
Learning communities in a learning region: the soft infrastructure of cross-firm learning networks in Silicon Valley

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Abstract. The ability of firms, industries, and regions continually to translate information and knowledge into viable new products, services, and production processes in the face of constantly changing technology and market conditions is increasingly at the core of competitive success in the contemporary economy. Such economic learning is ultimately dependent on the ability of individuals to learn, and yet most of the literature in this area has focused on firms and organizational learning processes, and is only beginning to engage seriously with people's learning processes. This paper explores the links between social learning processes and dynamics of innovation in Silicon Valley, arguing that cross-firm, occupationally based, 'communities of practice' provide a critical context for individuals to learn and maintain the competencies they need to be successful in the region's dynamic but volatile economy. These cross-firm occupational learning communities in many cases are being built through the activities of formal professional associations, which are playing an increasingly important role in providing the organizational infrastructure to sustain these learning communities. Using a case study of an association of women in Internet design and development occupations, the author illustrates the value of such communities in supporting individual and collective learning processes. These findings suggest that economic development strategies could productively be focused on identifying, strengthening, and expanding access to such cross-firm occupational learning communities.

1 Introduction

There has been an extraordinary burgeoning of literature in recent years on the relationship between innovation, learning, and regional economic development. This includes literature exploring the concept of a 'learning region' (Florida, 1995; Morgan, 1997; Simmie, 1997), examining regional systems of innovations (Braczyk et al, 1998; de la Mothe and Paquet, 1998), and evaluating the role of local and regional development policy in promoting and sustaining innovation (Glasmeier, 1999; Glasmeier et al, 1998; Keane and Allison, 1999; Lagendijk and Cornford, 2000). Underlying this interest in learning and innovation is the recognition that the contemporary economy is characterized by growing complexity of information and knowledge, rapidly evolving technologies and markets, and intensified unpredictability of the economic environment. In this context, the ability of firms and business systems to sustain innovation has become a matter of crucial importance for regional development (Amin and Cohendet, 1999). As a result, identifying and strengthening the factors that can support such economic learning have become critical goals for policymakers and academic researchers alike.

Research in this area has focused primarily on firm or organizational learning processes, and particularly on 'strategic learning'—the creation and development of new products, services, and production processes that clearly contribute directly to the competitive success of firms and regional industry clusters (Glasmeier and Fuellhart, 1996). Although research in this area has many strengths, the predominant focus on firms, rather than on people, and on 'strategic learning', rather than on more routine learning processes, leaves important gaps in our understanding of regional economic learning processes. This research has convincingly demonstrated, for example, that innovation requires social interaction (particularly across firm boundaries), that interorganizational communication

is built and maintained in large part through people's social networks, and thus that the nature of individual cognitive and collective learning processes in these social networks is a critical factor in shaping the ability of firms and regional economies to be innovative (Saxenian, 1996; Storper, 1997). Yet the actual processes of individual and collective learning remain largely a 'black box', allowing researchers to argue convincingly *that* social learning has occurred but with fewer insights into *how* it has occurred. Without a greater appreciation of *how* social learning processes occur, important questions about processes of innovation that are central to regional economic development remain unanswered. What processes of human learning are supported or hindered by particular organizational structures, for example? As a result, what types of efforts to institutionalize learning environments are helpful or harmful to learning? How do human learning processes adapt to, shape, and sometimes challenge existing organizational forms and what are the implications for organizational learning processes? Such questions are critical if we are to design economic development strategies that are effective in promoting economic learning processes.

This paper contributes to research in this area by highlighting the importance of organizations that support regional, occupationally based, 'communities of practice'⁽¹⁾ in Silicon Valley. Using insights developed by social theories of learning, I argue that significant learning takes place in loosely structured communities of people with similar occupations, skills, and experiences in the regional labor market. Furthermore, I argue that these communities of practice emerge not simply through informal social interaction, but are being actively built at least in part through the formal activities of professional associations, which provide a 'soft infrastructure' to facilitate learning in these networks (Cooke and Morgan, 1998; Lawton-Smith et al, 2001). Rather than being restricted to traditional, highly educated, 'true professions', such as engineers and computer programmers, such associations have become increasingly important particularly in a range of 'semiprofessions' (Collins, 1990) in the Valley, reflecting the importance of learning at multiple levels in the regional complex. Using the case study of an association of women in Internet design and development occupations, I argue that the cross-firm 'learning communities' being supported by the activities of such professional associations provide an important component of the regional economy's ability to learn. This suggests there may be significant potential for regional economic development policy to help encourage this 'soft infrastructure', by identifying, supporting, and expanding access to such cross-firm, occupationally-based learning communities.

The paper is organized in the following way. In the next section, I explore aspects of theories of the 'learning region' and regional innovation systems, highlighting their strengths, but also their limitations in understanding human learning processes. To help address these limitations, I build on the concept of 'communities of practice', arguing that this concept can be usefully applied to cross-firm learning communities. The subsequent section applies these concepts in an examination of the role of professional associations in helping to build learning opportunities, not just for engineers, programmers, and entrepreneurs, but for workers in a wide range of occupations in the labor market. This section is followed by a detailed examination of Silicon Valley Webgrlls, an association for women working in web-related occupations. This section examines the different types of information flows that occur through this association, highlighting their role in building an effective occupational community and thus helping people engage in continual learning. In the final section I discuss the implications of these findings for the region's economic development and for economic development policy.

⁽¹⁾ The term is developed in Wenger (1998) and is examined in more detail below.

2 Innovation, learning, and regional development

In the past thirty years, the economy has been dramatically restructured through a variety of processes, including most prominently the rapid development and diffusion of information technologies and rapid economic globalization (Burton-Jones, 1999; Castells, 1996). In this new economic environment, the ability of firms to adapt effectively to changing market conditions, identifying and capitalizing on new opportunities, and successfully responding to new challenges, is a key factor in ensuring competitive advantage for many firms and regions. Researchers from a variety of fields have extensively documented the critical importance of innovation in building and sustaining economic competitiveness (Amin and Cohendet, 1999; Hudson, 1999; Lundvall, 1992; Maskell et al, 1998; Tooke, 2000). The term 'learning' has been increasingly adopted in much of this literature as a comprehensive way of referring to the process by which firms, regions, industries, and countries absorb information, develop knowledge, and use this information and knowledge to improve their economic performance.

Innovations are new creations of economic significance of various types, including new products and services, new technological capacities, and new ways of organizing production processes and the delivery of services.⁽²⁾ The processes through which innovations emerge are complex, having to do with both the development and the diffusion of information and knowledge, and the translation of this information and knowledge into new products and production processes. Clearly, innovation that is rooted in new scientific research or technological development can be tremendously valuable, as the firms and regions that can take advantage of the resultant scarcity rents can be enormously profitable and grow tremendously rapidly. It is important to stress, however, that innovation is not solely dependent on scientific knowledge or formal R&D activities. Innovation has been shown to be critical in a wide range of 'low-tech' industries and in many areas of the developing world (Bell and Albu, 1999; Chataway and Wield, 2000; Ernst and Lundvall, 1997; Maskell et al, 1998; World Bank, 1998). Furthermore, innovation is not relevant simply in 'strategic' areas of firm direction (Glasmeier and Fuellhart, 1996). Innovation can take place at all levels of a firm's activities, and can be important in a range of 'routine' activities, including production processes, logistics, marketing, sales, distribution, or industrial relations (Malberg and Maskell, 1999). Innovation also does not necessarily need to involve the creation of something entirely 'new'. Knowledge is context specific, and thus the ability of a firm in one context rapidly to adopt or adapt technologies or production processes developed in other contexts can be an important part of innovative processes and competitive success. Indeed, many Silicon Valley firms have been highly successful in imitating leading firms, without having to incur the heavy sunk costs of research and development, and the ability of innovations to diffuse rapidly in the regional economy has been identified as one of the critical factors of Silicon Valley's dynamism (Castells and Hall, 1994).

In all of these contexts innovation is clearly an interactive process (Cooke and Morgan, 1998; Morgan, 1997). The linear model in which innovations are developed first in an isolated research and development unit and then translated into products for sale rarely describes actual innovation processes (Thomas, 1994). Feedback loops, or reflexivity, has been widely identified as a critical component of the learning process (Glasmeier et al, 1998; Lash and Urry, 1994; MacLeod, 2000). Furthermore, this process of interactivity rarely occurs within the context of a single firm. Firms innovate through the process of interacting with a wide range of other organizations.

(2) To avoid ponderous and awkward sentences, I subsequently use the term products and production processes but, throughout, I am referring to services and service delivery processes as well.

Through communicating with suppliers, customers, and competitors, and through building relationships with universities, research institutes, investment firms, government agencies, and so on, firms develop and exchange various kinds of information and knowledge that are critical to their ability to innovate.

This interactive element of the innovation process highlights the importance of regions in the study of economic learning. Spatial proximity facilitates the exchange of many kinds of information and knowledge, particularly tacit knowledge. Once knowledge is codifiable, it can become available relatively rapidly in many regions of the world, and imitation becomes much easier. In the face of these processes of ‘ubiquitification’ of codifiable knowledge (Maskell and Malmberg, 1999), it is the additional tacit knowledge that is developed in the production and service delivery process that is the critical component of any industry’s or region’s competitive success. As Storper (1997) argues, these intangible assets of a region or industry can be thought of as embedded in the social relationships that get built over time (‘relational assets’), and in the common frameworks that get built through these interactions that ease the coordination of economic activity (‘action frameworks’). The development of these common interpretive frameworks is not limited to spatial proximity. It is also possible for strong ‘relational proximity’ to develop, such as that built through frequent digital communication, common specialist literature, and periodic travel for face-to-face interaction, allowing for learning networks to develop across large distances (Amin, 2003). Nonetheless, spatial proximity does facilitate the development of intimacy and familiarity, which can be vital for rapid learning processes.

One of the major challenges facing research on economic learning processes is to identify the specific mechanisms and processes that make economic learning effective, particularly the relationship between human learning processes and organizational change. Most of the literature on economic learning processes focuses on organizational learning, with a goal of understanding how firms, industry clusters, regions, and nations are able to adjust to rapidly changing economic conditions, and develop innovative new products and processes. Human learning processes, and particularly the processes through which meaning, identity, and social interactions shape learning, remain a ‘black box’ in most of these studies. For example, in their comparison of the Danish and Finnish furniture industries, Maskell et al (1998) argue that the success of the Danish furniture industry is based on “interactive technological and organisational learning processes” (page 118) that have helped Danish firms effectively recognize and respond to changing consumer product demand while improving organizational efficiency. They are unable, however, to provide insights into the nature of those interactions, arguing simply that they are rooted in common culture, spatial proximity, and repeated long-term information exchanges which are ‘in the air’ for locally rooted firms, but impossible for outside competitors to “understand, codify, capture, and imitate” (page 111). In another example, Storper (1997) provides a compelling account of the important role of conventions of participation and identity of various social groups in shaping the models of production in Northeast Central Italy (pages 137–147). He stops short, however, of examining how people learn these conventions and thus how the conventions are reproduced, challenged, and modified over time.

Thus, research on ‘learning regions’ has effectively argued that human identity formation, convention creation, and cultural assets are intimately connected with shaping regional economic dynamics, but are only beginning to understand *how* processes of human learning and organizational learning are related. To truly understand the nature of such connections requires detailed ethnographic research that can start from understanding human learning processes, examining how these processes are shaped by, and in turn shape, organizational structure.

Social learning and communities of practice

Many theories of human learning are informed by an individualist perspective derived from human capital theory and do not provide very useful insights to the study of interactive learning processes and their role in innovation (Becker, 1964). Similarly, many approaches to learning rely on theories which emphasize abstract mental processes and deemphasize their social, relational, and situated base (Anderson, 1996; Hutchins, 1995). A more promising starting point, therefore, is theories of social learning, which argue that knowledge is acquired, developed, and applied through the interpretation of experience in a social context, based on mental frameworks and experiences that shape human processes of sense making and identity formation. Knowledge is context specific, and ultimately constructed through complex processes of social negotiation and interpretation shaped by the access to resources, reputation, social networks, access to equipment, and so on, of those involved in developing the knowledge (Latour and Wolgar, 1979). The artifacts of society, including the technological basis for communication and interaction, codetermine these learning processes. Thus, the social and technological contexts in which individuals learn and work play a decisive role in the development of the individual. "To understand how people learn is to simultaneously understand how they are able to adapt to (and sometimes to resist) the practices of various social institutions, and to appropriate and operate with the technological and intellectual tools that are salient in these environments" (Bliss and Säljö, 1999, page 1).

One of the most useful concepts to emerge in this literature is the notion of a 'community of practice' (Lave and Wenger 1991; Wenger 1998). At the core of this concept is the argument that the fundamental process by which people learn is through their engagement in social practice. This engagement is structured through their participation in informal communities that people form as they pursue shared enterprises over time. Participation refers "not just to engagement in certain activities with certain people, but to a more encompassing process of being active participants in the *practices* of social communities and constructing *identities* in relation to these communities" (Wenger, 1998, page 4). Participation in communities of practice is essential for sense making (meaning) and identity formation, because it is the participation that provides the basis for making sense out of the diversity of information and knowledge that people are exposed to.

A critical component of the learning process emerges prior to people being fully incorporated into communities of practice. The processes by which people become part of, engage with, and contribute to the practices of such communities are an essential component of successful learning processes. Lave and Wenger (1991) argue that people inevitably start out as peripheral members of communities of practice. For learning to be effective, the intention of newcomers to learn must be engaged by the community, and the mastery of knowledge and skills in any particular enterprise involves them moving towards full participation in the sociocultural practices of the community. Lave and Wenger term this process 'legitimate peripheral participation' and argue that this social process "includes, indeed it subsumes, the learning of knowledgeable skills" (1991, page 29).

In applying the concept of communities of practice to understanding learning in a work context, past studies have tended to focus on social interaction and joint enterprises limited to a single worksite or single company. Thus, Wenger (1998) illustrates his analysis of communities of practice by examining the ways that insurance claims processors learn to be effective in their job. Orr (1996) discusses the importance of these communities of practice amongst photocopier repair technicians in a major photocopier company. Osterlund (1996) examines the ways that the effectiveness of

salespeople in a major technology firm is conditioned by their interactions with multiple communities of practice. In the context of contemporary economic dynamics, however, with the growth in multifirm production networks and industry clusters, it is clearly not enough to understand within-firm learning processes. Many people's day-to-day work practices are less limited to their own particular worksites or own firms, making cross-firm learning processes increasingly important in shaping economic competitiveness.

In applying a communities of practice framework to cross-firm learning processes, Brown and Duguid (2000a) have gone perhaps the furthest, though they prefer the term *networks of practice*. Cross-firm networks of practice are built by people who share similar work practices, discourses, and knowledge, frequently centered in a common occupation or profession. It is these common practices, discourses, and identities that make such networks highly efficient for the rapid sharing of information related to work processes. Networks of practice are thus a more specific social process than simply social networks, with people bound more closely together through similar work practices. For Brown and Duguid, communities of practice are even more specific "subsections of these larger networks of practice", which are distinguished by more tightly-knit groups of people who "know each other", "work together directly", and "continually negotiate with, communicate with, and coordinate with each other directly in the course of their work" (2000a, pages 142–143). Networks of practice, they argue, although important for information sharing, are not a basis for action or knowledge development, which only takes place within communities of practice. Though people in networks of practice share a common repertoire of concepts and discourses rooted in practice, they lack the intensity of social interaction and common pursuit of a joint enterprise that are essential for forming a true community of practice.

Brown and Duguid suggest that the intensity of interaction required for a community of practice to form out of a broader network of practice is only possible in the context of day-to-day communication within a common business enterprise. I believe, in contrast, that cross-firm communities of practice *do* exist and that they can be an important component of economic learning processes. It is true that cross-firm social interaction is typically less frequent, more electronically mediated (via e-mail or telephone) and asynchronous than the daily, face-to-face interaction that typically structures work-site-based communication. Nonetheless, not all cross-firm communication is limited to the arms-length, anonymous sharing of information and lack of a joint enterprise that would characterize a network of practice. Cross-firm communities of people *do* form, in which regular, detailed, and trusting communication occurs, combining both electronic and face-to-face interaction. These communities may form around a shared business enterprise as, for example, in the case where the development of complex technological standards requires close interaction between product developers in multiple firms. They may also form, however, around a shared *occupational* enterprise. In these cases, the joint project that the community of practice forms around is not a specific business project. Instead, the community is formed by people recognizing that successful work practices requires continual learning, and that such learning is often rooted more in occupations than in business enterprises. In essence, such occupationally based communities of practice are not just communities in which valued learning takes place (which characterizes all communities of practice), but in fact are communities specifically structured around the pursuit of learning itself.

I will examine the importance of occupationally based, cross-firm communities of practice below, through a discussion of learning communities in Silicon Valley. First, however, let me be clear that in asserting the importance of cross-firm, occupationally based communities of practice I am not trying to deny the importance of the learning

processes that take place within firms, nor the value of information that flows across social networks or networks of practice. Instead, what I am suggesting is that it is critical that we provide more specificity to the now uncontroversial assertion that cross-firm social networks are an important part of regional competitiveness (Saxenian, 1994; Storper, 1997). The knowledge that gets developed in these social networks is not simply 'in the air', nor does it simply emerge out of information flows. Instead, I am arguing that important learning and knowledge development are structured around specific communities of people engaging in regular social interaction, working on some type of joint enterprise, with a shared repertoire of concepts and discourses that structure that engagement (Amin, 2003; Wenger, 1998). Furthermore, such cross-firm communities of practice are often built around a common occupationally based learning enterprise, rather than a specific business project. Understanding how such occupationally based learning communities operate is an important step in strengthening our understanding of economic learning processes.

3 Silicon Valley—learning region and learning communities

The dynamic success of Silicon Valley's economy since the 1950s has been fundamentally linked with the dense social networks that exist across firm boundaries, which are seen as being critical for learning and innovation in the regional economy (Angel, 2000; Kenney, 2000; Saxenian, 1994; 1996). The critical factor in these social networks, however, is not simply the circulation of information, but the shared practices that are so essential for providing structure and meaning to that information and facilitating its application in productive ways (Brown and Duguid, 2000b). Silicon Valley is remarkable in the extent to which shared practices are rooted not in a single firm or workplace, but instead rooted within a broader technical community in the region as a whole. Many workers in the region identify with the pursuit of technological knowledge, or with their particular skill, craft, or occupation, rather than their current work site or product. People's loyalties, from the earliest days of the region's development, frequently lie with "each other and to advancing technology, rather than to individual firms or even industries" (Saxenian, 1994, page 28). For much of the region's workforce, the pursuit of technological learning itself has become a primary component of their work practices, involving significant levels of social interaction with others around the region.

In the early days of the region's development, such cross-firm social interactions tended to develop in an informal way. Along with social ties developed in the workplace, people with similar interests and experiences came together in various users' groups and hobbyists' clubs (Saxenian, 1994, pages 30–34). As the region has grown larger and become more complex, however, economic actors in the regional production complex have become more conscious about the importance of this social interaction. As a result, they have more deliberately tried to create the formal infrastructure to support these 'networking' opportunities. Some of these more formal attempts to support networking have been initiated by prominent firms in the region. For example, Joint Venture: Silicon Valley Network was launched in 1992, with the goal of playing a strategic role in bringing local business leaders together with government and educational institutions to promote innovative solutions to the region's economic and community issues (Henton, 2000; Joint Venture: Silicon Valley Network, 1997).

Networking, however, does not happen solely through business ties. One of the most prominent organizational infrastructures to support networking in the Valley is the professional associations which have grown rapidly in the 1990s, amongst both high-level entrepreneurs, engineers, and programmers, and people in a range of more mid-level occupations. Table 1 lists a range of professional and technical associations,

Table 1. Partial list of professional associations active in Silicon Valley (sources: Saxenian, 1999; interviews, <http://ittalent.com/assocs.htm>, accessed July 1999).

Mission statement/brief description	Year founded	Membership in 1999
<p><i>American Marketers Association—Silicon Valley Chapter</i> (http://www.svama.org) The chapter sponsors meetings, workshops, and seminars where members meet and exchange ideas with leading innovators and thinkers in business, research, and academia. It also provides a forum to expand personal and professional contacts by networking with Silicon Valley marketing professionals.</p>	1980	400
<p><i>Association for Computing Machinery—Bay Area Chapter</i> (http://www.sfbayacm.org) Local chapter of one of the oldest educational and scientific computing societies. Hosts monthly meetings and networking opportunities.</p>	1947	80 000 (national)
<p><i>Association for Information Technology Professionals</i> (http://www.aitp.org) National association that began in the 1950s with machine accountants in Chicago. Evolved into the AITP in 1996. Has local chapters around the country, including San Jose.</p>	1996 (with roots to 1951)	
<p><i>Association for Women in Computing, Bay Area Chapter</i> (http://www.awc-sf.org) AWC is dedicated to the advancement of women in the computing fields. Local chapter hosts monthly meetings, produces a newsletter, provides job listings, and hosts job fairs and professional conferences.</p>	1978	
<p><i>Bay Area Association of Database Developers</i> (http://www.baadd.org) Promotes career potential of database developers through meetings, seminars, communication, publications and other program activities</p>	1985	100
<p><i>Bay Chi (Computer and Human Interaction)</i> (http://www.baychi.org) BayCHI is the San Francisco Bay Area chapter of the ACM Special Interest Group on Computer–Human Interaction (SIGCHI). They host their meetings at Xerox PARC.</p>		
<p><i>BayLISA</i> (http://www.baylisa.org) The Bay Area Large Installation Systems Administration Users Group provides monthly meetings for members to stay up on changes in the industry, to network and improve their career opportunities. It is the local chapter of SAGE.</p>	1991	~150
<p><i>Black Data Processing Association—Bay Area Chapter</i> (http://www.bdpabac.org) Local chapter founded in 1990. Focus on increasing opportunities for African–American professionals in information technology industries. Monthly meetings in Oakland and Cupertino. Also sponsors high-school internship program.</p>	1990	
<p><i>Chinese Institute of Engineers (CIE/USA)</i> (http://www.cie-sf.org) Promotes communication and interchange of information among Chinese engineers and scientists.</p>	1979	1 000

Table 1 (continued).

Mission statement/brief description	Year founded	Membership in 1999
<i>Chinese Software Professionals Association</i> (http://www.cspa.com) Promotes technology collaboration and facilitates information exchanges in the software profession.	1988	1 400
<i>Graphic Artists Guild of Northern California</i> (http://norcal.gag.org) Promotes the economic interests of member artists. Committed to improving conditions for all creators of graphic art and raising standards for the entire industry.	1995	3 000 (national)
<i>HTML Writers Guild</i> (http://www.hwg.org) World's largest international organization of web authors with over 98 000 members in more than 130 nations worldwide. The HWG assists members in developing their skills, and compiles information about standards, practices, techniques, competency, and ethics as applied to web authoring.		
<i>International Association of Business Communicators—Silicon Valley Chapter</i> (http://sv.iabc.com) Offers a range of programs for career development and technical advancement, including monthly meetings, professional development services, job listings.		260 (local) 13 700 (worldwide)
<i>International Webmasters Association (Silicon Valley Chapter)</i> (http://www.iwanet.org) Brings together people who are involved in all disciplines of webmastering, at the local and regional levels. Provides professional development and educational resources.	1998 (SV chapter)	12 000 (inter- national)
<i>Monte Jade Science and Technology Association (MJSTA)</i> (http://www.montejade.org) Promotes the cooperation and mutual flow of technology and investment between Taiwan and the United States.	1989	150 corporate members, 300 individuals (West Coast)
<i>Network Professional Association (Silicon Valley Chapter)</i> (http://www.npanet.org) For networking professionals who design, implement, and maintain computer networks. They work to advance the network computing profession by educating and providing resources for its members.	1990	7 000 (national)
<i>Professional and Technical Consultants Association</i> (http://www.patca.org) Professional association of independent consultants and principals who work in small consulting firms. Based in Silicon Valley.	1975	400

Table 1 (continued).

Mission statement/brief description	Year founded	Membership in 1999
<i>Silicon Valley Association of Software Entrepreneurs</i> (http://www.svase.org) Facilitates the creation of new computer software business ventures, improves the financial performance of existing ventures, and promotes and supports the commercialization of computer software technologies.		
<i>Silicon Valley Chinese Engineers Association (SCEA)</i> (http://www.scea.org) Network of Mainland Chinese engineers to promote entrepreneurship and professionalism among members and establish ties to China.	1989	400
<i>Silicon Valley Help Desk Institute</i> (http://www.svhdi.com) Provides training, educational materials, and a networking forum for help desk/support center professionals.		
<i>Silicon Valley Indian Professionals Association (SIPA)</i> (http://www.sipa.org) Forum for expatriate Indians to contribute to cooperation between United States and India.	1991	1 000
<i>Silicon Valley Linux Users Groups</i> (http://www.svlug.org) A users' group that started as part of the Silicon Valley Computer Society, and promotes networking and information sharing related to LINUX, and free or low-cost implementations of UNIX.	1988	
<i>Silicon Valley Web Guild</i> (http://www.webguild.org) Dedicated to the education and professional development of the San Francisco Bay area webmaster community.	1995	900
<i>Silicon Valley Webgrrls</i> (http://www.webgrrls.com) Face-to-face networking group that provides support, information and resources for women in new media.	1996	1 000
<i>Society for Technical Communications</i> (http://www.stc-siliconvalley.org) STC is an individual membership organization dedicated to advancing the arts and sciences of technical communication.	1971 (with earlier roots)	2 000 (local) 22 000 (national)
<i>System Administrators Guild</i> (http://sageweb.sage.org) Aims to advance the status of computer system administration as a profession, establishing standards of professional excellence, developing guidelines for improving the technical and managerial capabilities of members of the profession, and promote activities that advance the state of the art or the community.	1992	~5 000 (national)
<i>The Indus Entrepreneur (TiE)</i> (http://www.tie.org) Fosters entrepreneurship by providing mentorship and resources.	1992	560

that were active in the late 1990s, assembled from a variety of published sources and from interviews. There are dozens if not hundreds of professional associations and similar users groups that make up the dense network of occupational relations in Silicon Valley.⁽³⁾

These associations in Silicon Valley have little resemblance to traditional professional associations, such as those of doctors and lawyers. Associations in traditional professions predominantly act as monopolistic practitioner groups, whose activities are only partly about promoting learning opportunities and instead focus a significant amount of activity on certifying the learning required to enter the field and defending those barriers to entry (Abbott, 1988; Berlant, 1975; Larson, 1977). In contrast, for technical workers in information technology occupations (particularly for those in semiprofessions but for engineers in these fast changing fields as well), their power in the labor market is less tangible than the protection of monopolistic knowledge practices characteristic of 'true' professionals. Instead, their power in the labor market is largely built on their capacity to cope with rapidly changing technology and to deal with uncertainty. Information technology workers derive considerable status from being associated with cutting-edge technological and economic change, but at the same time they are constantly being market tested for the relevance of their skills and the organizational problems they claim to be able to solve (Fincham, 1996). Creating a monopolistic practitioner group in this context is not only nearly impossible, it is undesirable. Instead, it is essential that they remain open to new information and expanded networks. Ultimately the ability of workers in information technology industries to attain and retain their high status in the labor market requires dealing with rapid change. It requires the ability to stay on top of industry trends and changing skill demands, to find access to multiple employment opportunities when needed, and to build career mobility over time across multiple organizational contexts. Workers in these occupations solve these problems of maintaining the market relevance of their skills by taking advantage of networks of information exchange in communities of workers who share similar types of expertise. Groups of users become resources for each other in maintaining knowledge about skills that are in demand.

As a result the structure of professional associations in these occupations is significantly different than in traditional professional associations. In essence, their very focus is on learning, creating effective learning environments for their members, and expanding access to the career, rather than certifying membership and furthering the careers of existing members, as in traditional professional associations. Because effective learning requires being rooted in social practice, this requires more personal relationships, higher levels of face-to-face communication, and greater integration of work and learning opportunities. There is a greater focus on networking and providing services to an open and often undefined membership, rather than on restricting access to the field. The need to help their members anticipate and capitalize on changing industry trends requires greater openness. The value for the regional economy of such open organizational forms, and the information sharing they foster, can be more easily demonstrated through a case study of a single association.

⁽³⁾ It is important to note that networks and the organizations that help provide their infrastructure can be exclusionary as well as inclusionary. In other words, the very identities, conventions, and cultural practices that provide the basis for social communication also provide significant barriers to participation by people who do not share the same culture. Saxenian's more recent work, for example, identifies the 'glass ceilings' that many Indian and Chinese high-tech workers faced in the region as one of the reasons for them starting their own firms. The professional associations and entrepreneurial support organizations they organized helped provide their own set of social capital to overcome their lack of access to more traditional networks in the Valley (Saxenian, 1999).

4 Silicon Valley Webgrrls

Silicon Valley Webgrrls (SVW)⁽⁴⁾ was chosen as a valuable case study for examining the creation of cross-firm learning communities for at least three reasons. First, because it is an association in a 'mid-level' occupation, it can help broaden our understanding of regional learning dynamics by demonstrating the importance of cross-firm learning networks beyond the associations of high-level entrepreneurs, engineers, and computer programmers that dominate most studies of the Valley. Second, the organization emerged with the rapid growth of the World Wide Web, helping to expand a critical workforce at an important time in the growth of Internet firms in the Valley in the 1990s. Third, it demonstrates the value of combining in-person and online communication in the process of developing effective learning communities, and providing access opportunities for newcomers to learn the required skills and knowledge in the field.

The organization was first founded in 1997 with a goal of building an organization to help women be successful in Internet-related occupations. By November 2000 it had a membership of more than 1200, representing nearly all areas of the emerging Internet-related technologies. The organization had a vibrant online community, regular monthly meetings that drew sometimes upwards of 300 people, and was seen by members as an extremely valuable community for expanding their learning opportunities. Though the organization subsequently largely dissolved in the context of the bursting of the Internet bubble,⁽⁵⁾ by all accounts, it played a critical role in promoting critical knowledge acquisition and learning at a strategic time in the development of the Internet industry in Silicon Valley.

SVW was founded as a networking group for women in Silicon Valley working in and interested in learning about new media. SVW provided a forum where women could share information, exchange job and business leads, and learn about new technologies. It was committed to helping all women develop skills, contacts, and a passion for new media. Through monthly meetings, an e-mail list, and other contacts, its goal was to give women the information and support they needed to be successful in new-media occupations. Though the organization was nominally a chapter of the international organization Webgrrls, in practice communication between the national organization and most local members was inconsequential. It was the specific social practice of working in Silicon Valley, rather than the more general issues associated with web work, that provided the basis of social interaction and meaning within the chapter.

According to the leader of the Silicon Valley chapter, women in the region lacked the 'good ol' boys' network that helped men get ahead in the industry, and they wanted to create a 'good ol' grrls' network to provide that support. The group grew rapidly in 1998, tripling its membership from 400 to 1200 people. The membership of the organization included a significant number of younger women just starting out in the Internet field. There were also lots of older women, however, who had moved into

⁽⁴⁾ This case study is based on interviews with twelve leaders and members of the association, participant observation at four of the organization's monthly meetings, a detailed review of their web-based descriptive material, and participation for over a year in their online listserv which generated at the time more than 600 messages a month. The website of the organization (<http://www.svwebgrrls.com>) is no longer operational, but the national organization (<http://www.webgrrls.com>) is still going strong and is soliciting leaders to relaunch a Silicon Valley chapter.

⁽⁵⁾ There were a number of factors that helped contribute to the disbanding of the organization, including their all-volunteer organizational structure, burnout of the regional leadership, and some disagreements in organizational policy between the local chapter and the national organization, Webgrrls, based in New York City.

web-related occupations from their previous work. For instance, a print graphics person moving to web design, or a print writer moving to web marketing, or even a stand-alone database ‘guru’ moving into doing backend integration for a website. The existence of the association provided a rapid opportunity for newcomers to the field to become rapidly integrated into an existing community of practitioners in the field. People could get the information and knowledge (including technical skills) to be involved in web work from a variety of different sources, including through formal training programs, on-the-job training, and through their own efforts. In the context of the rapid changes in the industry, however, the professional association provided a critical network of relationships to help people sort through information and develop the new knowledge required to be successful in their work. The formal structures that SVW developed consisted of creating networking opportunities and information-sharing forums for its members, through both face-to-face communication in monthly meetings, and through a highly active listserv. These services provided the infrastructure for informal learning opportunities for members, advice on access to formal training opportunities, and mutual support in advocacy activities.

Meetings

Meetings of the organization were typically held once a month. The location varied, depending on the activity. Most frequently they were held at high-tech firms, but were also held at the San Jose Convention Center, and at more social venues (for example, restaurants) depending on the function itself. The meetings were well attended, drawing anywhere from 50 for the less popular meetings, to well over 300 for the larger ones. The most popular topics were either related to emerging technologies or to career issues. Examples of career-oriented meetings included more than 300 people attending a meeting in July 2000 to hear Patti Wilson, Principal and Founder of The Career Company (<http://www.careercompany.com>) talk about “Negotiating Salary and Options”. Another 250 people attended a career panel discussion at a meeting in March 1999, in which a panel of industry experts shared ‘secrets of finding a job in an Internet career’. Examples of more technical or industry-oriented meetings included a presentation in May 2000 attended by 250 people in which Molly Holzschlag (honored as one of the Top 25 Women on the Web by San Francisco Women on the Web) talked about new technologies. Similarly a panel of E-commerce experts in July 1999 drew their largest crowd—more than 350 people.

The organization made an explicit effort to make their meetings inviting to newcomers. The meetings were open to the entire public, not just Webgrrls members, and the meetings were advertised in a variety of online media, and in the San Jose *Mercury News* and *Silicon Valley Business Journal*. SVW altered the days of the week and week of the month of each meeting, in order to ensure that people who had ongoing conflicts on particular nights were not excluded. One critical component of this welcoming culture was ensuring that at every meeting ‘greeter grrls’ were there to welcome people who were coming to their first meeting. As part of this they then tried to connect newcomers with older members to help introduce them around. The warm environment of these face-to-face monthly meetings helped create a community of people that could then be sustained more easily through online communication. It helped integrate newcomers into the community, while also sustaining the involvement of old-timers.

ListServ

Perhaps the most important aspect of the organization was its regular listserv, in which members shared ideas, thoughts, and perspectives on important issues. At its peak in 1999 and 2000, the list generated an average of 600–700 messages a month—roughly 15–20 each day during the working week. The list was an important venue for people

to learn new skills, especially for newcomers learning from more experienced people in the industry, in an incremental way. The following is a typical exchange around a technical question:

1st message: August 4, 1999, 12:06 pm

On my surfings I've come across several sites (including the SV Webgrrls site last I checked) which does the typical frame setup seamlessly—a left navigation bar with the right frame seamlessly connected, ie there is no scroll bar or divider line so the image seems to come across one singlepage rather than looking like two frames. How is this achieved? When I build frames, there is always a divider line... it's likely I am using an older HTML but I would love to know how to perform this “trick”. Linda

Answer #1, at 12:38 pm

Hi Linda,

On the pages I've designed or worked on which have this look, it is achieved not through frames at all but through tables. So the whole page is a big table and the “frame” is the left hand column and the rest of the page is the right hand column.

Does this help? Feel free to bug me if not.

Cheers, Larissa

Answer #2, 1:52 pm

Just say (scrolling=“no”), but beware that you may be alienating some laptop or small display users.

Cheers! Lisa

Answer # 3, 2:11 pm

The SV Webgrrrisebgrrls site does it by setting:

frameborder=“0” framespacing=“0” border=“0” in the frameset tag
scrolling=“NO” and frameborder=“0” in the frame that shouldn't scroll

The joys of ‘view document source’! Just be sure that if you set no scrolling, your frame is short enough that people with small &/or low-resolution monitors will get the whole frame. Otherwise I've been to sites where some of the choices were invisible and unaccessible. Annelise

Answer #4 2:16 pm

Put frameborder=“no” border=“0” in your frameset tags. And doublecheck that scrolling=“no” OR “auto” but NOT “yes”.

hth, karen

Answer #5, 2:24 pm

as in this FRAMESET code snippet from the webgrrls site, if using frames, set your marginwidth and marginheight and frameborder to “0”. and to avoid the scroll bar set scrolling to “NO” (or “AUTO”).

```
<frameset rows="112,*" cols="550" frameborder="0" border=0 framespacing="0"
border="0">
<FRAME src="header/header.htm" name="header" marginwidth="0" marginheight="0" noresize scrolling="NO" frameborder="0">
<FRAME src="news/news.htm" name="main" marginwidth="0" marginheight="0">
</FRAMESET>
```

aaron

At first glance, this exchange may seem unremarkable. What is significant, however, is that within the space of two hours, Linda was able to get five answers to a technical question from people completely disconnected to her work site. For someone just

entering the field, this kind of immediate community provides an important opportunity to learn and expand their knowledge. For people constantly dealing with rapidly changing technologies, new design techniques, and new software, such an immediate community of practice was invaluable for staying on top of new developments and recent trends. The value of the online community was also evident in discussions of overall web design and artistic content, as in the following exchange:

Message 1: 8/11/99 3:38 pm

Hello:

I just finished the web design (html, graphics) for this corp site and it's on the temporary URL at [web address]. I would like to hear your feedback on the design and compatibility of different resolutions and browsers. The content is not rich yet coz we will add it later. (Don't mind the 2 broken links of job opportunity and board of advisors.)

Thanks! Nancy

Message 2: 8/12/99 3:36 pm

Hi all:

I would like to Thank Molly, Moshe, Laurie, Linda, Mark, Kim, Dawn, Annelise, Lisa and Doris (hope not to leave anyone out). I really appreciate your feedback on [company] site. You really point out something that I overlook. I am glad that some of you still use Netscape 3 which I totally forget about its' limitation of supporting cell bg image. That's why for NN3 user you only see my page in black background instead of the bg image that I create. I added bg color to solve the problem although my cell bg image is the central of my design of the site. For the rest of the problem that you mention, I am working on them and hopefully will have them done soon.

I am really happy to hear from you so soon and all your feedback are really really helpful....Especially those positive ones, really boost my confidence up.

^_^ Nancy

In this exchange, it is clear that within 24 hours, Nancy had substantive feedback from at least ten different people *not in her workplace* who were able to give her feedback and advice on improving her work. As these exchanges demonstrate, the list tended to be very open, with people very candid about sharing their skills and resources, and developing the skills needed to be successful in their efforts.

Although the answers to these questions could in theory have come from people located anywhere in the world (people are not required to specify their location when signing onto the listserv), in practice this is unlikely to have happened. The vibrancy of the listserv, which was essential for the rapidity of response to these questions, is rooted in the specific social practice of working in Silicon Valley. Most of the communication on the listserv was in fact related specifically to Silicon Valley, with specific technical questions actually forming less than 20% of messages sent on the list. The vast majority of communication through the listserv was rooted in a broader shared set of social practices and common repertoire of discourses that could only have emerged through living and working in the Valley.

The types of messages sent on the listserv can be divided into six broad categories. These categories are shown in table 2 (see over), along with their frequency from a month-long sample of messages in a typical month in 2000:

1. *General technical questions and discussions*—This category included messages of a technical nature that might be of interest to the whole list, including questions about particular software packages, web resources, or sources of information. It might also include discussions about changes in the industry or trends in technology.

Table 2. Content of Silicon Valley Webgrrls listserv, September 2000.

Category of message	Number of messages	Percentage of messages
1. General technical questions/discussions	162	26
2. Specific technical questions/answers	92	15
3. Events/resources/courses	77	13
4. Career/business advice	92	15
5. Jobs offered/available for work	87	14
6. Nonwork related	105	17
Total	615	100

Most frequently these messages related to companies located in Silicon Valley or products being developed in the Valley. This sharing of information provided important opportunities for people to stay up on industry trends, or monitor information resources that may be useful for them in the future. It also ensured that new developments and technologies in the region rapidly diffused to all members of the community.

2. *Specific technical questions*—These were messages in which someone was asking for assistance on a specific technical problem or issue or were asking for feedback on a particular web page design question. Typically the issues being discussed were narrow and highly technical in nature, and less likely to be of general interest to the entire list. These messages were responded to more frequently offline, but there were also a significant number that were replied to directly on the entire list. These messages were typically sent by people in immediate need of feedback in order to complete a task they were working on. They lacked the necessary knowledge, and were turning to an online community of over 1200 people in a similar occupation with similar skill sets but working in different firms who were able to help them with finishing the required task. In most cases, people received responses within a matter minutes or hours.

3. *Events/resources/courses*—These were messages that were not asking for any response or interaction, but were simply people sharing information or resources that they thought might be useful to the entire list. Many of the resources that were listed in this category were other websites providing useful information for people, for example an online resource directory for mentorgirls.org, or webreference.com which provided up-to-date information on the latest happenings in web development. Other notices, however, were of local presentations, meetings or conferences that were likely to be of interest to the list. Thus, for example, members would share information about an upcoming local presentation on “China’s Digital Futures”, or “On-line Privacy: Can We Have It?” Again the sharing of this information through the online community helped ensure rapid diffusion of innovations in the regional network, helped members stay on top of emerging trends in their field, and provided opportunities for more informal face-to-face communication.

4. *Career and business advice*—These messages were oriented towards nontechnical issues that might improve members’ career opportunities or their ability to generate improved compensation or working conditions, either as independent contractors or as employees. This might include a woman asking for advice in preparing for her first annual review with a new employer, or someone asking for feedback on her resume, or someone looking to change careers asking for advice on how to get started in web design. The majority of advice in these types of messages is highly specific to Silicon Valley, such as the plusses and minuses of working for a small, venture-capital-funded start-up firm, or negotiating over stock options. Furthermore, the local culture of open labor markets underpins a great deal of the advice being given. Sharing information

about career opportunities within the regional labor market helps build trust and mutual engagement of members of the association, while helping people make the most of the experience, skills, and networks that they had. Without the fear of internal consequences or even reprisals within their place of employment, members were open about sharing detailed information on work practices and employment experiences in a variety of firms in the Valley. This also helped provide important mobility channels for newcomers in the field.

5. *Job matching*—These messages consisted of employers and recruiters announcing positions that they had available, or SVW members who were available and looking for work posting their resume. In nearly all cases, the SVW list was simply one of many channels that these employers used to try to recruit workers, and that workers used to try to find employment. Nonetheless, employers found the concentrated group of people with similar skill sets an important recruiting channel. This job-matching function of professional associations and other intermediaries plays an important role in improving the efficiency of labor-market adjustments in the region (Benner, 2002).

6. *Non-work-related messages*—These messages, which formed a significant portion of messages on the list, provided an important environment for creating community. They reflected the melding of work and personal life that is so much a part of the culture of Silicon Valley. Examples of messages within this category included people sharing information about housing opportunities, recommendations of various professional services (for example, tax attorneys, divorce lawyers, babysitters), recommendations for leisure opportunities (for example, bed and breakfast recommendations, massage therapist referrals), restaurant recommendations in San Francisco and the Napa Valley, someone offering kittens to give away, and so on.

These non-work-related messages may seem trivial from an economic development perspective, but in fact they were a critical component of building the learning community in the organization. They formed a significant portion of traffic on the listserv—roughly 15–17%. Personal interviews with SVW members confirmed that many found these personal messages an important and valuable part of building the sense of online community. The interaction on non-work-related issues helps build the trust that facilitates communication on the range of work-related issues that comprised the rest of the online communication.

Lessons from Silicon Valley Webgrlls

When it was fully functional, SVW brought together a community of 1200 people in the Silicon Valley involved in one way or another with Internet development and web design. The information flows that were sustained by the organization provided an important means by which members learned new information to be able to perform their work more effectively, apply new technologies, and stay up on industry changes. It provided an important avenue for newcomers in the occupation to gain access to the information flows that are so essential in the field—essentially creating the ‘legitimate peripheral participation’ that Lave and Wenger (1991) argue is so essential for effective learning to take place. In an environment in which social networks have worked to exclude women from positions of influence in the core of the region’s high-tech agglomeration, SVW provided the information resources and social networks to help promote their members careers effectively.

The majority of members in SVW were in mid-level positions in the region’s high-tech agglomeration. By and large, they were not the engineers, entrepreneurs, and computer professionals that dominated new start-up firms in the rapidly growing Internet industry at the time. The skills and knowledge they had, however, was a

critical component of the Internet industry's rapid growth in Silicon Valley at the time. Web-design skills were in high demand, and the ability of firms in the region to have a significant number of newly skilled workers to develop websites and new web-based products and services rapidly was a critical component of the region's success story. By providing an accessible and identifiable learning community, SVW provided a critical community for newcomers to the industry rapidly to learn and update the skills and knowledge they needed to contribute effectively to the industry's growth in the region. Critically, the contribution to the region's economic development was not primarily directly in *developing* new products and services, but in ensuring the rapid learning of the skills required to bring new products and services to market through a new medium.

The high levels of trust, openness, and organized incorporation into the community, built through the combination of in-person and online communication, was a critical component of the organization's success. Though there were other associations of web developers in the region,⁽⁶⁾ SVW was one of the most prominent, with the most active public listserv and monthly meetings that routinely drew two to three times the attendance of other associations. The importance of the association to the entire industry, not just to women workers in the industry, was reflected in the attendance at monthly meetings—which typically included roughly one-third men—and the contributors to the listserv, which included dozens of men. Several of the most prominent male contributors to the organization said in interviews that they found it to be the most useful organization in the regional industry complex.

The difference in vibrancy between SVW and these other associations also highlights the fact that the existence of a professional association does not guarantee the development of effective learning communities. Such communities have to be rooted in extensive, interaction communication, in which people recognize themselves as part of a coherent community that gives meaning and structure to the information shared through the organization. SVW was able to develop a particularly high level of trust, rooted in a combination of face-to-face and electronic communication, and shaped by the social practice of working in Silicon Valley.

Thus, overall, SVW played a critical role as an organizational infrastructure that promoted the development of cross-firm learning networks, helping innovations diffuse through the regional economy, and ensuring the rapid development and deployment of new products and services. In essence, this formal organization helped sustain cross-firm communities of practice that contributed significantly to the learning of its members and thus contributed to the economic vibrancy of the region.

5 Implications for regional economic development theory and practice

Clearly one should be cautious about making too many generalizations from a single case study, and there are clearly certain aspects of SVW that make it unusual. Nonetheless, there are many professional associations in Silicon Valley with similar organizational structures, combining monthly meetings with online communications, creating learning communities for their membership and providing an organizational infrastructure for the development of strong social networks. These organizations grew significantly in the 1990s, and have become a more formal support for the informal social networks that have always been critical in the region's economic development. The in-depth examination of learning processes in a single case study does provide important insights into broader processes of economic learning that are missing from existing research in the field. The purpose of

⁽⁶⁾ Including the Silicon Valley Web Guild (<http://webguild.org>) and the HTML Writers' Guild (<http://www.hwg.org>).

this in-depth examination of SVW was twofold. First was to provide insights into how interpersonal communication helps build the human learning process and thus contributes to economic development in the region. Second was to provide insights into the ways that formal organizations focused on human networking (not business networking) can provide an important basis for economic development in the region. SVW provides a particularly interesting context for exploring these questions, given its basis in a newly emerging (though obviously critically important) industry, and its membership in a mid-level occupation in the Valley, rather than the upper end of the labor market.

Research on economic learning processes has typically focused on organizational learning processes, such as technology transfer and research and development. The analysis presented here, however, suggests the need for a greater focus on the workforce and the organizations that support human learning processes, rather than on firms. Placing the focus of learning on social participation in cross-firm communities of practices has broad implications for what it takes to understand and support learning. As indicated above, at an individual level, learning as social participation directs our attention to the processes by which people become part of, engage with, and contribute to the practices of their communities. The case study of SVW demonstrates that professional associations can be an important means for supporting the development of such communities of practice.

It is important, however, to recognize that it is the communities of practice themselves, not the organizations, that are critical. Communities of practice are fundamentally informal and self-organizing, and thus do not lend themselves well to formal organizational structures. The very effort to institutionalize communities of practice may constrain their ability to function, grow, and change. Yet communities of practice also require infrastructure to flourish, including the technological and material resources for communication, interaction, and engagement in their social practices. Supporting communities of practice, however, is not easy, because it involves identifying and sustaining the interconnected communities of practice that make the organization effective and valuable as an organization (Wenger, 1998, pages 7–8). Within the context of single firms, Wenger and Snyder (2000) discuss the considerable challenges businesses face in recognizing and supporting such communities of practice (Wenger and Snyder, 2000). The challenge for firms is to identify those communities of practice that will enhance the company's strategic capabilities, provide the infrastructure that will support the communities and enable them to apply their expertise, and use evaluation methods that can make visible these complex relationships between activities, knowledge, and performance.

Clearly it is firms that ultimately translate human learning into products and services sold in the market, but the learning that takes place in cross-firm communities of practice is also critical for economic learning. Furthermore, there are reasons why learning in such cross-firm communities of practice may be superior in particular ways to within-firm learning in the region. One factor has to do with the importance of incorporating newcomers into the community of practice. With the growth in more contingent employment relationships and 'boundaryless' career paths, firms are frequently reluctant to hire people without extensive experience in the field, and less experienced workers find it difficult to navigate successful employment opportunities in these highly complex labor markets (Benner, 2002; Carnoy et al, 1997). Professional associations, such as SVW, provide a highly visible and accessible entry point for newcomers to become integrated into regional social networks. This transparency is a critical component of increasing participation in communities of practice (Lave and Wenger, 1991). A second factor contributing to the free flow of information and learning in cross-firm networks is the lack of hierarchy in the organization. As Jocoy (2003)

points out, the divergent interests between managers and employees can hinder the development of effective workplace learning environments (Jocoy, 2003). To learn and innovate effectively, workers must feel motivated and be engaged in meeting the firm's goals. The inherent power dynamics that exist in the employer–employee relationships can make this difficult to maintain at times, as management faces constant challenges in building appropriate 'consent' within their workforce. This becomes a particular challenge as changing employment contracts (both formal and psychological) are decreasing the levels of loyalty between firms and their employees (Arthur and Rousseau, 1996; Rousseau, 1995). To the extent that many workers increasingly see successful careers as not being rooted long term with their current employer, but instead being rooted in their 'portfolio' of personal skills and in their networks of social relationships, career development is rooted more in regional industrial complexes rather than firms. Thus people can be highly motivated in creating strong communities of practice through professional associations, and investing in the learning environment there, while being constrained sometimes in their own work environment. In essence it is the shifting social networks over time, not their employers, that provide long-term career opportunities that shape their ability to learn over time.

Recognizing the value of regional communities of practice, and the organizational infrastructure that supports them, has important implications for regional development policy. The challenge is to identify cross-firm communities of practice that can enhance a region's strategic capabilities, provide infrastructure to support those communities, and evaluate their contribution to regional learning and economic performance. In addressing these challenges, paying particular attention to the activities of professional associations and other occupationally based groupings may prove highly productive, as the case study of SVW suggests. Such an approach might have three fundamental objectives. First, identify the existing cross-firm communities of practice that make learning possible. Second, provide organizational support to help sustain and expand these efforts, and improve their linkages with other institutions, most particularly community college, university extension programs, and other institutions of adult education. Finally, help these organizations expand access to other workers, such as through the creation of expanded apprenticeship and mentorship opportunities.

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