broad (marine conservation) or very broad (conservation in general). As shown in Table 3, we found that more than three quarters of all the networks (16 of 21) had a very specific or somewhat specific domain of knowledge, irrespective of their purpose. If we assume that our sample consisted largely of successful networks, these results suggest that defining a specific domain of knowledge seems to be an important feature of successful networks.

Several case studies also mentioned the importance of defining precise, measurable objectives for the network and developing a clear definition of learning. A few case studies emphasized that learning networks are most successful when the participants *need to know* something – not when it would be *nice to know* it. For example, the Medrad Corporation defines organizational learning as "long-term memory of needed skills" which "rests not with individuals, but with explicit and implicit business processes" (Graham 1995). Learning at Medrad is oriented towards helping the company understand and digest new information and developing standardized processes and tools that increase the company's long-term memory.

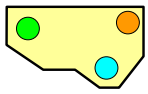
Table 3. Correlation between *Purpose* and *Specificity of Domain*

	Specificity of Domain			
Purpose	Very broad	Somewhat	Somewhat	Very specific
Info Exchange		2		5
Best Practices		3	1	3
Research			2	5

Level of Analytical Rigor – This variable describes the degree of formality in the learning process used by the network. We considered a network to have low analytical rigor when the group did not have specific learning questions. If they had learning questions, then analytical rigor was medium and it was high if they also had a learning framework or other structure to define how to address their learning questions. As shown in Table 4, Most research networks had high analytical rigor (an average score of 2.9), whereas the majority of the other networks had medium rigor (an average of 2.4 for best practice networks and 1.9 for information exchange networks). One example of a learning network with high analytical rigor is the Locally Managed Marine Areas (LMMA) network. The LMMA network's learning framework defines what data each participating site team will collect about its marine area and how the network will analyze this data to answer the relevant learning question (LMMA Network 2003).

Table 4. Correlation between *Purpose* and *Level of Analytical Rigor*

	Level of Analytical Rigor			
Purpose	Low = 1	Medium = 2	High = 3	Average
Info Exchange	2	4	1	1.9
Best Practices		4	3	2.4
Research		1	6	2.9



Membership and Commitment

Our analysis included four variables related to the membership of the network: the *Process for Joining the Network*, *Size*, *Formality of Commitment*, and *Incentives for Sharing Information.*

Process for Joining Network – This variable describes how the network controls its membership. We defined four qualitative levels for this variable. As shown in Table 5, information exchange networks tended to be open to anyone who was interested or at least open to defined groups (i.e., all of a company's employees), whereas the majority of the other networks had an approval process or invited only certain people to join. For example, one company that requires a formal membership process is L.L. Bean. The company uses field testers to provide feedback on its products.

> The selection process [to be a field tester] is rigorous – the original model was the Yale Medical School application – and applicants must submit a series of essays, profiles, and product evaluations before they are accepted…Testers are selected not only for their experience, but also their articulateness and candor. The combination is rare (Garvin 2000b).

Table 5. Correlation between *Purpose* and the *Process for Joining the Network*

	Process for Joining the Network			
Purpose	Open	Open to defined grps	Approval process	Invitation only
Info Exchange	1	6		
Best Practices		2	3	2
Research		1	2	4

Size – This variable describes the total number of members in each network. The smallest networks had only a few members while one of the largest (Buckman Laboratories' Knowledge Network) was set up to allow hundreds of employees in 20 associate companies in more than 80 countries to share information (Fulmer 1999). As shown in Table 6, our results suggested that information exchange networks can be any size, but the others tend to be medium or small. Size influences the structure and character of the network. Wenger et al. (2002) use anthropological research about interpersonal relationships to support their theory about the effect of size:

> Communities with fewer than fifteen members are very intimate. Between fifteen and fifty participants, relationships become more fluid and differentiated. Between fifty and 150, communities tend to divide into subgroups around topics or geographic location, and beyond 150 members, the subgroups usually develop strong local identities.

Table 6. Correlation between *Purpose* and *Size*

	Size of Network		
Purpose	S (<20)	M (21-100)	L (>100)
Info Exchange	2	1	4
Best Practices	2	4	1
Research	3	4	

Formality of Commitment – This variable describes the degree to which network membership obligations are specifically spelled out. We defined three levels of formality of commitment: low for networks with no formally binding agreement or informal commitment; medium if members informally understand their rights and responsibilities; and high if the group has a written description of rights and responsibilities, such as a social contract. For example, in the L.L. Bean example described above, to be selected as one of L.L. Bean's field testers, one must commit to providing detailed, honest assessments about products. As shown in Table 7, formality of commitment increases as one moves from information exchange to best practices to research networks.

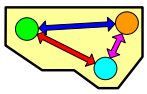
Table 7. Correlation between *Purpose* and *Formality of Commitment*

	Formality of Commitment			
Purpose	Low = 1	Medium = 2	High = 3	Average
Info Exchange	4	2	1	1.6
Best Practices	1	2	4	2.4
Research		1	6	2.9

Incentives for Sharing Information – This variable examines the motivations that people in a network have for sharing what they have learned with one another. Knowledge is a valuable commodity and many people don't part with it easily. According to one expert on knowledge management, "One of the challenges of knowledge management is to ensure that knowledge sharing is rewarded more than knowledge hoarding" (Davenport & Prusak 1998). As shown in Table 8, we found that most research networks provided formal incentives for sharing information, but information exchange and best practice networks relied more on informal incentives, including personal satisfaction, recognition as valuable contributors to the group and participating in a process that increases the effectiveness of participants' work.

Table 8. Correlation between *Purpose* and *Incentives for Sharing Information*

	Incentives for Sharing Information			
Purpose	Personal satisfaction	Informal recognition	Doing job better	Formal incentives
Info Exchange	2	2	3	2
Best Practices	1	3	4	1
Research		2	1	4



Coordination and Communication

Our analysis included five variables related to the structure of the network and the flow of information and knowledge. We looked at the networks' *Coordination, the Structure for Communication, Decision-Making Processes, Institutional Setting,* and *Primary Means of Communication.*

Coordination – This variable looks at how the network is coordinated, ranging from having no coordinator to having one or more full-time paid staff. As shown in Table 9, our results suggest that networks almost always need paid coordinators. Of the 21 networks we examined, 18 (86%) had paid coordinators, two had volunteer coordinators and only one very small best practices network did not have any coordinator. This may be an artifact of our data collection methods, since we relied primarily on written case studies and networks without paid coordinators would be less likely to document their experiences. The case studies and other literature, nevertheless, strongly emphasize the importance of coordination. For example, British Petroleum considered its extensive coaching system essential to the success of its virtual teams. The coaches (coordinators) dedicated 20% of their time to providing

training in the use of virtual communication equipment and the remainder "was devoted to helping team members link their business objectives to the capabilities of the system" (Cohen & Prusak 1996). The one British Petroleum virtual team that was only given training and no coaching was the only one that failed.

Table 9. Correlation between *Purpose* and *Coordination*

	Coordination		
Purpose	None	Volunteers	Paid staff
Info Exchange		1	6
Best Practices	1	1	5
Research			7

When describing the skills that the coordinator should have, several of the case studies emphasize communication and facilitation skills and interest in helping develop the community's practice. They state that it is not necessary for the coordinator to have expertise in the learning topic. The General Electric (GE) case study describes the company's Change Acceleration Process (CAP) coaches in the following way:

> Coaches are educators and facilitators, process experts who are knowledgeable about change and skilled in applying CAP concepts and tools. Their primary responsibility is to maintain the order and discipline of the change process...Surprisingly, most have limited knowledge of the problem at hand. Teams are assumed to possess all necessary content knowledge; they own the problem and remain responsible for devising solutions (Garvin 2000a).

Some networks have not only coordinators or coaches but also high-level network sponsors. Sponsors are usually senior managers who provide oversight and support. The General Electric case study recommends that sponsors "have the authority to act on the recommendations of…teams, as well as overcome the political barriers that so often derail change projects (Garvin 2000a)."

***Structure for Communications* and *Decision Making* –** These variables describe how the members of the network communicate with one another and how the network makes decisions. Some typical communication structures include the bicycle wheel, spider web, fishing net, and family tree (Eade 1997; Kwaterski 1999). In a bicycle wheel network, members communicate with one another through a central facilitator. In a spider web network, the central facilitator sets the direction of the network but many sub-networks and webs of communication also link members. Fishing net networks do not have a central facilitator; the center of activity can shift according to need, with many nodes of communication throughout the network. Finally, in family tree networks, information begins at the top and works its way down to each successive level, with little communication among members. Decision making structures often parallel communication and coordination structures, but can vary in the number of people involved in making decisions.

Most of the information exchange networks we analyzed had a fishing net structure (see Table 10) and involved many network participants in decision-making (see Table 11). In contrast, most of the research networks had a more centralized bicycle structure and involved less people in decision-making. Best practice networks had a bicycle or spider web structure and governance varied. Our sample of learning networks did not include any family tree networks.

A few of the case studies explicitly comment on the importance of decentralization of decision making processes. For example, Rosenbluth International believes that greater involvement in decision-making makes employees more committed to learning. The company used to have a centralized training department characterized by top-down decision-making, but they realized that "responsibility for learning had to be accepted by each individual associate if the organization was to create a learning organization environment." The company now has 'learning consultants' (a new job title within the department). These individuals now "help leaders at the business unit level determine how learning can be built into the daily functioning of their office or team." (Hoffman & Withers 1995)

Table 10. Correlation between *Purpose* and *Structure for Communication*

	Structure for Communication		
Purpose	Bicycle	Spider web	Fishing net
Info Exchange	1	1	5
Best Practices	3	4	
Research	5	2	

Table 11. Correlation between *Purpose* and *Number of Decision-Makers*

	Number of Decision-Makers		
Purpose	Low	Medium	High
Info Exchange	1	1	5
Best Practices	2	2	3
Research	3	2	2

Institutional Setting* and *Primary Means of Communication – These variables describe whether the network is established within or across organizations and whether the members primarily communicate with one another face-to-face or virtually. As shown in Table 12, we found no apparent correlations between the purpose of the network and the institutional setting. When we looked at the primary means of communication, as shown in Table 13, we found that information exchange and best practice networks included some virtual networks, but none of the research networks were virtual. Facilitation of virtual networks is more complex than facilitation of co-located teams or groups that are able to meet together. It is harder to build trust and personal relationships when participants' primary means of communication is the internet. Due to the challenges of virtual communication, it would be difficult for a virtual team to achieve the more complex objectives of research networks; these networks need at least some face-time. For example, British Petroleum found that "virtual teamworking did not eliminate the need for meetings…They were still required to establish mutual trust and understanding and to hash out important issues" (Cohen & Prusak 1996).

The case study of Shell's virtual communities of practice emphasized that human interactions are more important than technology in contributing to learning. Exchange of information between users was found to be much more useful than their information database. User surveys determined that 85% of all time savings generated by their knowledge management

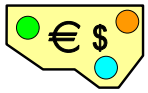
system could be attributed to advice received from other participants and only 15% were attributable to information in the database. "Discussion groups are much better at determining which information is relevant in which context than searching tools are. People are able to add warnings about the interpretation of context-dependent parts of recorded knowledge" (Beep Knowledge System 2002b).

Table 12. Correlation between *Purpose* and *Institutional Setting*

	Institutional Setting	
Purpose	Intra	Inter
Info Exchange	5	2
Best Practices	1	6
Research	3	4

Table 13. Correlation between *Purpose* and *Means of Communication*

	Means of Communication		
Purpose	Co-located	Meetings	Virtual
Info Exchange	2	1	4
Best Practices		6	1
Research		7	



Financial Resources

Our analysis also included three variables related to the financial resources needed to make the network function including *Annual Budget, Source of Financial Support,* and as discussed above, *Investment in Coordination.*

Annual Budget – This variable looks at the cost of the learning network. Owing to lack of detailed financial information in most of the case studies, it was difficult to say anything systematically across our sample, other than that learning networks are not cheap. For example, one network had an annual budget of $300,000, while one corporation (Buckman Laboratories) allocated approximately $8-9 million per year to its global knowledge networking system. According to company executives, knowledge management produced significant results:

> Overall, since the inception of our knowledge sharing system, K'Netix, we've experienced a 50 percent rise in sales from new products, which indicates a dramatic rise in profitability from innovation. Sales per associate have increased 51 percent, while operating profit per associate has gone up 93 percent. The payoff is clear. (Ellis & Rumizen 2002)

When calculating the cost of a learning network, it is important to distinguish between the cost of *network* activities versus the costs of *member* or *project* activities that would take place regardless of whether or not the member was part of a network. For example, The Nature Conservancy's Fire Learning Network brings together Conservancy staff, partners and

scientists to improve the management of fire-adapted landscapes and share lessons learned. The network covers the costs of group learning, but not the projects costs involved in managing specific sites. In some cases, such as the Biodiversity Conservation Network which functioned as a grantmaking intermediary, the Network paid for both network activities and specific project costs. One consequence of this arrangement was that some members probably joined the Network who were more interested in the project funds rather than the learning activities (Salafsky et al. 2001).

Although we do not have sufficient data to say for sure, it seems that in general, research networks require a higher level of coordination and participants' time than best practices networks, which require more than information exchange networks. We thus suspect that the per member cost of research networks is higher than that of best practices networks, which in turn, is higher than that of information exchange networks.

Source of Financial Support – A learning network can be financed either through contributions from its members or by external entities. Networks that are housed within one institutional setting are often supported by the host institution. For example, British Petroleum covers all of the costs of its Virtual Teamwork Program (Cohen & Prusak 1996). Networks that cut across institutional boundaries either rely on contributions from their members or require outside grant support. For example, the Locally Managed Marine Area Network is supported by grants from several private foundations (LMMA Network 2003). As a general rule, learning networks seem to be attractive to donors and can be a good mechanism to raise funds not only for network activities, but also specific member activities.

Recommendations for Practitioners

Perhaps the most important finding from our research is that there are certain conditions that any learning network, regardless of the type, will have to meet. Specifically, before forming a learning network, consider the following initial questions:

- *Do you have a fairly specific subject or domain for your learning network?*
- *Do your potential network members have the interest, desire, and time to commit to the network?*
- *Does your network have the ability to hire a paid coordinator?*
- *Can you obtain financial resources for network activities?*

If you answer "no" to any of these questions, then you should probably think hard about trying to form a learning network.

If you can answer "yes" to all of these questions, then your next step is to think about what type of learning network might make most sense for your situation. As discussed above, we have identified three types of learning networks:

- ***Type I. Information Exchange Networks*** – In these networks, learning is primarily guided by participants' requests for information, although the network may also have

some learning questions. Their membership process is usually open and they can be any size. They usually require very little commitment from their members and they rely primarily on informal incentives for participation. In terms of coordination and communication, they typically have a paid coordinator and a fishing net communications structure. Information exchange networks can include virtual networks and tend to be relatively cheaper to implement.

- ***Type II. Best Practices Networks*** – In these networks, participants define specific learning questions and collaborate to document, validate and disseminate best practices. Best practice networks have learning questions and sometimes have a formal learning framework. They have a membership approval process and tend to be medium in size. They require a formal or informal commitment from participants but they tend to rely on informal incentives for sharing information. They have paid coordinators and a bicycle wheel or spider web communications structure, with varying levels of participation in decision-making. They usually rely on face-to-face communication and rarely include virtual networks.

- ***Type III. Research Networks*** – In these networks, learning is centered around a formal learning framework designed to answer specific research questions. They tend to be small or medium in size. The process for joining the network can be entirely closed (by invitation only) or regulated by an approval process. They require a formal commitment and often offer formal incentives for sharing information. They have a paid coordinator and usually have a bicycle wheel communications structure with a strong center. Participation in decision-making varies. To communicate, they rely on meeting together for at least part of their member interaction.

The decision of which type of network to employ involves balancing both your needs and your available resources. As a starting point, we recommend that you consider the question:

- *What types of learning are the members of your network interested in?*

If your members are interested in sharing experiences around a variety of topics, then a Type I Information Exchange Network might make most sense. If, however, your members are interested in discussing specific best practices or pursuing research questions, then Type II or Type III networks may make more sense. If you are interested in a Type II or Type III network, you should then think about the following questions:

- *Do you have specific learning questions? Can you see developing a formal learning framework?*
- *Will membership be open or subject to approval or by invitation only?*
- *Will your members be willing to make a formal commitment to the learning process?*
- *Can you provide formal incentives for sharing information?*
- *Who will be on the coordination team?*
- *Will your members support a centralized communication structure?*
- *Is this a virtual network or will the group meet together?*

Depending on your answers, you will probably find that your situation is more comparable to one or the other of the two types. However, you may also find that you really don't have the resources to make either a Type II or III network function. In these cases, you may be better off starting with a Type I network. It may also be appropriate in many cases to start with a Type II network and let it evolve into a more intensive Type III network over time.

A Final Word

If we have learned one thing through this research and our experiences over the past few years, it is that although learning networks sound great in theory, they are challenging to design and implement in practice. Nonetheless, we remain convinced that these networks will ultimately lead to dramatic improvements in the practice of conservation. We hope that by identifying different types of networks we can catalyze ongoing investigations into the conditions that will help lead to success.

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Annex 1: Variables Collected Across Each Case Study

The following table contains a description of the variables in our database of case studies. This database will be available soon on the web at www.FOSonline.org. The database also contains additional fields with standard bibliographic information about each case.

Variable Name	Variable Definition	Codes/Responses	Comments
Region	To what region of the world does the reference pertain?	Global US/Canada Pacific LAC Europe Africa Asia N/A	Refers to location of network, not necessarily location of author.
Discipline	To what discipline does the reference primarily pertain?	Conservation Development Public health Education Business Finance Foreign affairs Social services Other Non-specific N/A	
Org Type	What type of organization would be the primary audience for this learning structure?	Foundation NGO Government For profit company Professional society Academic Other Think tank Multilateral Community N/A	
Name of Structure	Name of group learning structure		
Example of Structure	Name of example of structure in this reference		LMMA is an example of a learning portfolio
General Purpose (formerly called ***Purpose)***	Purpose along a spectrum from pure action to pure learning	Joint action Joint and individual action Coordinate individual action Knowledge for action Pure knowledge N/A	

Variable Name	Variable Definition	Codes/Responses	Comments
Purpose (formerly called ***Strategic Intent)***	**Primary** intention of the network	1 = solve everyday problems 2 = document best practices 3 = develop new knowledge	(1) to help each other solve everyday problems in their disciplines (ex. Xerox repair guys) (2) to document and share current best practices (including tools, insights, approaches, etc.) (ex. World Bank urban services group) (3) to develop new knowledge, ideas and solutions (ex. LMMA)
Process for Joining the Network (formerly called ***Membership)***	Is there a mechanism to screen membership?	Open Open to defined groups Approval process Invitation only N/A	
Formality of Commitment (formerly called ***Level of Formality of Commitment)***	Do participants have to commit formally to the structure, by signing some sort of binding agreement?	High Medium Low N/A	High = document such as social contract defines rights and responsibilities Medium = informal understanding of rights and responsibilities Low = no formally binding agreement or informal commitment N/A
Level of Analytical Rigor		High Medium Low N/A	High = rigorous; learning framework or other structure clarifies what hypotheses/assumptions are being tested and how, based on scientific method Medium = somewhat rigorous; group has defined some learning questions but doesn't have a structure for addressing those questions Low = not rigorous; very little clarity of learning questions or how to address them
Structure for Communication and Decision-Making (formerly called ***Structure for Communication)***		Bicycle Wheel Network Family Tree Network Spider Web Network Fishing Net Network	Bicycle Wheel Network: Members communicate with one another through the central coordinator Family Tree Network: Info begins at the top and works its way down to each successive level, with little communication among members Spider Web Network: A clear center sets the direction, but with many sub-networks and webs of communication between members (ex. LMMA) Fishing Net Network: The center of activity can shift according to need, with many "nodes" of communication throughout the network. No permanent central coordinator of information – leadership shifts according to need.

Variable Name	Variable Definition	Codes/Responses	Comments
Learning Style		Experiential (learning by doing) Lecture Information exchange N/A	
Internal Audience	Who is doing the learning internally?	Practitioners / project staff Donors Academics & researchers Community Policymakers Other N/A	
External Audiences	Who outside the network are lessons for?	Same as previous	
Incentives for Sharing Information	What incentives do members of the group have for sharing information with others?	None Personal satisfaction Informal recognition Doing job better Formal incentives Other N/A	Informal recognition = recognition as knowledgeable contributors to the group Formal incentives = organizational incentives, such as recognition on annual evaluations, promotions, etc.
Scale	Distance from direct action (direct protection vs. policy or certification)	Field level Management Policy or economic level Academic/research N/A	
Focus	type of unifying theme to which the structure can be applied	Conservation target Threats Conservation strategy Actors Geography Other N/A	Describes the topic of focus. If possible, describe the "shared practice," or specific knowledge the community is developing, sharing and maintaining.
Specificity of Domain **(formerly called *Specificity of Focus)***	How specific or broad is the topic of focus	1 = very specific 2 = somewhat specific 3 = somewhat broad 4 = very broad	1 = very specific (ex. ecology of the snail-darter) 2 = somewhat specific (ex. LMMA, fire ecology) 3 = somewhat broad (marine conservation) 4 = very broad (conservation in general)
Number of Decision-Makers (formerly called ***Governance)***	Extent of member involvement in decision-making	Low (few people make decisions) Medium (several people involved in decision-making) High (all members involved)	

Variable Name	Variable Definition	Codes/Responses	Comments
Coordination	Type of coordinating body like a PCT	Staff paid by network Mix of paid and volunteers Volunteers None N/A	Volunteers = people paid by other organizations + people donating their own time
Coordination Amount	How much time is dedicated to coordination?	0 Less than 1 FTE 1 FTE 1-2 FTEs 2-3 FTEs More than 3 FTEs	
Coordination People	How many people work on network coordination?	0 0-1 1-2 2-3 >3	
Leadership Qualities	What characteristics should coordinator(s) have to be most effective? What characteristics do the leaders of this network have?		
Technical Assistance	Sources of TA (mentors, resource teams, etc.)	Staff paid by network Volunteers Mix of paid and volunteers None N/A	
Impetus for Formation of Learning Structure	Who decided that the structure should be formed	External Balanced Member-driven N/A	
Means of Interaction	How do the participants interact	Full group meetings Sub-group visits/mtgs Phone E-mail Internet Videoconferencing Standard mail	
Institutional Setting and Primary Means of Communication (formerly called ***Communication Dynamic)***	Institutional or inter-institutional group? + Primary means of communication: Co-located and meets together, meets together but not co-located or works virtually?	Co-located inst team Inst team meets together Co-located inter-inst team Inter-inst team meets together Virtual inst team Virtual inter-inst team	Co-located inst team = Xerox repair Inst team meets together = World Bank urban services network Co-located inter-inst team = weed mgmt group Inter-inst team meets together = CMP Virtual institutional team = BP's virtual team Virtual inter-inst team = LMMA? TNC Fire Network? (Is internet primary means of communication?)

Variable Name	Variable Definition	Codes/Responses	Comments
Number organizations	How many organizations are involved in the network?	1 2 3-5 6-10 11 or more	
Levels of Participation		1 2 3 4 or more	Describes the different levels of participation. For example, a network may include a core group, a group of active participants and a group of observers, so one would describe the roles and responsibilities of members of each level.
Distance	Average distance of participant from coordination body or other participants	Same county/province Same state Same region in country Same country Same continent Several continents N/A	
Time for Network Communication	Average time a participant dedicates to communication with other members each year	A few hours Several days Several weeks Several months N/A	Time dedicated to meetings, emails, phone conversation, conference calls, etc.
Time for Network-Related Action	Average time a participant dedicates to doing work related to the learning structure per year	A few hours Several days Several weeks Several months N/A	Time dedicated to action, such as implementing the learning framework. Ex. farmers doing applied research.
Frequency of Interaction	How often do participants have meaningful interaction?	>1/mont Approximately once per month Once/3m Once/6m Once/year Once/2-3 years N/A	Meaningful interaction = more than a short email. Could include email of 1+ pages, phone conversation, visit, etc.
Face Time	How often do participants get together (on average)?	Once or more per week Once per month Once every 3 months Once every 6 months Every 6-12 months Every 1-2 years < every 2 years	
Size	Can this structure be applied to different # of participants?	Mainly small (<20) Mainly medium (20-100) Mainly large (>100) Flexible	

Variable Name	Variable Definition	Codes/Responses	Comments
Common Language	Is this structure currently applied in more than one language?	One language Bilingual Several languages N/A	
Adaptation to Disciplines	Has this learning structure (developed in 1 discipline) been adapted to others? Name all disciplines to which it has been applied.	Conservation Development Public health Education Business Social services Other Non-specific N/A	
Source of Financial Support	Extent of costs covered by outside funding or participating organizations or individuals	All outside funding ¾ outside + ¼ participants ½ and ½ ¾ participants + ¼ outside all participants N/A	Note: Participants can be individuals or companies. So, if the company is footing the bill, we classify that as "all participants."
Annual Budget	Annual budget of network in US$		
Critical Mass	Dependent variable. Ability of the network to reach "critical mass." Rank the stage that the network has achieved, using qualitative scale.	1 = little or no outputs 2 = limited or initial outputs 3 = some outputs 4 = extensive, useful outputs	1 = little or no work across projects; not much activity or outputs 2 = limited work across projects; some initial interactions or outputs, but fizzled 3 = some work across projects; some interactions; achieved some outputs 4 = extensive work across projects, regular interactions among members, useful outputs

Annex 2: Short Case Study Descriptions

Type I. Information Exchange Networks

British Petroleum's Virtual Teamwork Program: When British Petroleum reorganized into 42 separate business assets that operate semi-autonomously, the company developed its virtual teamwork program to facilitate communication among people doing similar work in different parts of the new business structure. BP formed virtual teams to "draw on the company's global expertise to solve local problems" (Cohen & Prusak 1996).

Buckman Laboratories: In 1992, Buckman built a knowledge network called K'Netix to facilitate greater sharing of information among employees and to respond more quickly to requests for information from the field. The system gave hundreds of employees in 20 associate companies in over 80 countries access to the knowledge base of the company and allowed everyone to enter knowledge into the system. The heart of K'Netix was its forums, where anyone could post a message, question, and/or request for help. Buckman hired Systems Operators to monitor the discussions in the forums, track requests and ensure that industry experts provided answers, preferably within 24 hours. Each forum included a message board, a virtual conference room to facilitate debate and a knowledge database (Fulmer 1999).

FRAME: FRAME is a virtual network of experts and practitioners active in the management of Africa's natural resources who share lessons, best practices and solutions. FRAME collects, organizes and disseminates information through its website. FRAME also facilitates the exchange of experiences between practitioners, primarily through interactive web-based discussions and some face-to-face meetings. Anyone can join FRAME and contribute information. Items added to FRAME are called "knowledge objects" and can include documents, websites, and business cards (FRAME 2004).

Health Care Action Research Network: A small group of action researchers in nursing who were struggling with action research methodologies established this learning network. The network brought the researchers together to share their experiences, provide mutual support and demonstrate the impact and value of action research in health care. It emphasized integrating action and reflection, and bringing together research and practice (Nichols 1997).

Rosenbluth International: This case study focuses on corporate culture as a central ingredient for creating a learning organization. Rosenbluth developed a learning culture that placed the responsibility for learning in the hands of each employee. The company encouraged its employees to take risks, make mistakes and learn from their mistakes, and share them with others. Rosenbluth reconfigured its training department into a centralized learning resource with responsibility for facilitating a learner-driven approach to employee development, instead of the traditional company-led training. The essential elements of the learning organization approach included: (1) a safety net that allowed employees to take on new behaviors in a safe environment, (2) a sense of teamwork and sharing (commitment to the growth of the group and not just individual growth) and (3) the role of the leader as champion of people and facilitator of learning (Hoffman & Withers 1995).

Shell Exploration and Production: In the late 1990s, Shell's New Ways of Working Team consolidated their numerous existing Communities of Practice into three global networks, focusing on surface, wells and subsurface activities. These learning networks operate as virtual discussion groups. Any member can post a question and several of their colleagues will usually respond within a few hours, because each of the integrated groups has between 1000 and 4000 members around the world (Beep Knowledge System 2002b).

Xerox Repair Technicians: In the 1980s, Xerox discovered that its copier repair technicians ("tech reps") were meeting informally to share their experiences about how to repair machines. Recognizing that learning is a social process, the company decided to encourage this informal learning network by providing two-way radio headsets to the tech reps and building a knowledge database to facilitate the storage and sharing of repair "tips" (Brown & Gray 1995).

Type II. Best Practices Networks

Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP): ALNAP is an international, multisectoral learning network dedicated to improving the accountability and quality of humanitarian action, by sharing lessons, identifying common problems, and, where appropriate, building consensus on approaches. ALNAP fosters active learning and exchange about good practices among UN agencies, bilateral donors, the Red Cross movement and NGOs (ALNAP 2004).

Aspen Institute Rural Development Philanthropy Learning Network: The Rural Development Philanthropy (RDP) Learning Network is a diverse group of community foundations and philanthropic organizations learning from one another's innovative strategies to improve RDP practice and outcomes. With primary support from The Ford Foundation, The Aspen Institute's Community Strategies Group is managing the network, collecting RDP tools, stories and strategic lessons, and disseminating them to the community foundation and community development fields. The network coordinators defined four central learning questions to guide the exchange of information (Aspen Institute 2003).

Koncraft Manufakturen Virtual Joinery Network: This network fosters exchange of experiences between five small businesses (handicraft joineries) in Germany. The businesses share knowledge about the design and production of ecologically-oriented kitchens and furniture. They market their products together and collaborate to optimize the use of their collective human resources. They incorporate new knowledge into their common standards and practices. (Beep Knowledge System 2002a)

The Nature Conservancy's North American Fire Learning Network: The Nature Conservancy's Conservation Learning Networks bring together Conservancy field staff, partners, and scientific experts in a series of facilitated, progressive workshops focused on organizational learning about conservation planning, threat abatement, and strategy development and implementation. The North American Fire Learning Network (FLN) has engaged more than 250 partner organizations, tribes and private landowners to achieve two overarching goals: (1) to accelerate ecosystem restoration at a set of high-priority fire-adapted landscapes where multi-agency teams are implementing or poised to implement restoration strategies, and (2) to foster innovation and transfer lessons learned from individual projects to many more landscape-scale projects, scientists and key decision-makers who may ultimately bring about larger-scale change (TNC 2004).

Sustainability Learning Networks Program: University of Cambridge professors developed this learning network program with a consortium of companies to help the companies increase their managers' knowledge and understanding of sustainable development. The program built on the participants' varied business experience and responded to their learning needs. Participants interacted primarily through online project work, enhanced by three face-to-face workshops and individual research (Hendry & Courtice 1999).

Teachers' Learning Circle: Learning circles are small groups of teachers who work together to develop professionally. Learning circles are based on the theory that most individuals learn through "a process of social interaction that creates conditions for personal transformation." This group of teachers formed a learning circle and wrote a book about how to use learning circles to improve the quality of teaching and learning in schools. The book focuses on learning how to build communities, construct knowledge, support learners, document reflection, assess expectations and change cultures (Collay et al. 1998).

World Bank Thematic Group on Urban Renewal: Since the 1990s, the World Bank has been striving to become a clearing house for knowledge about development. World Bank developed this thematic group as a vehicle for knowledge management about urban slum renewal. The group centralized and organized knowledge about urban slum renewal to make it accessible to others. They used various tools for data storage and dissemination, including help desks, databases, knowledge bases, workshops, study tours, toolkits and web sites (Fulmer 2001).

Type III. Research Networks

Biodiversity Conservation Network: Conservation organizations generally assume that if people can benefit financially from enterprises that depend on nearby forests, reefs, and other natural habitats, then they will take action to conserve and sustainably use them. The Biodiversity Conservation Network (BCN) was a learning network that brought together conservation and development organizations and local communities to systematically test this assumption (or hypothesis) across 39 conservation project sites in Asia and the Pacific. Each project implemented one or more community-based enterprises such as setting up an ecotourism lodge, distilling essential oils from wild plant roots, producing jams and jellies from forest fruits, harvesting timber, or collecting marine samples to test for pharmaceutical compounds. Each project team collected the biological, enterprise, and social data necessary to test the Network's hypothesis (Salafsky et al. 2001).

Eastman Chemical Company: Beginning in the 1980s, the company began to form teams at all levels oriented toward constant improvement of their business. Each team uses their Quality Management Process (QMP) to set clear goals or "major improvement opportunities," to test hypotheses, revise them and retest them, until the team reaches a sufficiently high level of confidence and embraces change. Pilots and prototypes provide valuable laboratory results to inform large-scale implementation strategies (Lipnack & Stamps 1994).

GE's Change Acceleration Teams: GE forms Change Acceleration Process (CAP) teams to solve significant, "competitive necessity" problems, which require new knowledge, ideas and solutions. CAP is an experiential learning program that defines learning as a change in behavior. Teams (generally 8-12 people) participate in an intensive, 3-day CAP course to help them develop applied problem-solving skills. All CAP courses are organized around a common framework and set of tools. The framework divides the change process into 7 steps: (1) leading change, (2) creating a shared need, (3) shaping a vision, (4) mobilizing commitment, (5) making change last, (6) monitoring progress, and (7) changing systems and structures (Garvin 2000a).

L.L. Bean's Creative Inquiry: L.L. Bean uses creative inquiry to improve its outdoor gear and apparel and develop new products. The company forms cross-functional learning teams that include field testers, product designers, marketing managers and suppliers. Each team's learning questions focus on product improvement and the data collection methods are varied and extensive. The company has a very rigorous selection process (based on the Yale Medical School application) for its field testers. Typically, the field testers are demanding clients that evaluate its products (Garvin 2000b).

LMMA Learning Portfolio: A learning portfolio is a network of projects that use a common conservation strategy and work together to achieve three goals: (1) to implement more effective conservation projects, (2) to learn about the conditions under which this conservation strategy works, does not work, and why, and (3) to improve the capacity of the members of the portfolio to do adaptive management. The Locally Managed Marine Area (LMMA) learning portfolio is a network of projects in the Pacific that are all working with local communities to implement and adapt traditional marine resource management systems to promote conservation and resource security. A wide range of organizations across the Pacific are working together to implement this portfolio. Subsidiary networks also exist in Fiji, Papua New Guinea, West Papua, Palau, the Philippines, Hawaii, and other countries (LMMA Network 2003).

Medrad's Quality Improvement Teams: Medrad produces automated vascular injection systems and other products for medical imaging (x-rays, CAT scans and magnetic resonance). Medrad's Quality-for-Life Program is a Total Quality Management (TQM) style initiative involving problem-solving and quality improvement methods and strong programs to encourage individual employee involvement through suggesting new ideas and participating in Quality Improvement Teams (QITs). Learning occurs through the work of interlocking teams. For example, Medrad formed one QIT to focus specifically on accelerating improvement in new product development. The team used project histories to diagnose weaknesses in new product development and recommend improvements. The company then formed new teams to implement the resulting improvement projects (Graham 1995).

Weed Management Knowledge Networks: Knowledge networks create new information about a complex situation through the interaction of different kinds of knowledge, such as academic theory and practitioner experience. The authors, university professors in agronomy and education, invited farmers, farm advisors, campus- and field-based extension faculty and weed science researchers to form knowledge networks about ecological management of invasive weeds. The networks conducted collaborative research and shared knowledge about the effectiveness of different weed management strategies. The authors present knowledge networks as "promising solutions to ecological management challenges" (Jordan et al. 2003).