Complementary Capabilities in Dynamic Environments: The Evolution of Professional Services in Information Technology Product Firms

by

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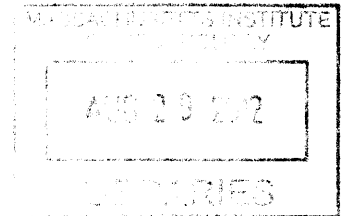B.S. in Electrical Engineering, Purdue University, 1984

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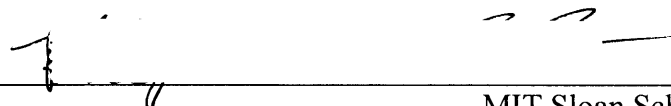MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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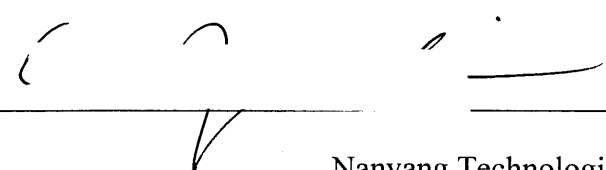
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ABSTRACT

The innovative firm must continually evaluate its boundaries – decisions often shaped through make-buy-partner evaluations and choices about where to define the firm's competences. Building off of earlier work that suggests heterogeneity in types of organizational competences, I submit that a firm's portfolio of organizational capabilities map across three states: core, supplementary, and complementary. Core capabilities are the defining competences that are imprinted during the founding and formative years of the firm. Persistence in the core often leads to inaction and failure. Supplementary capabilities may form after the firm establishes its core and whose origins are traced to diversification expansion events. Complementary capabilities may form at founding and/or as managers detect competence gaps during changing conditions. Complementary is activated primarily to increase the value of the core.

Given the firm as a portfolio of heterogeneous competences, the dissertation's focus is on when, why, and how the established innovator activates new complementary capabilities in dynamic environments. The context is hardware product vendors within the Information Technology (IT) industry and the complementary organizational capability is the business of professional services – e.g., consulting, systems integration, and custom implementation.

Considering the expansion into professional services as a type of related diversification, the first paper uses panel data of U.S.-based IT product firms from 1987-2008 to explore the industry-level patterns behind the expansion into complementary services-centric domains given the core expertise in R&D-centric activities. I find that product firms who were diversified into more complementary R&D-centric activities (e.g., software) were more likely to diversify into complementary professional services – suggesting that professional services are part of a larger architectural/portfolio enablement strategy.

The next part of the dissertation explores this phenomenon further by examining the process by which two innovative firms activate new complementary capabilities using polar-opposite dominant models: EMC preferred to "make" while Cisco preferred to "partner." Both case studies emphasize the process and unique dilemmas with the activation and evolution of complementary capabilities from 1995-2010, an era marked by continuous technological change and market uncertainties. I conclude with a discussion of the common patterns across these two firms and managerial implications.

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1 Introduction

This dissertation is about *innovators*, but not so much about *innovation*. I examine the strategy of innovators although not directly about how they create new innovations. I explore a fast-paced industry that rewards firms for innovation, yet I find that some innovators will monetize their existing know-how in the form of a professional services business. While professional services are an important value chain activity in markets for enterprise customers who deploy products in very complex ways, the monetization of these services does not result in exponential revenue growth or significant profit opportunities for the innovator. However, these services are related and complementary to the core innovation activities of the firm.

This presents an interesting puzzle for the innovator. On the one hand, professional services solve a very basic functional problem in markets where complex products are deployed. Some innovators are investing billions of dollars in such capabilities today. On the other hand, some industry leaders believe a growing services emphasis is a sign of weakness that provides a false sense of security for the innovator. I explore this puzzle and contribute to two research communities.

I contribute to the strategic management community who is currently seeking further insights into how firms renew and reconfigure their organizational capabilities in fast-changing environments. My setting is the information technology (IT) industry, a constantly changing context (Brown & Eisenhardt, 1997). By focusing specifically on professional services as a complementary capability in this setting over a dynamic 15-year period, I find that the firm manages its capabilities across three states: core, supplementary, and complementary. The core is the most distinctive set of capabilities that are persistent, closely tied to the firm's identity, and can be traced back to the original founding of the firm (Prahalad & Hamel, 1990). Supplementary is the state where new business expansion opportunities spring from. Supplementary capabilities can be traced back to diversification events. Complementary is the state of distinctive activities whose primary function is to reinforce the value of the core. I find that since the firm's core persists and is prone to become rigidities (Leonard-Barton, 1992), young aggressive innovators are more likely to reconfigure their supplementary and complementary capabilities in order to adapt in dynamic environments.

I contribute to the innovation management community. While the dissertation acknowledges the prior work on technological change, the focus here is on how, when, and why innovators will activate complementary professional services as a strategic option. This community has made great strides in understanding how innovators search for new technological paths to pursue (Fleming, 2001; Katila & Ahuja, 2002; March & Simon, 1958). Yet this conversation has seen only a few studies that consider why the innovator extends search in the direction of new low-margin complementary services (Davies, 2004; Fang, Palmatier, & Steenkamp, 2008; Suarez, Cusumano, & Kahl, forthcoming). The scope of profit opportunities has been confined to commercializing a product or licensing patents. I find that as young innovators diversify into new opportunities, they begin to activate and monetize new complementary capabilities in professional services. I also find that these complementary service capabilities are indeed part of the innovation conversation since they are usually tightly-coupled with the core technological capabilities.

2 Conceptual Model and Research Setting

The dissertation explores the emergence and evolution of professional services within Information Technology (IT) product companies. This phenomenon has received the most attention in the context of IBM's transformation under the leadership of former CEO Lou Gerstner during the 1990's (Gerstner, 2002). I argue in the remaining chapters that exploring this phenomenon helps us understand more deeply two areas of concern for the innovator. First, the dissertation seeks to contribute to the strategic management conversation on organizational capabilities in dynamic environments. When, where, and how firms navigate during fast-changing conditions is of interest to managers and the academic research community. This conversation has attracted a large and enthusiastic academic audience over the last two decades, yet many questions remain open. Where do capabilities come from? How do they emerge? Are all capabilities path-dependent back to the founding years? How does the firm reconfigure its capabilities in dynamic environments?

Second, the dissertation seeks to contribute to the conversation about how firms organize for innovation, specifically with an interest to examine how services become part of the innovator's arsenal for competition and value creation. This particular area of organizing for innovation has been active in practitioner circles,[1] yet has received little attention within the strategy and innovation academic communities where empirical work has focused on the upstream parts of the value chain such as in scientific research, product development, and manufacturing activities. This chapter provides a brief overview of the strategic management literature on organizational capabilities. The emphasis is on highlighting the current state of the conversation on capabilities in changing environments. While some authors have made provided a loose taxonomy of capabilities existing as either core (Leonard-Barton, 1992; Prahalad & Hamel, 1990) or complementary (Teece, 1986), I propose that capabilities are not so dichotomous. I offer a conceptual model that shows how an organization's capabilities may reside in one of three states: core, supplementary, and complementary. Moreover, an organizational capability may straddle across two states simultaneously. I suggest that this world view provides more clarity on the heterogeneity of organizational capabilities and such a framework will help us understand further how firms adjust their portfolio of capabilities during

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[1] Since the dot-com crash, several large acquisitions of professional services firms have been announced by

periods of change. I conclude the chapter with a description of the research setting for the dissertation.

2.1 Perspectives on organizational capabilities

2.1.1 What are they and how do they matter?

Strategic management scholars have been interested in understanding the sources of competitive advantage for several decades. With the aim of adding more academic rigor to the field, work from industrial organization (IO) economics was transferred into the field of strategic management through a convenient framework that emphasized industry analysis (Porter, 1980). While the work moved the field forward, a key pushback was from scholars who believed that competitive advantage went beyond firm structural barriers – for example, barriers to entry, power over buyers, and power over suppliers. The challenge was to explain how one firm could consistently outperform other firms within a similar structural position.

The resource based view of the firm (RBV) began to coalesce in the 1980's as a theory to argue that performance differences were due to differences in a firm's resources and capabilities (Barney, 1999; Wernerfelt, 1984). RBV scholars trace their roots to earlier work that suggested that a firm's distinctive competences enable it to more productively use its resources than its competitors and hence facilitate competitive advantage (Andrews, 1971; Penrose, 1959; Selznick, 1957). A rubric was proposed suggesting key resources that enable competitive advantage are valuable, rare, difficult to imitate, and non-substitutable (Barney, 1999). Some early work defined resources very broadly as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc." (Barney, 1991: 101). However, most scholars today make a distinction between resources as the firm's assets and capabilities as how well a firm combines and deploys its resources (Amit & Schoemaker, 1993; Makadok, 2001; Schreyögg & Kliesch-Eberl, 2007).

Despite debates about the strength of the resource and capability perspectives (Collis, 1994; Priem & Butler, 2001), two characteristics are commonly agreed upon. First, capabilities are organizational processes that involve coordination and cooperation across multiple people(Kogut & Zander, 1992). The role of an individual leader is necessary but not sufficient. Second, capabilities take time to develop and hence involve a process of learning (Cohen & Levinthal, 1990).

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How capabilities emerge is often an open question (Arikan & McGahan, 2010; Ethiraj, Kale, Krishnan, & Singh, 2005; Helfat & Lieberman, 2002). The origins of new-to-the-firm capabilities come from three viewpoints. One perspective focuses on the distinctive organizational competences internal to the firm such as product development, alliance formation, or strategic decision making (Eisenhardt & Martin, 2000). This perspective is tied very closely to the idea that organizational practices have a historical link back to the founding of the firm (Helfat & Lieberman, 2002; Klepper & Simons, 2000; Nelson & Winter, 1982). This perspective argues that new capabilities make strong use of pre-existing resources and organizational practices.

The next two perspectives take a much broader approach that considers that the firm gains access to new organizational capabilities from external sources. Firms acquire new-to-the-firm resources and capabilities when they purchase other firms (Capron & Mitchell, 2009; Karim & Mitchell, 2000; Lavie, 2006; Puranam, Singh, & Chaudhuri, 2009). Integrating the acquired firm is a very difficult process as different cultures clash and key employees often leave. The net result is that many acquisitions fail to live up to expectations and therefore the new-to-the-firm practices do not mature. However, managers are willing to take this risk when they perceive that internal development will take too long especially in fast-moving technology markets. Finally, the firm can access new capabilities through external alliance partners (Arikan & McGahan, 2010; Kale & Singh, 2007; Rothaermel & Boeker, 2008). While the firm relinquishes some control to its partners, the firm is able to access important value chain activities so that it can focus on its own most distinctive activities in the marketplace.

2.1.2   In dynamic environments

If the assertion that a firm's distinctive competences facilitate competitive advantage, then why do leading firms fail? What can boundedly rational managers do to renew the firm's competitive edge when conditions change? These questions get at the heart of today's conversation concerning firm competences in dynamic environments. In fast-moving settings such as the IT industry, there's a long list of firms who once occupied dominant market positions yet eventually failed as conditions changed – e.g., Digital Equipment Corporation (DEC) introduced the widely popular PDP and VAX minicomputer families; Apollo Computer led the

early workstations market; and Sun Microsystems led the UNIX server market during the dot-com boom.[2]

Despite many areas of debate over the years, there is a general consensus that although organizational practices may persist over time, their value as distinctive competences for competitive advantage may not persist. Some have described once distinctive organizational practices as rigidities and sources of inertia during changing conditions (Leonard-Barton, 1992). Resources and competences tied to technological know-how are subject to erosion over time (Brown & Eisenhardt, 1997; Dierickx & Cool, 1989). For example, managers in the IT industry are well aware that conditions are constantly changing (Grove, 1996). The subject of technological change has been the locus of many empirical studies exploring how capabilities hold up during changing conditions (Abernathy & Utterback, 1978; Christensen, 1997; Tushman & Anderson, 1986).

A large audience in the strategic management community has coalesced around what has been called dynamic capabilities (Teece, Pisano, & Shuen, 1997). Although the definition has been a topic of debate for many years, the essence of dynamic capabilities is about how the firm is able to reconfigure and renew its organizational practices such that they continue to maintain a distinctive relevance that facilitates competitive advantage for the firm (Eisenhardt & Martin, 2000; Winter, 2003). Rather than getting hung up on definitions of dynamic capabilities, recent scholarship is pushing towards getting back to the central themes of this topic: organizational capabilities in dynamic environments (Arikan & McGahan, 2010; Schreyögg & Kliesch-Eberl, 2007). This dissertation is aligned with the latter.

The current focus of this conversation has been on the dynamics of *pre-existing* organizational practices. For example, the diversifying firm can reap an advantage where existing resources and competences are valuable for a new market (Helfat & Lieberman, 2002; Klepper & Simons, 2000). While recent frameworks highlight the need for new competences during changing conditions (Helfat & Peteraf, 2003; Lavie, 2006), the origins of new-to-the-firm organizational capabilities remains an open question in this conversation.

Given that an established firm is very likely to expand into new markets and businesses, new organizational capabilities are likely to follow as the firm deploys new resources. Some of

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[2] Failure here means that the firms lost so much market value that they eventually became acquisition targets.

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the new opportunities may build off of existing resources and competences (Helfat & Lieberman, 2002), but the firm may expand into new businesses by acquiring firms that extend the firm's resource base in new directions (Karim & Mitchell, 2000). As the firm extends its resource base, new organizational capabilities can form. Business expansion is a fundamental application of the resource based view of the firm and is formally studied through the literature on diversification strategy (Penrose, 1959; Rumelt, 1982; Teece, 1982). The dissertation argues that the tools from the diversification literature will help facilitate a deeper understanding of when, where, and how new organizational capabilities form.

2.1.3 Heterogeneity and how it matters

The firm has a portfolio of organizational competences, and not all are created equal (Dierickx & Cool, 1989). One taxonomy distinguishes between organizational practices that are core to the firm (Prahalad & Hamel, 1990) and those that are complementary (Teece, 1986). While I describe my research setting in more detail later in this chapter, this taxonomy is the most appropriate *starting point* for the dissertation. If we accept that the firm can access new-to-the-firm capabilities via internal development, acquisitions, and alliances, then the taxonomy of core and complementary is incomplete. For example, Cisco has acquired over 140 technology firms since 1993. Each target has resources and organizational competences that Cisco seeks to maintain and recombine with its existing practices.

I propose that such diversification expansion events enable the firm to develop new organizational competences that fit into a third category that I am calling *supplementary*. I suggest that the origins of new supplementary competences can be traced to diversification decisions.

Key to my proposed states is to consider the lifecycle of the firm itself. A new start-up firm's primary concern is how to establish a compelling market presence in the face of severe resource constraints (Aldrich & Auster, 1986; Stinchcombe, 1965). The entrepreneur seeks to maximize the firm's chances for success by forming a strong founding team, mobilizing resources, and developing its new innovation (Roberts, 1991; Shane, 2004). If the new firm develops a distinctive market presence, the firm transitions into a young, established firm. Once established, the firm is more likely to consider when, where, and how to expand – i.e., diversify – into new business opportunities (Penrose, 1959; Rumelt, 1982; Silverman, 1999). While

diversification expansions are considered to be either related or unrelated to the core business of the firm, the general consensus is that the firm is more likely to expand into related areas where it can develop synergies with existing resources and competences (Palich, Cardinal, & Miller, 2000).

Given that the firm can make, buy, or partner for organizational capabilities, I suggest that the taxonomy – core, supplementary, and complementary – will help us understand more deeply how the firm can manage its portfolio of capabilities in dynamic environments. The dissertation focuses on complementary capabilities. Table 2.1 highlights the three states and the key distinguishing characteristics. During the firm's lifespan, I suggest that organizational competences will map to one state, occasionally occupy two states, and sometimes transition between states. Each competence may co-evolve with a revenue-generating business unit of the firm but is not necessarily tightly coupled to it.

Using the taxonomy, I will provide an example. Apple Computer launched its iPod mp3 player in 2001 as a supplementary business. The firm's *supplementary* organizational competence in mp3 product development grew stronger as they expanded the product line to include the iPod Mini, Nano and Shuffle editions by 2005. With connectivity to either a Mac or Windows PC via iTunes, the iPod became more than just a complementary product for the Mac. In 2007, the firm signalled that they had become more than just a computer company (core capability) who had diversified into mp3 players (supplementary capability). In January 2007, the firm announced the launch of the iPhone and simultaneously changed its formal name from Apple Computer, Inc. to Apple, Inc. – a sign that it had reshaped its core competence from computer product development to consumer electronics product development. The latter designation established synergies across multiple product businesses inclusive of computers, mp3 players, smartphones, and eventually tablets.

Table 2.1. Three states of organizational capabilities

	Core	Supplementary	Complementary
Governance structure	Own	Own	Own or partner
Coupling with the core		Uncoupled or loosely-coupled	Tightly-coupled or loosely-coupled
Origins	During founding and formative years	Usually after the core is established	During founding
	Occassionally other capabilities transition to the core		Later at managers' discretion
Number	One to few	Zero to many	Zero to many
Lifecycle	Persistent	Varies	Ones at founding likely persistent; ones after founding may vary
Entry event	Firm founding	Diversification entry (related or unrelated)	Firm founding; *related* diversification entry; partnership contract
Exit event	Firm exit event (failure or acquired), or changing conditions	Firm exit event, divestiture, end of life, or changing conditions	Firm exit event, divestiture, end of life, contract termination, or changing conditions
Optimizing for	Performance (revenues and profits), brand, competitive advantage, and relevance in changing conditions	Primary: performance (revenues and profits), economies of scope, portfolio advantage	Primary: increase the value of the core (and/or the supplementary)
		Secondary: added value to the core	Secondary: modest performance contribution
Risk in dynamic environments	Potential source of inertia during changing conditions	Starved for adequate resources; resource integration problems	Perceived misalignment with the core

Core capabilities

These organizational practices are the primary distinctive competences of the firm ((Andrews, 1971; Prahalad & Hamel, 1990). These practices are housed within the firm and a clear path dependency back to the founding and formative years of the firm is evident. These few distinctive practices are imprinted by the founding team and most likely will persist during the life of the firm – for better or worse (Leonard-Barton, 1992). These practices serve as the internal and external brand identity of the firm. Occasionally, a new competence will enter the core, but only after an extended intentional or unintentional vetting period. Apple's success with the iPod was so strong that the firm changed its formal name before *shipping* the first iPhone. The Microsoft Office suite of applications began as part complementary and part supplementary

but eventually became part of Microsoft's core identity and competence portfolio. The biggest risk with core capabilities is that they often lose their relevance during changing conditions whether it be changes in technologies, competitive responses, customer behavior, or macro-economic conditions. These firm-defining distinctive organizational practices have dominated the conversation in what capabilities are and how they matter.

Supplementary capabilities

The entrepreneurial venture is constrained for resources and most often is only able to focus on a single business. Once the firm is established, the management team is more apt to look for new businesses to expand into. Given that the firm is more likely to expand into related areas where it can leverage existing resources and competences (Helfat & Lieberman, 2002; Klepper & Simons, 2000; Palich, Cardinal, & Miller, 2000; Tushman & Anderson, 1986), the new areas are not likely to uproot or substitute for existing core competences but rather to build off of existing organizational practices. The firm's portfolio of organizational competences will likely change and evolve with the firm's portfolio of product businesses (Helfat & Raubitschek, 2000).

Early work on diversification strategy is closely linked to the development of the resource based view of the firm (Penrose, 1959; Rumelt, 1982). Much of the diversification conversation cites resource similarity as the mechanism that enables synergies between the existing core business and the new expansion business. However, managers will also consider how to diversify into new areas that have no path-dependent linkages to pre-existing organizational processes by acquiring resources and capabilities developed by other firms (Capron & Mitchell, 2009; Karim & Mitchell, 2000; Puranam, Singh, & Chaudhuri, 2009).

These classic diversification entries become an opportunity for the firm to develop new organizational competences – some tightly-coupled to new product businesses but not so in all cases. I refer to these new competences as supplementary capabilities. Supplementary competences are owned by the firm and have a chance to make a significant contribution to revenues and profits. As conditions change, supplementary opportunities may transition into core activities for the firm. For example, Intel's core competence was in developing dynamic random access memory (DRAM) chips during the 1970s when it introduced the microprocessor

as a supplementary business. Eventually, the microprocessor business became the core competence of the firm when it exited the DRAM business (Burgelman, 1994).

Given that entry is a diversification expansion event, the biggest risks are often due to the difficulty from integrating the new business especially in the case of entry via acquisition. Another risk for the supplementary business can stem from the lack of resources. When resources at the corporate level are prioritized for the core activities first, the growth of a promising supplementary business may be constrained. Many intrapreneurial opportunities become ideas for entrepreneurs when not adequately nurtured within the originating firm. For example, Xerox is a classic case of missed technological opportunities from their Palo Alto Research Center (PARC) resources and organizational competences that never materialized into businesses or competitive advantage for Xerox (Smith & Alexander, 1999). For technological search, innovators need not co-locate a new technology venture alongside the core activities of the firm. With Xerox headquarters located in New York, PARC was set up far away in California to pursue supplementary opportunities as an uncoupled think tank to the core copier business back in New York.

Complementary capabilities

Similar to supplementary capabilities, complementary organizational practices serve as yet another state that is viewed through a different lens than the core practices of the firm. The key takeaway is that complementary capabilities are activated primarily to increase the value of the core activities of the firm. They may be as simple as physical resources such as coal reserves in the petroleum industry (Helfat, 1997), functional organizations such as sales and marketing (Helfat & Lieberman, 2002), or organizations with revenue-generating products and services (Gawer & Cusumano, 2002; Milgrom & Roberts, 1995). When complementary capabilities map to revenue-generating businesses, a secondary purpose is to provide a modest revenue contribution although the primary purpose remains to support the core business and/or a supplementary business.

Unlike core and supplementary capabilities, complementary capabilities can either be owned by firm, sourced externally from alliance partners (Rothaermel, 2001; Teece, 1986), or leveraged from IT software development communities (Dahlander & Wallin, 2006).

Research on complementary resources and capabilities has added another dimension to our toolkit on what is needed to extract value from an innovation (Milgrom & Roberts, 1990; Milgrom & Roberts, 1995; Teece, 1986). For example, most inkjet printer vendors make their profit from selling complementary components such as paper and ink rather than from the printer itself. This is a very common form of a razor-blade business model which fundamentally highlights the importance of the complementary components.

The economics literature classifies products as either substitutes or complements to the firm's focal product line. The more sales of a substitute product translates into fewer sales of the focal product. On the other hand, the more sales of a complementary product results in more sales of the focal product (Milgrom & Roberts, 1990; Milgrom & Roberts, 1995). By introducing a valuable complementary product, the firm subsequently enhances the economic value of the primary product (Porter, 1985). Below I highlight prior ways that complementary resources provide value for the innovator.

Incumbent survival

Where earlier research in innovation studies showed how incumbents often failed when new entrants introduced competence-destroying disruptive technologies, later research in the typesetter industry found that incumbents who possessed complementary resources (proprietary font library) and capabilities (sales/service network) that remained valuable alongside the new disruptive technology lowered their risk of failure from the disruptive technology (Tripsas, 1997). Work in the bio-pharmaceutical industry found that incumbents who were able to access valuable complementary capabilities owned by alliance partners were also able to survive disruptive changes in the industry (Rothaermel, 2001).

Diversifying entrant advantage

Later research began to show that diversifying entrants are in an advantaged position when they possess pre-existing resources and competences (core and complementary) that are relevant in the new market opportunity (Mitchell, 1989; Montgomery & Hariharan, 1991; Rumelt, 1982; Taylor & Helfat, 2009). Radio producers were found to be more innovative and outperform non-radio producers as both entered the television industry, which suggests that pre-existing experience in radio production became a valuable complementary organizational

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capability in the television industry (Klepper & Simons, 2000). In a study of generic pharmaceutical drug entry, firms were more likely to enter generic drug markets that relied on existing complementary resources and capabilities such as similar methods of manufacturing, similar suppliers, and similar sales distribution channels (Scott Morton, 1999).

Platform leadership

Innovative firms who are able to create and attract a vibrant ecosystem of complementors can reap the benefits of positive network effects. With few technological differences between VHS and Betamax, the VCR format battle was eventually determined based on the large availability of complementary products in the form of prerecorded tapes for the VHS format (Cusumano, Mylonadis, & Rosenbloom, 1992). One of the four principles for platform leadership concerns the focal firm's ability to attract complementors to innovate in ways that the focal firm could not imagine (Gawer & Cusumano, 2002). The more complementary products, the more customers are attracted to use the platform and hence the more powerful the platform becomes.

Post dominant design

The work on dominant designs shows how the locus of innovation differs before and after the emergence of a dominant design (Abernathy & Utterback, 1978; Utterback & Suárez, 1993). Product innovation drives the pre-dominant design era while process innovation drives the post-dominant design era. Put another way, the innovative firm's survival post-dominant design is correlated with its ability to drive its costs down as the basis of competition becomes price. The value of complementary competences in manufacturing and production greatly increase as they become a key mechanism by which the firm drives product costs down.

The dynamics of complementary capabilities

In Table 2.1, I highlight the differences in new-to-the-firm capabilities. While organizational competences take time and require learning, the seeds of their formation can be traced to prior events where strategic intent is signaled and resources are mobilized. For core competences, the process begins during the early formative years of the firm (Nelson & Winter, 1982; Teece, Pisano, & Shuen, 1997). The formation of supplementary competences can be

traced to diversification events – whether internal development, organic hiring, or acquisition. Complementary competences may form during the founding of the firm. For example, functional organizations such as sales, marketing, and manufacturing are important parts of the initial commercialization process. However, the intent to access complementary competence may also be traced back to diversification-like expansion events or alliance formation events.

Complementary competence is not always relevant for the innovator. For example, start-up innovators with an innovation not protected by patents are more likely to mobilize complementary resources to fully commercialize their innovation. On the other hand, start-up innovators with intellectual property such as a strong patent may opt to forgo the commercialization process in favor of licensing the innovation to an established firm (Arora & Ceccagnoli, 2006; Gans, Hsu, & Stern, 2002).

The incumbent firm may also discover that complementary resources are not valuable. As the external context changes over time, the incumbent may find itself stuck with pre-existing specialized complementary resources that are no longer of value within a new technological domain. For example, when calculators shifted from an electromechanical to an electronic technological foundation, the sales and service network was no longer of value because the electronic calculator technology was more reliable and hence required far less servicing (Majumdar, 1982). In a case study examining the shift from instant film photography to digital photography, Polaroid's insistence on a razor blade business model – one where the complementary components are the key profit generators – for its digital imaging technology ultimately meant that the firm did not properly invest in manufacturing capabilities necessary to compete using a different business model (Tripsas & Gavetti, 2000). These examples suggest that the firm has to balance a portfolio of organizational competences – core, supplementary, and complementary. Changing conditions may require new competences to be established and a reconfiguring of existing competences (Lavie, 2006; Taylor & Helfat, 2009).

Recent work suggests that not only do innovative firms have to navigate through technological shifts, but they also face the challenge of how to connect pre-existing complementary resources and competences with new complementary resources and competences in support of the new technology (Taylor & Helfat, 2009). Given that a firm's core competences are more likely to persist during the life of the firm, the movement of non-core capabilities – supplementary and complementary – may help us understand more about how firms adapt in

dynamic environments. In that vein, this dissertation offers a series of studies about the emergence and evolution of complementary capabilities.

2.2 Research setting

To explore complementary capabilities in dynamic environments, I have chosen the Information Technology (IT) industry. This industry is characterized as a fast-paced context marked by continuous technological change (Brown & Eisenhardt, 1997; Eisenhardt, 1989). Moore's Law – the doubling of transistors every 18 months – is the proxy often used to describe the relentless, ongoing march of technological change for this industry. Since the 1980's, the industry structure has shifted from one of centralized systems with proprietary technologies driven by the vertically integrated computer firms to one of distributed systems with open systems driven by specialized and less vertically integrated firms (Bresnahan & Greenstein, 1999). The locus of innovation has also shifted from the computer system as the core and peripheral devices as an afterthought of the systems vendors to one where large firms with market power occupy positions across computer systems, storage, and networking devices – collectively representing the core of the IT hardware sectors. For example, computer networking vendor Cisco Systems was the most valuable firm in the world at the peak of the dot-com boom. During the 1990's, data storage vendor EMC was the best-performing stock of the decade on the New York Stock Exchange.

One area that has been part of an ongoing debate within the IT industry has been the subject of services – not so much about the existence of services, but rather about the role of value-added or professional services within a technology product firm. On the one hand, incumbents such as IBM, HP, and Dell have spent billions of dollars acquiring large professional services companies. IBM stands as a well-known example of a technology product firm who has evolved into a more services-led orientation where services are now a core competence of the firm. Previously, services were a complementary competence in support of IBM's hardware product business and perhaps also a supplementary competence as it also provided a respectable revenue contribution. Gerstner described the services business prior to the Global Services organization as (Gerstner, 2002), "a second-class citizen next to IBM's hardware business."

The initiative to shift services within IBM from complementary/supplementary to core was a difficult transition. Gerstner (2002) states further,

"Still, there were fireworks. Throughout those critical early days, it seemed there was a crisis a week between services and some other IBM unit."

The IBM experience represents the conventional wisdom within technology product firms that services are very important but primarily as complementary to and in service of the core technology-based activities of the firm. This elevated attention towards complementary services relative to the core innovation activities of the firm is often viewed as a sign of weakness for the innovator. During the Internet boom, Microsoft CEO and co-founder Bill Gates suggests that the innovator who begins to shift services from more than complementary has fallen into "a death trap slyly presenting itself as a safe haven from bloodletting product wars."[3] While the entire IT industry was overly optimistic during the dot-com bubble, this sentiment towards services was evident even following the dot-com crash. Sun Microsystems CEO and co-founder Scott McNealy described an increased services position within a technology product firm as "the graveyard for old tech companies that can't compete."[4] These comments do not disparage the importance of services for technology product companies, but rather they reflect a heterogeneity in organizational competences – with services acceptable as complementary with perhaps a limited supplementary role but not as core for the product innovator. However, these services anecdotes from IBM, Microsoft, and Sun Microsystems open up a much larger conversation about what it means to be an innovator, how the firm ought to respond in dynamic environments, and what is the appropriate role of complementary activities such as services.

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[3] "The road to ruin – services," Forbes, Vol. 162, Issue 8, Oct 12, 1998.
[4] "IBM shrugs off loss of contract it once flaunted," New York Times, Sep 16, 2004.
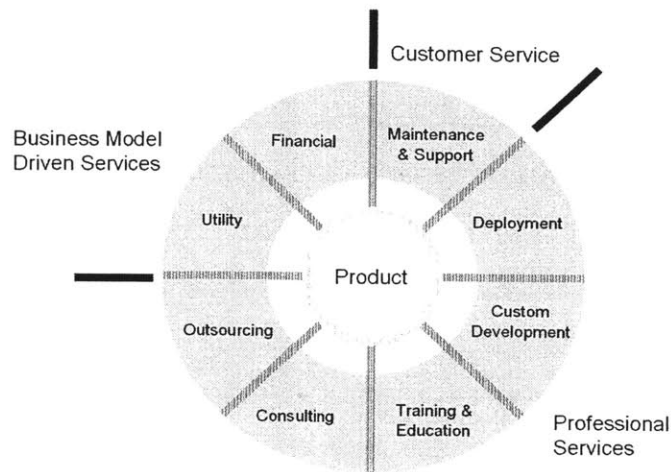
Figure 2.1. IT industry services taxonomy (adapted from Anderson, 2008)

This dissertation focuses on the entry and evolution of complementary organizational capabilities in a very dynamic environment. I begin with a modified version of an IT industry services taxonomy in　　　　Figure 2.1 (Anderson, 2008). While product support services such as maintenance, break/fix, and warranty are the starting point for services at technology product firms, I focus on the business of professional services within IT product firms as the complementary capability of concern for the dissertation. While customer support services are required for the innovator who commercializes a product, professional services are an optional set of complementary value chain activities. At one end of the spectrum, technology product firms are investing billions of dollars in their own professional services capabilities. At the other end of the spectrum are those technology product firms who suggest that over-investing in services is a sign of misplaced priorities for the innovator. This dissertation seeks to explore when, why, and how the innovator's complementary capability strategy emerges and evolves in the context of continuous change. Chapter 3 uses a large sample study to explore this phenomenon across US-based publicly traded IT hardware manufacturers between 1987-2008 through a lens of related diversification. Chapter 4 uses an inductive approach to explore the phenomenon within the EMC Corporation, a data storage vendor, who prefers to "make" yet evolves through a series of make, buy, and partner events. The paper explores how related complementary business expansions that reinforce the core business can be difficult to implement. Chapter 5 uses an inductive approach to explore the phenomenon within Cisco Systems, Inc., a data networking vendor, who prefers to "partner" for professional services. The

paper explores how Cisco evolves its partnering capability while simultaneously increasing its "make" capability as both Cisco and its partners face new market uncertainties and changing conditions. Chapter 6 concludes with a discussion of the common patterns of how EMC and Cisco manage complementary capabilities in dynamic environments.

3 Professional Services as Strategy for IT Product Firms

ABSTRACT

In recent years, technology product companies like Hewlett-Packard, Dell, and Xerox have made multi-billion dollar acquisitions of technology services firms Electronic Data Systems, Perot Systems, and Affiliated Computer Services, respectively. Many speculate that such market moves are driven by the erosion of profit margins in hardware products or the desire to lock in existing customers. Using panel data of U.S.-based IT industry product firms from 1987-2008, the paper examines this phenomenon where product firms diversify into professional services. Rather than a profit erosion story, preliminary results suggest that initial entry into professional services is driven more by the firm seeking to close the gap between product complexity and user know-how. The implications are that diversification into technology services has multiple stages. Initial entry (scope expansion) is to address complexity gaps whereas later acquisitions (scale expansion) are driven by other mechanisms.

Keywords: Diversification, Technology Services, Information Technology Industry

3.1 Introduction

A long debate has been waged for many years as to how and why diversification leads to performance advantages. Central to this debate is the type of diversification: related versus unrelated. The seminal papers in this literature point to the superiority of related diversification dating back to early work by Penrose (1959) and Rumelt (1974). Later framed as a resource-based view argument (Peteraf, 1993; Wernerfelt, 1984), Penrose's view hinges on a firm's ability to leverage existing resources. For example, Apple's early success with the iPad can be partially explained by its ability to leverage existing tangible resources such as the iTunes software application, the user applications ("Apps"), and its existing distribution channels (Apple stores) as well as intangible resources such as its brand reputation. Altogether, Apple appears to be the beneficiary of economies of scope due to its ability to leverage existing resources and capabilities into a competitive advantage (Helfat & Lieberman, 2002; Klepper & Simons, 2000).

Recent work has added to our understanding that economies of scope have a temporal element. For instance, the classic case for economies of scope unfolds where multiple businesses are running in parallel. However, resource similarity may also provide potential scope economies for sequential diversification moves as well (Helfat & Eisenhardt, 2004). When an industry becomes unattractive, the firm may be able to shift its resources into a new market opportunity. For example, Intel was able to leverage its resources as it chose to transition from memory chips to microprocessors (Burgelman, 1994).

On the other hand, the case for an unrelated diversification is often made on the premise of reducing the firm's industry-specific risk. If a firm is diversified across multiple product businesses within a single industry that is no longer economically attractive, the firm may look for a different industry to compete in. However, the firm may be contractually obligated to support a large installed base of customers in the current industry, which prevents it from simply walking away from this less than desirable situation. By diversifying into a new high-growth industry, the firm can keep its prior commitments, subsidize the low performance in its legacy business, and simultaneously position itself for future growth opportunities. This portfolio effect provides the firm with cash flows not correlated with the financials in its existing industry (Lubatkin & Chatterjee, 1994; Palich, Cardinal, & Miller, 2000).

The key assumption behind an unrelated diversification is that the businesses are independent of one another. Hence, practitioners can manage the businesses like a financial portfolio. Former electronics pioneer RCA diversified far from its technological base in the 1970's when it acquired a frozen foods firm, a car rental firm, and a greeting cards firm in the hopes of managing those businesses as independent investments. The potential returns from these unrelated businesses were not enough to prevent the financial decline of RCA.

However, very little research within the diversification literature has considered the case of diversification that is related from a complementarity perspective yet is unrelated from a resource similarity perspective. Moreover, the businesses are co-dependent which breaks a key assumption of unrelated diversification. The paper examines this unique type of diversification that provides neither the scope economies from relatedness nor the portfolio effect from unrelatedness. The paper seeks to solve this puzzle as to why firms would make such a diversification move.

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The diversification scenario outlined above characterizes the phenomenon where manufacturing firms are diversifying into services (Neely, 2008; Oliva & Kallenberg, 2003; Wise & Baumgartner, 1999). The common hypothesis is that diversification into services is driven by the commoditization or the erosion of profit margins in hardware products . Other theories claim that firms move into services to lock in their existing customer base (Shapiro & Varian, 1999). The mixing of manufacturing and non-manufacturing sectors within one firm is difficult to implement (Gebauer, Fleisch, & Friedli, 2005; Gerstner, 2002). Prior related diversification research recognizes that "the service sector requires a different set of skills or knowledge than manufacturing industries" (Chang, 1996). Manufacturing and service sectors are unrelated based on resource dissimilarities along multiple dimensions: managerial logics (Bettis & Prahalad, 1995; Prahalad & Bettis, 1986), organizational dynamics (Farjoun, 1994), and economic models (Gerstner, 2002).

The paper aims to make two contributions. First, the paper proposes a theoretical framework to explain why firms pursue unrelated diversification between businesses that are co-dependent. Prior research argues that portfolio effects are the primary driver behind unrelated diversification among independent businesses (Palich, Cardinal, & Miller, 2000). In the case of co-dependent businesses, I argue that the firm pursues an unrelated diversification not to pursue portfolio effects but rather to close a widening gap between complex firm-specific products and user know-how. At the extreme, this complexity gap exists where products are high in complexity but user know-how is low.

Second, the paper finds empirical support for the theoretical framework in the context of entry into professional services by computer industry product firms from 1987-2008. Upstream focused vendors who manufacture components and subsystems are less likely to enter professional services because the complexity gap is thin where the primary users are either lead users (von Hippel, 1988; von Hippel, 2005) or early adopters of innovations (Rogers, 2003). Conversely, the results suggest that firms selling into markets where a wide gap between system complexity and user know-how exists are more likely to enter professional services. As market demand for technology products grew during the open systems era, the addition of more mainstream users (lower know-how) with the simultaneous advancement in technology resulted in a wide complexity gap (Rogers, 2003). The framework and empirical results suggest that

initial entry into professional services by product companies is primarily being driven by the need to address complexity gaps rather than the erosion of hardware product profit margins.

3.2 Theory and Hypotheses

3.2.1 *Related and Unrelated Diversification*

The merits of related and unrelated diversifications are a longstanding debate within the strategic management literature. On the one hand, research on related diversification is traced back to the work of Penrose (Penrose, 1959) who argues that firms expand into related market opportunities because they can build off of pre-existing internal resources and capabilities that ultimately translate into a profitable advantage (Helfat & Lieberman, 2002). These related opportunities might exist in an entirely new industry where the diversifying firm's existing competences are relevant or as a new offering within the diversifying firm's existing industry.

Resource similarity is often considered in the context of the day-to-day operations of the firm. For instance, economies of scope benefits are believed to come from technological resources such as the sharing of patents across multiple businesses (Silverman, 1999) and the leveraging of technologies common to the primary product business (Lee & Lieberman, 2010; Stern & Henderson, 2004). Beyond technological similarity, the literature has also found that alignment with the dominant managerial logic is conducive to fostering potential opportunities for economies of scope (Tanriverdi & Venkatraman, 2005).

Some of the latest work on related diversifications has further clarified some of the classical assumptions. Applying a more dynamic lens to examine economies of scope, recent work has argued that pre-existing resources and competences not only benefit the simultaneous running of multiple businesses but also enables a firm to transition from an unattractive industry into a new high-growth industry (Burgelman, 1994; Helfat & Eisenhardt, 2004). Conventional wisdom argues that resource similarity in related diversifications is achieved via internal development efforts while unrelated diversifications relies on external acquisitions to access dissimilar resources and capabilities. However, recent work has shown that related diversifiers also use acquisitions to deepen their current stock of resources in their primary line of business (Karim & Mitchell, 2000; Lee & Lieberman, 2010).

On the other hand, the case for an unrelated diversification is similar to managing a portfolio of financial investments. A firm looking to reduce its within-industry risk may

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consider diversifying into a completely different industry that is not subject to similar cyclical patterns (Lubatkin & Chatterjee, 1994). For example, a firm producing VHS tapes will likely not realize economies of scope benefits if it decides to use its excess capacity to produce cassette tapes. While VHS players and cassette players remain accessible, the market for these magnetic tape media is much smaller due to the increased availability of digital media such as CDs and DVDs.

Ideally, the financial returns from the unrelated diversification opportunity are not correlated with the financial returns from the primary business (Palich, Cardinal, & Miller, 2000). The conventional wisdom for an unrelated diversification applies very well to large conglomerates like General Electric or the Virgin Group who have had success acquiring and managing multiple independent businesses. However, it's not clear whether the same wisdom applies to cases where the businesses are co-dependent.

3.2.2 The Complexity Gap

Very little research has considered the case of unrelated diversifications where the businesses are co-dependent, which is likely to be motivated by a different mechanism other than portfolio effects since the revenues from the two businesses are correlated. In some cases, firms can create synergies between complementary but dissimilar resources and capabilities (Harrison, Hitt, Hoskisson, & Ireland, 1991; Milgrom & Roberts, 1990; Tanriverdi & Venkatraman, 2005). However, resource complementarity is a tricky concept. The difference between what is complementary and what is not complementary is fuzzy. For instance, office furniture is complementary to computers. The functional groups of finance, marketing, and customer support are all complementary to the primary product business of the firm (Helfat & Lieberman, 2002). Any technology that connects with the firm's product is also considered complementary (Teece, 2006).

Rather than an elusive complementarity argument, I propose that unrelated diversifications for co-dependent businesses are motivated by the firm's need to close the gap between a firm-specific complex product and the user know-how. In Figure 1, I present a simple diagram with axes for user know-how by product complexity to illustrate. In the case where products are simple in the two left side quadrants, the complexity gap between all users and the product is thin. For example, a USB mouse is simply plugged into a computer's USB port.

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Additional services from the retailer, the manufacturer, or an independent third-party are not necessary.

Insert Figure 1 here

In the upper right-hand quadrant where a user is high in know-how and the product is complex, a thin to moderately wide complexity gap may exist as the firm deploys its latest cutting-edge technology. Imagine the product as an intermediate good that becomes an input for a later-stage product at another product firm further downstream in the value chain. For example, Adaptec produces host adapters, which are products that connect storage devices to computers. In fiscal year 2007, sales to computer vendors IBM and Dell accounted for over half of Adaptec's annual revenues. In this example, Adaptec's primary users are the engineers at systems vendors like IBM and Dell who subsequently integrate the host adapters into larger systems. The IBM and Dell engineers are incentivized to keep pace with the latest technological developments. In the diffusion of innovations, these high know-how users are the early adopters and innovators whose job or hobby is to gain early access to the most recent technology (Rogers, 2003).

Research on lead users argues that certain types of users are not only very innovative, but on occasion are found to be the true source of innovation for products that ultimately are sold under the banner of a firm (Thomke & von Hippel, 2002; von Hippel, 1988; von Hippel, 2005). Similar to early adopters of innovations, lead users are high in know-how.

Therefore, complex products marketed to such sophisticated users will have a thin complexity gap. The complexity gap may start moderately wide upon the launch of a new technology product, but the user is incentivized to close that gap as part of her job. Although additional guidance is sometimes made available from an expert within the firm on an ad hoc basis, I argue that firms who primarily have operated within this quadrant are less likely to create a formal professional services business. A professional services manager informed me that his firm doesn't book as many client professional services engagements in Silicon Valley because

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those customers tend to be more knowledgeable than his highly trained technical consultants.[5] This argument suggests that:

Hypothesis 1: Firms that focus on upstream product technologies where users have high know-how will be less likely to enter into professional services.

As the market for technology products became ubiquitous during the open systems era, more users with less know-how than the early adopters began to enter the market. If we assume for illustration that the users work at firms, then we can imagine lots of variation in users ranging from small business owners to large enterprise customers. This community of users is often less interested in the intimate technical details of the products, but rather more interested in the shortest route to a return on their IT investment. In the diffusion of innovations, these are the mainstream or majority users (Rogers, 2003).

During periods of technological change such as the open systems and Internet eras, firms may choose to fill capability gaps that emerge with the new technology (Lavie, 2006). Many of the initial users of mainframes, minicomputers, and workstations were early adopters who were willing and able to keep up with the latest developments (Bresnahan & Greenstein, 1999).

Even though computing became available for the masses, computers are still complex systems comprised of multiple components and devices. The computer system is the last downstream manufactured product in the value chain. While IBM is often recognized for its establishment of an influential professional services organization called Global Services in 1996, they actually established a professional services organization in 1987 because "the task of integrating information systems, products, and services has become increasingly complex [for our customers]" (IBM Annual Report 1987).

Field interviews also suggest that where complexity gaps are large, the need for professional services increases. One consequence of the open systems era was that computing devices were distributed all throughout the user's organization instead of in one central data center. Transitioning from a mainframe-centric environment to a distributed systems environment became a difficult shift for many CIOs to manage. The vision for talking with CIOs was as follows:

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[5] Interview at Firm #1 on July 17, 2010.

"'Your IT environment is very complex. [As] things become more distributed, you lose visibility. We're going to help bring control back to you by giving you total visibility as to what your ... infrastructure looks like. Should you choose to work with us, we will help design an architecture for you moving forward that's extensible so that as you grow, the architecture will grow with it.' That was the sale. That is not a product sale. That's why the account [sales] managers couldn't be these consultants. Not that they weren't good. They were excellent at what they did. Wrong background, wrong model."[6]

One informant summed it up, "But the minute you go from dropping in an appliance [simple product] to architecting a data center, that's freaking complex."[7] This suggests that where products can be interconnected in a multitude of ways also leads to a wide complexity gap:

Hypothesis 2: *Firms that market complex products to users with low know-how will be more likely to enter into professional services.*

3.2.3 Prior Diversification

When considered as independent businesses, a product company and a professional services company require very different general management approaches (Prahalad & Bettis, 1986). A product-manufacturing firm is concerned with issues such as developing technologies, product roadmaps, managing factories, and inventory turns (Gerstner, 2002). A professional services firm is concerned with managing customized work, quality face-to-face interaction with clients, staff utilization rates, and retaining highly skilled, marketable individuals (Maister, 1993; Teece, 2003). In the 1989 annual report's letter to shareholders, the CEO of the largest technology services provider unequivocally stated, "Electronic Data Systems (EDS) is not a hardware manufacturer, nor are we a software vendor. Yet we're the leading authority on selecting, applying and supporting these two technologies." Although often intangible, these two types of firms possess different identities from the managerial level down to the individual contributor.

Considering the administrative systems that managers use to run day-to-day operations, the evidence from IBM suggests that mixing a product organization and a professional services organization requires a very different economic model, sales compensation system, and financial management system (Gerstner, 2002). In a best-case scenario, these two managerial logics are

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[6] Interview with a former manager of Firm #1 on June 25, 2010.
[7] Interview with a current manager at Firm #1 on July 17, 2010.

not necessarily conflicting, but simply operating as complementarities at two different stages of the value chain. In a worst-case scenario, the two managerial logics may severely clash. For example, human-intensive services scale by adding more people whereas a product business can scale through process innovations in production. A market research analyst suggests that, "IBM and others didn't want to add people. There were lots of internal battles."

Very little overlap exists in the upstream parts of the value chain where technological resources matter the most. Whereas research and development create new technologies and products upstream in the value chain, professional services are geared towards helping users apply the technologies and products in their data centers. From a resource similarity perspective, product development and professional services have little in common. Relatedness based on R&D intensity (Montgomery & Hariharan, 1991) or patents (Silverman, 1999) easily flags this stage of the value chain as unrelated. However, a strong resource complementarity link exists between product development and the professional services methodologies stage.

While differences between a product business and a professional services business exist, complementary but dissimilar resources and capabilities may create synergies for the firm (Harrison, Hitt, Hoskisson, & Ireland, 1991). Further complementarity synergies are possible for firms with prior experience in diversifications. Klepper and Simons (2000) found that prior experience in radio manufacturing provided a competitive edge for entry in the television industry. Helfat and Lieberman (2002) suggest that pre-existing capabilities provide an advantage for diversifying entrants when relevant in the target industry. Firms in this study are likely to pursue related diversification entry into other product manufacturing categories where similar organizational dynamics exist. Although the technological activities have little overlap between the product business and the professional services business, prior diversification experience is likely to drive further diversification (Hoskisson & Hitt, 1990). Also, as the firm expands its product portfolio, a professional services group can help customers understand how to best leverage the firm's products.

Hypothesis 3a: Firms that are more diversified across different manufacturing product technologies will be more likely to enter into professional services.

While price pressure from competitors can lead to profit margin erosion over time, the firm may pursue complementary product categories with more attractive profit margins. If

manufacturing product margins decline, the best profit margin opportunities reside in computer software products. However, while complementary software products are flexible and can enable big gains in productivity, the customization process is very complex. To close the complexity gap created by complementary resources, the firm is likely to consider entering into professional services. This suggests that:

Hypothesis 3b: Firms that are more diversified across different complementary product technologies will be more likely to enter into professional services.

3.3   Methods

3.3.1   The Information Technology Industry and Professional Services

The empirical setting is the IT industry starting back in the mid-1980's. The specific focus is on the manufacturing sector of this industry. I empirically test how the firm-user complexity gap and the firm's technological diversification configurations are associated with the direction of diversification between a manufacturing and non-manufacturing setting. While computer hardware and technology professional services are complementary activities when considered along the value chain, the conventional wisdom in the mid-1980's among computer manufacturing vendors was to treat professional services such as installation, training, systems integration, and consulting in one of two ways. First, some of the firms provided installation and training as part of hardware sales. In other words, it was done for free. There was no intent to create a business and charge for these types of services (Lazar, 1994). Second, some firms provided these activities on an ad hoc basis. Perhaps an engineer is temporarily assigned to a high-profile customer who is having extreme difficulties. Generally, this type of "ad hoc problem solving" is not considered a business, a routine or a capability (Winter, 2003).

The following excerpt captures the conventional wisdom of the mid 1980's:

"Professional-services companies have always been the unglamorous part of the computer business. The $10.5 billion industry that specializes in helping companies decide what computer equipment to buy – and how best to use it – didn't sell sexy technology or command the same market multiples as other computer companies. And although growth was steady – up 16% a year since 1980 – services lacked the spectacular leaps in revenue and fat profit margins that characterized computer hardware and software." (Field & Schares, 1986)

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This paper examines this very narrowly focused diversification opportunity where a firm signals a *change* in its approach to services. Every product firm provides a baseline of customer service for its products. This is usually articulated as service (not plural), customer support, break/fix, warranty, or maintenance. Customer service often includes installation, but more as a *free* activity bundled with the product. Customer service is normally managed as a cost center. In other words, there's no intent to run a profit and loss business. By exception, maintenance contracts can be quite profitable.

3.3.2 *Measuring diversification into services*

While scholars acknowledge the need for more research on services within strategic management (Huff, 2009)and innovation literatures (Tushman & Smith, 2002), it's not clear how or whether the frameworks and methods used in product manufacturing-based empirical studies apply. For example, one may classify entry into professional services as either unrelated due to a lack of resource similarity or as related based on a complementarity argument. See Table 1 for an assessment based on the operationalization scheme used in prior empirical studies. Many studies simply assume that diversification entry doesn't systematically exist between manufacturing and non-manufacturing settings. The sentiment is that "the service sector requires a different set of skills or knowledge than manufacturing industries" (Chang, 1996).

Insert Table 1 here

Given that services require very little upfront investment, how to operationalize diversification into services is not clear. If we consider how a product diversification event is detected, the event is signaled in one of two ways. At some point during product development, the firm signals to the market a potential launch date and then formally launches the product. Secondly, a firm signals its intent when it acquires another product firm. These product diversification signals are usually picked up within industry reports and by possibly as SIC code updates. When a services *business* starts is often less clear due to the low level of upfront investment required to get started. The firm may signal the event within a press release, but there's much variation on how and when firms issue press releases. My empirical scheme is to operationalize diversification entry as the firm sends a signal of a formal organizational structure

or acknowledgement of revenue-generating activities. This paper measures entry based on the firm's description of its business within the annual 10-K report. The assumption is that all services beyond basic customer support are articulated as some type of professional service activity.

Although the scope of professional services varies across firms, the following list highlights a general consensus of activities that fall under the professional services category.

Deployment services include any optional for fee work activities that help customers deploy the product within their data center. Examples are installation, implementation, configuration, systems integration, and migration services.

Custom development or design services involve customization work above and beyond the mass market product offering.

Education and training services include product training and certification programs.

Consulting services range from technology to business advice. Consulting is often bundled together with deployment services such as implementation and systems integration.

Outsourcing services provide customers with an opportunity to transfer installation and day-to-day operations to the product firm or a third-party. This is also often referred to as managed services.

3.3.3   Sample and Data

The firm is the level of analysis for this study. The starting sample of U.S.-based computer industry firms was established using Compustat to identify firms with a past or present primary industry affiliation under the three-digit 357 Standard Industrial Classification (SIC) code for computer hardware manufacturers. At the four-digit SIC level, the sample is organized as follows: 3570 Computer and Office Equipment, 3571 Electronic Computers, 3572 Computer Storage Devices, 3575 Computer Terminals, 3576 Computer Communications Equipment, 3577

Computer Peripheral Equipment, 3578 Calculating and Accounting Machines NEC (No Electronic Computers), and 3579 Office Machines NEC.

The analysis does not include computer software product firms for two reasons. While every industry classification system has limitations, the SIC coding for computer software product vendors is especially problematic. All such firms are classified under the one four-digit 7372 SIC whereas the hardware vendors have at least a coarse level of sub-groupings (3570-3579). This puts the burden on the researcher to find some other method for organizing the software firms. One alternative is the North American Industry Classification System (NAICS) 2002 which is no better for software firms. SIC 7372 maps to two NAICS codes – 334611 Software Reproducing and 511210 Software Publishers.

From a theoretical perspective, the operational model for manufacturing firms includes large capital expenditures and sophisticated supply chain considerations which translate into a heavy reliance on technology for scaling operations. In hardware product markets that are facing intense profit margin pressures, complementary products such as software are easily scalable and have very attractive profit margins. Hence, software is the preferred diversification path for profit margin relief rather than professional services. EMC Corporation enjoyed great success selling storage hardware systems in the 1990's, but like most firms it suffered a major reduction in 2001 and 2002 revenues. Since 2002, EMC has grown by acquiring over 25 software firms. For these reasons, a hardware product firm may face a higher level of organizational inertia and reluctance towards establishing a formal labor-intensive services business – i.e., beyond customer support and maintenance. Similar to a professional services firm, a software product business can be started with very little upfront capital expenditures. As a result, establishing a professional services organization within a software firm may face much less resistance than within a manufacturing-oriented firm. Therefore, this analysis focuses on the computer product manufacturers.

The professional services measure is based on a content analysis of the firm's description of its strategy and operations as reported in annual 10-K reports that are filed with the U.S. Security and Exchange Commission (SEC). Using the sample of SIC 357 firms identified by Compustat, the annual 10-K reports were downloaded from two electronic databases: SEC Electronic Data Gathering, Analysis, and Reporting (EDGAR) and the LexisNexis Academic. EDGAR contains SEC filings back to 1994 while LexisNexis Academic contains filings back to

1987. Where firm-year reports were not available from the electronic databases, 10-K reports were obtained from microfiche archives available at MIT Sloan and Harvard Business School libraries. Financial measures were obtained for the sample of firms from Compustat as far back as 1980 to provide enough flexibility to calculate lagged measures where necessary for the analysis.

The manufacturing and complementary product diversification measures are based on the product codes obtained from the 'Who Makes What' section of the *CorpTech Directory of Technology Companies* published annually starting in 1986. Hardcopy directories were manually coded for years 1987, 1989, 1991, 1993, 1995, 1997, 1999, and 2000. Years 1988, 1990, 1992, 1994, 1996, 1998, and 2001 were estimated based on the prior year's codes. Years 2002-2005 were obtained electronically from CD-ROMs and processed using scripts.

While the classic diversification studies rely on the SIC system, recent work has also used the product codes in the CorpTech directories (Lee & Lieberman, 2010; Lee, 2007). Whereas Lee (2007) was interested in understanding diversification down to the micro categories of CorpTech, I chose to operationalize the product diversification measures down to only the major product code levels. Within the computer hardware industry (COM), a firm manufacturing computer memory systems (COM-CM) who expands from 3.5-inch floppy disk drives (COM-CM-F3) into Winchester hard disk drives (COM-CM-HW) is not considered a major diversification move for this paper. On the other hand, if the same firm expanded into a computer output device category (COM-OU) such as inkjet printers (COM-OU-PI), such an expansion registers as a product diversification move in this paper. Therefore, the coding strategy of capturing every other year is reasonable for this analysis.

The CorpTech data was not available for every firm in the initial Compustat list. Firms who entered the dataset after 2003 were also dropped since the CorpTech measures were obtained up to 2005. Firms were dropped who had only one annual 10-K report on file with the SEC. Several firms had zero sales revenue and were subsequently dropped. The final sample contains 340 firms with a total of 2577 10-K reports.

3.3.4   Model Estimation

A discrete-time event history methodology is used to model the firm's downstream entry into professional services (Castilla, 2007). The dependent variable is the instantaneous rate at

which a firm acknowledges professional services as an organizational activity. This methodology is preferred when information on the exact timing of an event is unavailable—that is, when interval "censoring" exists. For this study, exact adoption dates are not known since the measures are based on annual data. A second advantage of this method is that firms who do not embrace professional services contribute to the model exactly what is known about them. Time-varying explanatory variables are easily included because each period during which a firm is at risk is treated as a separate observation. Left censoring was an issue for 13 of the 340 (4%) firms who experienced the event either prior to entering the risk set or during their first observation within the risk set. In other words, firms who are already providing professional services as they enter the model are immediately dropped. The model seeks to estimate the systematic factors associated with the transition from nothing to the establishment of a professional services business.

3.4   Measures
3.4.1   *Dependent Variable*

Professional Services. The rate of entry into professional services is the dependent variable. For each firm-year, a professional services dichotomous variable is set to 1 when a firm acknowledges professional services entry within the annual 10-k report. Otherwise, the variable is set to 0 which represents one of the following conditions: the firm has no resources devoted to providing professional services, the firm provides limited professional services on an ad-hoc (Winter, 2003) or free basis, or the firm's professional services activities are not considered a strategic priority relative to other pressing concerns. Each firm discusses its primary business initiatives within the business overview section (i.e., Item 1) of the 10-k report that is filed with the SEC. The management discussion section (i.e., Item 7) often contains another rehash of the key business initiatives within the context of the financial statements. See Appendix 1 for specific examples of how the content analysis works.

3.4.2   *Explanatory Variables*

Level of technological diversification. Two variables capture the relative level of technological diversification within each firm. Similar to Lee and Lieberman (2010), I use the CorpTech data to operationalize the measures for level of diversification. *Manufacturing*

product diversification is a relative measure of the degree to which the firm has increased or decreased its allocation of resources and development of capabilities in product technologies that require manufacturing. Examples of manufacturing technologies range from various types of computers to peripheral devices such as printers, storage, and modems.[8] Each firm's baseline level of manufacturing product diversification is a count of the industry sub-segment codes across CorpTech computer hardware and telecommunications industry segments upon entry into the dataset. For example, Cisco Systems enters the dataset in 1990 following its initial public offering. Its baseline diversification measure is based on data from the 1990 CorpTech directory. For firms publicly traded prior to 1987, the baseline diversification level is based on 1987 CorpTech product codes. Therefore, the manufacturing product diversification variable is the difference between the current firm-year count and the baseline firm-year count. The value ranges from –8 to 9. See Table 2 for a complete list of the product manufacturing categories used to calculate this measure.[9]

Complementary product diversification is a relative measure of the degree to which the firm has increased or decreased its allocation of resources and development of capabilities in computer software product technologies. Examples of software captured by CorpTech are industry-focused applications such as healthcare software, general-purpose software such as project management applications, and software utilities such as development tools. See Table 2 for a complete list of the major computer software product codes. As with the manufacturing product diversification variable mentioned earlier, the complementary product diversification variable measures the firm-year increase or decrease relative to the baseline count as determined when the firm enters the dataset. The value ranges from –6 to 9.

Insert Table 2 here

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[8] The boundary between computer hardware and data communications equipment such as modems and networking equipment is blurry. Compustat includes some data communications equipment manufacturers under the four-digit SIC 3576 while CorpTech classifies those same firms in SIC 3661 or 3669. For example, Cisco Systems is under 3576 in Compustat but 3669 in CorpTech. Consequently, the diversification measures are found across the computer hardware and telecommunications industry product codes in the CorpTech directories.

[9] Several internet-related product codes were added to the Telecommunications industry section beginning with the 2000 CorpTech directory. These codes are omitted in the operationalization of the manufacturing product diversification variable.

Complexity gap measures. Two variables measure the relative technological position of the firm with respect to its location along the value chain. My hypothesis is that where the complexity gap between the product and the customer base is wide, the greater the likelihood of the firm creating a professional services business. *Initial upstream focus* is a variable that captures the degree to which the firm is focused on upstream product technologies when it enters the dataset. In general, these are product categories that are intermediate goods to be used within more complex products. More importantly, these product categories are used by engineers working within firms or by technically savvy hobbyists. The complexity gap between product and user is relatively thin. For example, Adaptec produces host adapters, which are products that connect storage devices to computers. In fiscal year 2007, sales to computer vendors IBM and Dell accounted for over half of Adaptec's annual revenues. Engineers at IBM and Dell are most likely the intended users of Adaptec's products and this translates into a low complexity gap. This variable is set to one where the firm enters the dataset focused on more upstream product technologies such as photonics, subassemblies, components, and subsystems. Otherwise, the value is zero. See Table 3 to see how the CorpTech product categories can be organized vertically from upstream to downstream.

Computer systems vendor is a dummy variable that is set to one for every firm-year where a large-scale, personal, or specialized computer is sold as indicated within the CorpTech directories. Otherwise, the value is zero. See Table 3 for a list of CorpTech product categories for computer systems. The assumption here is that the computer system represents the final manufactured product that is made available to a general market where there is likely a higher percentage of customers less technically savvy than those further upstream. Moreover, a larger complexity gap is likely to exist at this level also due to the need to combine the manufactured product with various complementary resources such as computer software. The combination of one or more computers with many possible arrangements of software results in a very complex system. Moreover, the product complexity is often increasing faster than what the end-user is willing to keep up with.

Insert Table 3 here

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3.4.3 Control Variables

Firm controls. Firm *size* is operationalized based on quartile sales revenue bands. A quartile revenue dummy is coded as one when the one-year lagged firm-year sales revenue falls within a revenue band. Otherwise, the value is zero. The cutoff points for the four bands are $50 million, $250 million, and $750 million. The $0-50 million band is the reference group and therefore is excluded from the models. Firm *age* is calculated as the log of the difference between the current year and the year of incorporation. *Net profit margin* is the average net profit margin from the previous three years. Firms that are experiencing poor performance may be more likely to search for diversification opportunities (Campa & Kedia, 2002; Hoskisson & Hitt, 1990). However, the conventional wisdom suggests that poor performing firms are more likely to pursue new opportunities that build on pre-existing skills (Klepper & Simons, 2000; Tushman & Anderson, 1986). Although unrelated with respect to day-to-day operations, the low fixed cost economics of professional services may provide a low-risk revenue opportunity for poor performing publicly traded firms to sustain top line revenues.

Industry controls. *Population density* represents the aggregate number of publicly traded U.S.-based computer hardware firms from 1987-2008. Normally in an organizational ecology study, the density is obtained for the entire population of firms going back to each firm's founding (Hannan & Carroll, 1992). Such an approach is critical for studying firm birth rates and mortality rates. For this particular study, the organizational process under study is entry into professional services such that the most pressing need is that we capture data before this organizational entry process begins. Data collection limitations restrict the beginning to 1987 for this study. *Population mass* represents the aggregate number of workers employed per year by firms (Ruef, 2000).

3.5 Results

3.5.1 Descriptive Statistics

Table 4 reports descriptive statistics for the 340 firms in the overall sample. The eight four-digit SIC codes are consolidated into five primary product groupings – computer systems (3570 and 3571), storage devices (3572), peripherals (3575 and 3577), data communications equipment (3576), and other machines such as calculating, accounting, and office machines

(3578 and 3579).[10] The mean number of observations per firm is approximately ten. With the study beginning in 1987, we experience a mild left censoring issue with 13 firms. In other words, 13 firms experience the event either prior to 1987, in 1987, or during their first year in the dataset. For example, Unisys and IBM experience the event during or prior to 1987. Identix experienced the event in 1993 as it entered the dataset. Firms such as Unisys, IBM, and Identix are subsequently dropped in the analysis.

Thirty-four percent of the firms experienced the event. The mean year of incorporation was 1979 while the median year was 1983. This means that the population of firms is nearly evenly divided into firms founded before and after the start of the open systems era.[11]

Insert Table 4 here

Table 5 reports the firm-year descriptive statistics and pairwise correlation matrix for the 2,577 firm-year observations. Many of the firms experience multiple professional service events in subsequent years, but the current analysis focuses on the first event only.

Insert Table 5 here

3.5.2 *Determinants of experiencing a professional services event*

Table 6 contains the Cox hazard rate models using robust standard errors and coefficients rather than hazard ratios. Model 6-1 showing with only control variables tells a story that this phenomenon is primarily playing out within large firms. While firms generating over $250 million are more likely to enter into professional services, the magnitude and significance level is even stronger above $750 million. The performance measure of net profit margin has a mild negative magnitude but is not significant. A story of profit erosion driving diversification into professional services would be expected to show up in the net profit margin variable.

Models 6-2 and 6-3 test the complexity gap hypotheses. Indeed, Model 6-2 finds support for Hypothesis 1 where firms that start from an upstream product position in the value chain are

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[10] All computer systems vendors are reported under 3571 in CorpTech. Only a few computer monitor firms (3575) exist today and so the category is combined with the general peripherals category (3577). SIC 3578 and 3579 are small groups with a diverse set of firms.
[11] Many view the August 1981 launch of the IBM PC as the beginning of the open systems era.

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less likely to enter professional services. The assumption of a low complexity gap at the upstream stages of the value chain seems reasonable. Model 6-3 finds support for Hypothesis 2 where firms that sell complex systems to markets with relatively low user know-how are more likely to enter professional services. The computer systems vendor variable is a reasonable proxy for a large complexity gap. However, other product categories saw an increase in complexity during this time period. For example, some storage hardware sub-categories (SIC 3572) evolved from simple direct attach storage devices to complex storage area networks. But as a systematic pattern within a category, computer systems vendors seem to be a reasonable proxy for a large complexity gap in the model.

Models 6-4 and 6-5 test the prior diversification hypotheses. Model 6-4 finds no support for Hypothesis 3a. Although firms have slightly increased their relative level of diversification across major manufacturing product categories, such a move is not significant with entry into professional services. This suggests that simply having a more complex portfolio of products is not enough to lead the firm to enter professional services. If professional services require a different set of skills and resources, entry requires adding people in a way that is not very scalable. On the other hand, Model 6-5 finds a positive and significant link between an increased position in complementary resources (i.e., computer software) and entry into professional services. As software often requires additional effort to customize within each user's environment, this customization work often translates into professional services activities such as systems integration. While software is adaptable to heterogeneous user environments, this also increases the complexity gap for users who want to optimize the return on their IT investment but have decided their competences are best focused on other business needs.

In the full Model 6-6, the story remains consistent. Where the complexity gap is thinnest (upstream in the value chain), firms are less likely to enter. And conversely, where the complexity gap is widest, firms are more likely to enter. Firms who have increased their relative level of diversification into complementary non-manufacturing technologies are also more likely to enter. Overall, the large firms are more likely to enter. While net profit erosion is associated with entry into professional services, the magnitude is very small and the variable is not significant.

Insert Table 6 here

3.5.3 Robustness checks

Instead of operationalizing firm size into revenue bands, the natural log of the number of employees was used in these models and the results were the same. The story of large firms is a robust finding and seems plausible. Although the resource similarity link between product and services firms is weak, large firms have more general slack than smaller firms and hence more able to invest in complementary yet resource dissimilar opportunities.

Year dummies from 1988 onwards (1987 was the reference group) were put into the model and the results were consistent in terms of sign, magnitude, and significance.

The proportional hazard rate assumption was tested using the Grambsch and Therneau global test which makes use of the Schoenfeld residuals (Grambsch and Therneau, 1994). The test considers whether the model as a whole shows evidence of non-proportional hazards. As a whole, Model 6-6 has a p-value of 0.93 and therefore supports the proportional hazard rate assumption. The highest revenue band (\$750 million+) has a p-value of 0.16 which is not a complete violation but is potentially a concern. However, the \$250-\$750 million revenue band has a p-value of 0.70 which is in line with the proportional hazard rate assumption. Also, the assumption is even stronger when running the model using log employees as the size variable. Therefore, firm size is robust and a large part of the story.

3.5.4 Limitations

This paper uses one approach to operationalize diversification between manufacturing and service categories. While the content analysis software has been developed and iterated upon over the course of months, the dependent variable is somewhat narrowly defined. See Appendix 1 for a brief discussion. Even when alternative names for professional services are used within the 10-K reports, the term *professional services* is often used generically when describing revenue recognition which strengthens the case for the content analysis. However, the term *services* is often very ambiguous and this is freely acknowledged among practitioners. Unfortunately, services can refer to professional services or other more technology-oriented services.

The content analysis software captures other terms in its search which are sometimes equated directly with professional services such as consulting and systems integration. This is

worth further investigation to understand the level of cases that are perhaps being omitted. Therefore, the analysis may underestimate the transition to professional services. Some of the transition events are checked via news articles and analyst reports, but smaller firms are less likely to show up in such venues. More work on connecting the signal from the 10-K with external news articles would be helpful.

3.6   Discussion & Conclusions

While this paper answers the call by scholars for more research in the area of services, innovation, and strategy (Huff, 2009; Tushman & Smith, 2002), the category of services within high-tech product companies is often quite broad, elusive, and amorphous. In an effort to avoid the traps and fuzzy boundaries between what is a product and what is a service, this paper takes a narrow approach by focusing on professional services. In general, professional services means something different than customer service and professional services are usually not confused with product offerings in a traditional sense. A narrow focus on professional services avoids the fuzziness of *services*.

This paper argues that diversification is an appropriate term to describe the choices that computer manufacturers have been making for decades not only into product manufacturing sectors, but also into service sectors. Going back to Penrose, diversification occurs when the firm enters a new industry or as the firm expands its offerings within its current industry (Penrose, 1959). Since services are not capital intensive, exactly when to measure the diversification event is not straightforward especially if entry is via an internal development effort. The signal is more straightforward in the case of an acquisition. For example, Amdahl Corporation's acquisition of DMR Inc., a Canadian professional services firm, in 1995 was described as a move "to accelerate its diversification into computer services." (DePompa, 1995)

This paper contributes to the literature on diversification by showing how firms often enter new opportunities where the benefits from relatedness and unrelatedness are not so certain. The findings suggest that firms may diversify into complementary opportunities where neither scope economies nor portfolio effects are salient motivators. Specifically, this paper argues that manufacturing firms primarily diversify into some service categories as the gap between product complexity and user know-how expands. Conversely, the results suggest that where the complexity gap between product and user know-how is thin, firms will not diversify into

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professional services. Commoditization is often believed to be the primary motivation for diversification into technology services among computer industry product firms. While commoditization may explain why firms abandon certain product categories, the evidence suggests that it is not the primary driver for *initial* entry into professional services. The paper does not completely rule out the effect of commoditization, but I argue that commoditization drives firms into more computer software opportunities where profit margins are far superior to those in professional services.

Future research should extend this study to explore the relationship between the explanatory variables in this study and the relative financial contribution from professional services. Perhaps the alternative explanations for this phenomenon are more prominent for those firms that achieve a material level of revenues from professional services.

The managerial implications of this research are twofold. First, managers should not be blinded by the complementary nature of technology services. As we see with professional services, new competences with dissimilar operational models are likely to be difficult to implement especially where synergies are contingent on cooperation with existing internal organizations. Second, professional services don't scale as well as manufactured products and therefore the firm is not likely to fully integrate this function within the firm. Since existing channel partners are likely to be professional service providers also, the firm will need to manage some level of channel conflict.

The complexity gap framework does not suggest that every firm operating within a quadrant with a wide complexity gap will enter professional services, but some entity must close that gap. The options are: the user (not likely if mainstream user), the product firm (not mandatory), or an independent third party. The rest of the dissertation takes a closer look at how two similar types of computer industry product firms choose to close the complexity gap. By combining archival data with semi-structured interviews, the remainder of the dissertation examines how one firm sets out to build a professional services business from scratch (direct) while the second firm sets out to encourage investment in professional services by its large network of channel partners (indirect).

Figure 1. The Complexity Gap

High ↑ Lead users Early adopters Innovators **User know-how** Majority users Low	**Thin complexity gap** **Thin complexity gap**	**Moderately wide to thin complexity gap** * users incentivized to close gap **Wide complexity gap** * users choose not to close gap

Low ————————————→ High

Product complexity

50
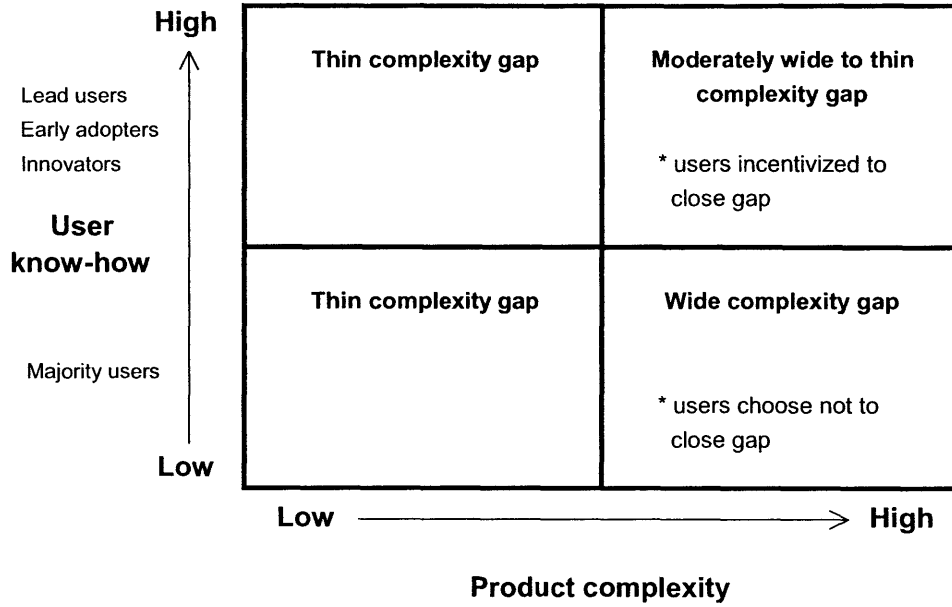
Figure 2. Computer product manufacturing industry, 1985-2008

Population Density

Staff Density

Revenues

51
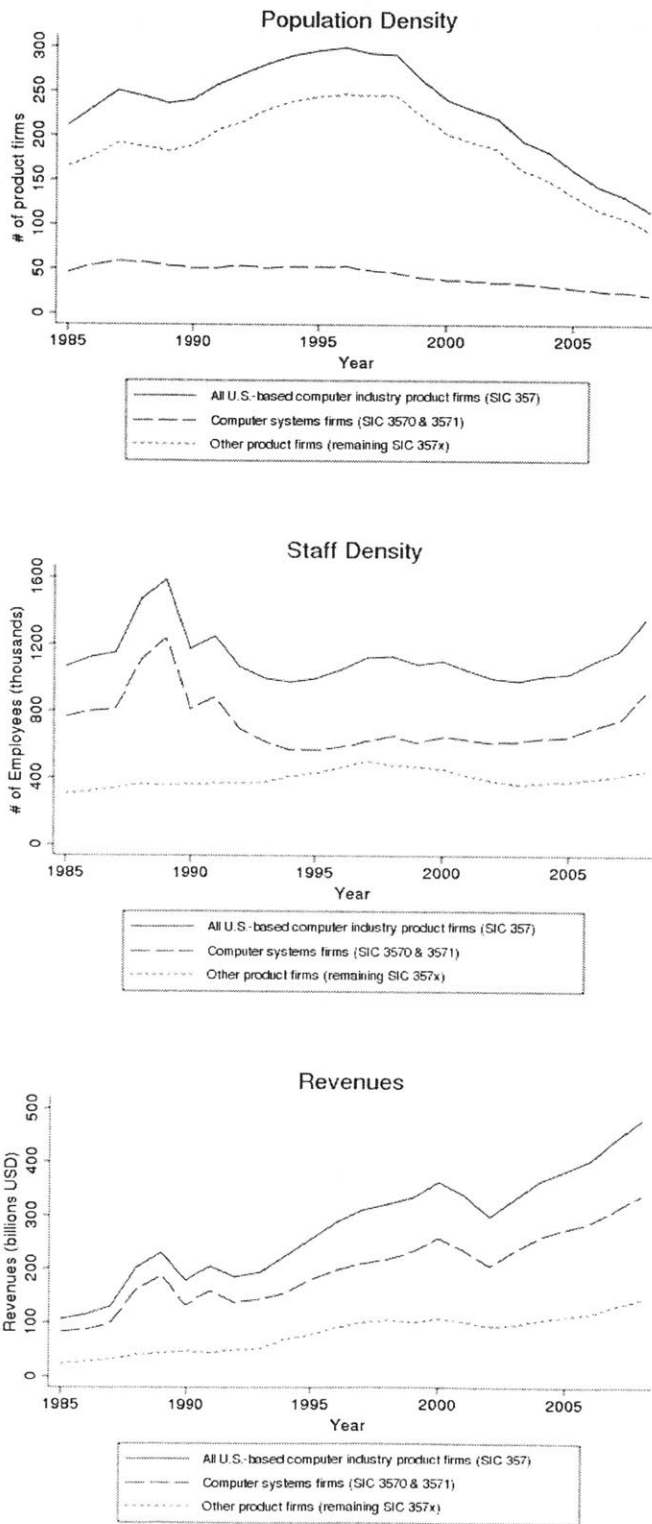
Table 1. Resource relatedness across diversification empirical studies

Reference	Source and target industries	Data	Basis of resource similarity between source & target	Example: Diversification from computers (3571) into professional services (7373)	
				Prediction	Comments
Multi-industry studies using SIC					
Montgomery and Wernerfelt, 1988	Manufacturing	TRINET, FTC Line of Business (LB), 10Ks, EIS, Census of Mfrs	Two-digit SIC code proximity	Unrelated	Based on the "35" vs. "73" two-digit SIC difference
Montgomery and Hariharan, 1991	258 manufacturing	FTC Line of Business	R&D, advertising, and capital intensity between firm and target industry	Unrelated	Implicit assumption of unrelatedness between manufacturing and non-
Farjoun, 1994	222 manufacturing and non-manufacturing	TRINET, Occupational Employment Survey (OES) -- Dept of Labor	Human expertise across seven occupational categories	Unrelated	Table 3 shows differences across mgmt, professionals, production and administration
Chang, 1996	Manufacturing	TRINET, OES, Compustat	Human resource profiles (mgmt, engr, science, mktg)	Unrelated	Unrelated based on footnote (p. 593): services and manufacturing require different skills
Robins and Wiersema, 1995	Mostly manufacturing (SIC 0090-5999)	Scherer (1982) tech flows matrix, TRINET, FTC LB, Census of Mfrs	Relative level of technology inflows and outflows between manufacturing industries	Unrelated	Implicit assumption of no patent-based technology flows to target industries above SIC 5999
Silverman, 1999	Manufacturing	MicroPatent, Compustat, TRINET, FTC LB, Census of Mfrs	Probability weighted measure of patent relevance within potential target industries	Unrelated	Product technology patents not relevant for a professional services business
Bryce and Winter, 2009	Manufacturing (SIC 2000-3999)	Longitudinal Research Database at US Census Bureau, Census of Mfrs	Shared know-how as codified in a normalized relatedness index: ranges from -7.0 to 3.5	Unrelated	Implicit assumption of unrelatedness to target industries above SIC 3999
Industry specific studies					
Stern and Henderson, 2004	US personal computer manufacturers	International Data Corporation (IDC) PC manufacturer data	Expansion within (related) or outside (less related) of the firm's primary product line	Related	Provided expansion into professional services is specific to the primary product line
Lee and Lieberman, 2010	Telecommunications	CorpTech product data, Compustat	Relative to firm's primary CorpTech industry code (TEL, COM, SOF, SUB, DEF)	Related	Likely but not always reflected within primary industry category (e.g., TEL-SV or COM-SV)

Table 2. CorpTech Industry and Major Product Code Categories

Computer Hardware

COM-AI	Artificial intelligence hardware
COM-AX	Comp accessories/components
COM-BU	Business equipment
COM-CB	Computer boards
COM-CM	Computer memory systems
COM-CN	Converters
COM-CP	CPUs
COM-IN	Computer input devices
COM-MC	Microcomputers
COM-MF	Mainframes
COM-MN	Minicomputers
COM-MO	Monitors
COM-MS	Supercomputers
COM-OU	Computer output devices
COM-PC	Peripheral controllers
COM-SN	Computer hardware for the handicapped
COM-SP	Specialized computers
COM-TR	Terminals

Telecommunications

TEL-AV	Audio/video equipment
TEL-BR	Broadcasting/receiving equipment
TEL-CI	Communications interfaces
TEL-CS	Communications security devices
TEL-DC	Data concentration equipment
TEL-EM	Electronic mail equipment
TEL-MX	Multiplexers/modems
TEL-NW	Comm networks and related equipment
TEL-SI	Signal-related equipment
TEL-SM	Satellite & microwave comm equipment
TEL-TD	Telecom distribution equipment
TEL-TE	Telephone/voice equipment
TEL-TR	Transmission systems/equipment
TEL-ZD	Other data communications equipment nec

Subassemblies and Components

SUB-CE	Electronic connectors/packaging
SUB-CL	Electrical connectors/packaging
SUB-CM	Mechanical connectors/packaging
SUB-EM	Electromechanical devices
SUB-ES	Electronic subsystems
SUB-ET	Electron tubes
SUB-ME	Nonelectronic, mechanical devices
SUB-PC	Passive components
SUB-SE	Semiconductors/semiconductor devices
SUB-TR	Transducers

Computer Software

SOF-AC	Accounting software
SOF-AI	Artificial intelligence software
SOF-BA	Banking software
SOF-CN	Construction software
SOF-CS	Communications systems software
SOF-DM	Database/file management software
SOF-ED	Educational and training software
SOF-FM	Facilities management software
SOF-FN	Financial analysis/management software
SOF-GO	Government software
SOF-HL	Health services software
SOF-IN	Insurance software
SOF-LE	Legal software
SOF-LI	Library software
SOF-MA	Manufacturing software systems
SOF-ME	Media and communications software
SOF-NP	Non-profit organization software
SOF-NR	Natural resource management software
SOF-OA	Office automation software
SOF-PD	Software development systems
SOF-PM	Project management software
SOF-PU	Public utilities software
SOF-RE	Real estate software
SOF-SM	Sales/marketing software
SOF-SR	Service industry software
SOF-TR	Transportation software
SOF-TS	Technical/scientific software
SOF-UT	Utility systems software
SOF-WD	Warehousing and distribution software
SOF-ZA	Other applications software nec

Photonics

PHO-AO	Acousto-optic equipment
PHO-CA	Cameras and related equipment
PHO-DI	Displays
PHO-FO	Fiber optics and related
PHO-LA	Lasers/laser related equipment
PHO-OE	Optoelectronic devices
PHO-OP	Optics and related equipment

Table 3. CorpTech Major Product Codes by Value Chain Level

Product Value chain		
Upstream	**Photonics**	All PHO codes
	Subassemblies and components	All SUB codes
	Subsystems	COM-AX, COM-CB, COM-CN, COM-CP, COM-PC, TEL-CI, TEL-CS, TEL-DC, TEL-MX, TEL-NW, TEL-SI, TEL-SM
	Devices	COM-AI, COM-BU, COM-CM, COM-IN, COM-MO, COM-OU, COM-TR, TEL-AV, TEL-BR, TEL-EM, TEL-TD, TEL-TE, TEL-TR, TEL-ZD
Downstream	**Systems**	COM-MC, COM-MF, COM-MN, COM-MS, COM-SP

Table 4. Firm level descriptive statistics

Variables	N	Mean	SD	Min	Max
Primary product categories	340				
Computer systems		0.18	0.38	0	1
Storage devices		0.13	0.34	0	1
Peripherals		0.32	0.47	0	1
Data communications equipment		0.29	0.46	0	1
Other machines (calculating & accounting)		0.09	0.28	0	1
Professional Services event					
Observations per firm	340	9.53	6.09	2	22
Experienced professional services event	340	0.34	0.47	0	1
Left censored firms	340	0.04	0.19	0	1
Founding					
Year of incorporation	340	1979.09	15.07	1876	2000
Initial diversification level					
Manufacturing product diversification	340	2.10	2.22	0	18
Complementary product diversification	340	0.81	2.02	0	26
Initial vertical scope					
Upstream product focus	340	0.19	0.39	0	1

Table 5. Overall descriptive statistics and pairwise correlation matrix of variables

Variables	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11
1 Professional services event	0.05	0.21	0	1											
2 Manufacturing product diversification	0.25	1.46	-8	9	0.04										
3 Complementary product diversification	0.29	1.08	-6	9	0.10	0.20									
4 Initial upstream product focus	0.20	0.40	0	1	-0.04	0.20	0.01								
5 Computer systems (primary)	0.15	0.36	0	1	0.07	0.03	0.05	-0.20							
6 Size: $50-250 million in sales (lag)	0.30	0.46	0	1	-0.03	-0.07	-0.07	0.01	-0.05						
7 Size: $250-750 million sales (lag)	0.11	0.31	0	1	0.04	0.04	0.13	0.09	-0.02	-0.23					
8 Size: $750+ million in sales (lag)	0.12	0.33	0	1	0.09	0.09	0.14	-0.02	0.24	-0.24	-0.13				
9 Net profit margin (lag 3-year average)	-7.65	24.62	-100.00	40.75	-0.04	0.01	0.03	0.02	0.03	0.18	0.12	0.17			
10 Age (log)	2.67	0.72	0.00	4.78	0.02	0.12	0.11	-0.10	-0.05	-0.04	0.03	0.14	0.11		
11 Population density (log)	5.52	0.19	4.74	5.70	-0.01	-0.08	-0.05	-0.04	0.05	-0.02	-0.11	0.06	0.10	-0.18	
12 Population mass (log)	7.02	0.13	6.88	7.37	-0.07	-0.03	-0.08	-0.03	0.08	0.03	-0.02	0.02	0.08	-0.13	-0.15

The number of observations = 2577

Table 6. Discrete-time event history analyses of professional services entry

Predictor variables	(6-1)	(6-2)	(6-3)	(6-4)	(6-5)	(6-6)
Initial upstream product focus		-0.756 **				-0.720 *
		(0.293)				(0.331)
Computer systems (primary)			0.707 ***			0.507 *
			(0.207)			(0.221)
Manufacturing product diversification				0.052		0.063
				(0.059)		(0.054)
Complementary product diversification					0.202 ***	0.177 ***
					(0.056)	(0.053)
Controls						
Size: $50-250 million in sales (lag)	0.138	0.172	0.158	0.215	0.204	0.259
	(0.261)	(0.262)	(0.260)	(0.269)	(0.264)	(0.264)
Size: $250-750 million sales (lag)	0.755 **	0.869 **	0.764 **	0.727 *	0.609 *	0.723 *
	(0.290)	(0.287)	(0.285)	(0.306)	(0.307)	(0.305)
Size: $750+ million in sales (lag)	1.231 ***	1.252 ***	1.025 ***	1.191 ***	1.094 ***	0.989 ***
	(0.236)	(0.239)	(0.239)	(0.245)	(0.249)	(0.250)
Net profit margin (lag 3-year average)	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Age (log)	0.044	-0.020	0.071	0.075	0.057	0.010
	(0.133)	(0.131)	(0.137)	(0.133)	(0.140)	(0.137)
Population density (log)	-0.825	-0.905	-0.881	-1.047 +	-1.102 +	-1.230 *
	(0.568)	(0.554)	(0.565)	(0.583)	(0.577)	(0.568)
Population mass (log)	-3.496 ***	-3.662 ***	-3.633 ***	-3.488 ***	-3.477 ***	-3.729 ***
	(0.951)	(0.944)	(0.902)	(0.979)	(0.994)	(0.954)
Number of firm-year observations	2235	2235	2235	2115	2115	2115
Number of firms	350	350	350	327	327	327
Number of professional service events	107	107	107	101	101	101
Log pseudo-likelihood	46.330	54.500	63.340	41.830	47.000	71.000
Wald chi-squared	-518.440 ***	-514.777 ***	-514.296 ***	-481.552 ***	-477.422 ***	-471.005 ***

The results based on robust standard errors. Coefficients displayed instead of hazard ratios.
*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; + $p \leq 0.10$

3.7 Appendix 1 – Notes on operationalizing professional services entry

For example, the professional services variable is set to one in the following cases:

"For example, the newly-created Professional Services Division helps customers implement open systems and provides systems integration." (Hewlett-Packard Company 1991)

"In 1996, the Company expanded its offerings of professional services through its Teris Consulting Group. The Company provides consulting and technical services and technology as part of providing single point-of-contact solutions. The Company's consultants help clients plan, implement, and manage computing and storage environments." (Storage Technology Corporation 1996)

"EMC formed its Enterprise Storage Professional Services business in 1997 to design and deliver world class professional services to its global customer base... The Company has hired 100 Professional Services employees to date." (EMC 1997)

Sometimes firms do not signal the newness of their professional services strategy directly in the 10-K report. For example, Compaq's acquisition of Digital Equipment Corporation in 1998 gave it a diversification entry into professional services. It was a clear case of diversification into services as written about by industry analysts. The Compaq Services Group did not exist in 1997. While the empirical analysis assumes that this transition is significant, the 10-K report omits this background information:

"The Compaq Services Group provides innovative, proactive life-cycle services that meet a wide variety of information technology infrastructure business requirements. Compaq Services accounted for 12% of Compaq's worldwide revenue in 1998. Compaq offers a comprehensive portfolio of professional services and support through a global network of approximately 27,000 employees as well as 30,000 service delivery partners to help customers plan, design, implement, and manage and maintain their information technology solutions." (Compaq Computer Corporation 1998)

Sometimes the transition into professional services is very subtle. Cylink, a young firm with 325 employees focused on security hardware products in 1998, established a professional services group. As a small firm with employees who often have multiple duties, the vice president of human resources in 1997 also became the vice president of professional services in 1998. The signal was picked up in the description of executive officers in the 1998 10-K report.

Later in 1999, the firm articulates more of its intention around professional services as they acquired a consulting firm. So indeed, the 1998 signal reflected a change in services approach for Cylink. Also, the former vice president of the professional services organization confirmed these events.[12]

The search criterion is flexible enough to detect various combinations of professional service phrasing such as *professional consulting services*. See the case of Dell below:

> *"Through Dell Technology Consulting, the Company offers professional consulting services to help customers select and implement server and storage solutions." (Dell Computer Corporation 2000)*

Since this is a computer-generated measure, caution is taken to root out false positives. For example, the following discussion equates to a 0 value:

> *"Audit fees were for professional services rendered in connection with the company's annual financial statement audits and quarterly reviews of financial statements for filing with the Securities and Exchange Commission." (eRoomSystem Technologies 2003)*

In the above example, the firm is paying for outside assistance so that it may diligently comply with SEC filing regulations rather than referring to a set of income-generating skills offered to customers.

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[12] Phone conversation on November 3, 2010.

4   The Evolution of Professional Services at EMC

4.1   Executive Summary

A major theme in the management of innovation concerns the nature of change. Given that technology is often a source for competitive advantage in new product development, manufacturing process improvements, and internal productivity gains, the topic of technological change has been a key area of study. The general consensus is that the established innovator greatly struggles and often fails in the face of change that disrupts existing resources, existing know-how, and existing organizational competences.

On the other hand, the established innovator prefers change that builds on existing resources, existing know-how, and existing organizational competences. The idea of building on existing know-how and practices is also a central theme within the strategic management literature on diversification. I suggest that change in the setting of diversification expansion is about the direction of change from within. Diversification scholars find that the established innovator is more likely to expand into related new markets and businesses that create the greatest synergies with existing businesses. These synergies produce economies of scope and are believed to be created from the ability to reuse existing resources. Yet, not all related diversification expansions are smooth. When managers expand through mergers or acquisitions, the integration of the two firms often fails to generate the intended synergies and thus this literature suggests that expansion through internal development is the easiest to implement – i.e., the least disruptive.

Given this background on the nature of change within organizations, this chapter takes an inductive approach to study the beginnings and the evolution of professional services at EMC. The business of professional services began as an idea with executive support in 1995. Through the use of public archival data and interviews with current and former employees, I explore the process of when, why, and how EMC built a new complementary organizational capability in a very dynamic environment from 1995-2010.

I find that the process to build a new complementary capability depends on how long it takes to establish credibility with key organizations and how long it takes to be perceived as aligned with the business model of the core. Professional services were intended as an architectural enabler to combine multiple products within an expanding portfolio. This higher-level architectural view was often perceived as misaligned when viewed through a product-oriented business model lens. Credibility depends on scale (enough resources) and skill (ability to deliver consistently). However, scale is often constrained for the complementary in favor of the core. On the other hand, these resource constraints often result in the use of very flexible arrangements that simultaneously combine make, buy, and partner approaches to activate complementary capabilities. This flexibility is realized over time through a process of learning as the firm struggles to adapt within a very dynamic environment. By comparison, the core competence in storage products is persistent and always internal (i.e., "make"). However, when

the competitive environment changes such that the core is devalued, the firm's survival may rest on its ability to reconfigure the complementary and supplementary capabilities.

The primary analysis in this chapter is split across four time periods where I examine the strategic intent and implementation of the professional services organization. Each section considers the overall technology strategy, the competitive environment, and the fit of professional services. Section 4.5 begins with a historical background on EMC from founding to 1995. The section specifically highlights the development of three distinctive competences leading up to 1995: technological innovation with Symmetrix, direct sales account management, and customer service. Section 4.6 focuses on the dot-com boom era from 1996-2000 and examines the struggle for organizational fit for the new professional services business. Section 4.7 focuses on the market collapse of 2001-2002 and how the professional services business faired in the context of a major restructuring effort. Section 4.8 focuses on the post dot-com era of 2003-2010 and examines how professional services evolved as the firm aggressively diversified through acquisitions. Section 4.9 concludes with a discussion of common patterns across the various time periods.

4.2   Introduction

A key question in the management of innovation is why firms struggle with disruptive change. This question has been examined from multiple angles. One strand of literature looks at how organizational capabilities become organizational rigidities within a new technological regime (Leonard-Barton, 1992). Old routines and competences turn from advantage to disadvantage.

A recent strand has examined this as an issue of managerial cognition. Somehow top managers are stuck using old frames – the new wine in old wineskins dilemma. What is often perplexing in these settings is that managers are quite bright and the firms often have the new technology in their labs. But balancing the new opportunities with the existing cash cow business is extremely difficult. Polaroid held patents in digital photography yet managers viewed the new opportunities through the lens of the old razor blade business model (Tripsas & Gavetti, 2000). In the disk drive industry, firms listened too intently to their existing customer base and missed the new markets (Christensen & Bower, 1996).

While the research has overwhelmingly shown that firms have difficulty managing disruptive change, there exists an implicit assumption that incremental change is either easy or at least less disruptive. This chapter examines an area of related change from within and asks the question, why is incremental change so difficult?

I conduct a case study of EMC Corporation, specifically focusing on its position in professional services. EMC is a compelling case not simply as an example of innovation, but also in that it has like most large firms experienced periods of emergent growth and then struggled as competitors eventually caught up and eroded its dominant position. This is a very typical story that goes far beyond technology firms. My focus in this dissertation is to explore the role and evolution of complementary capabilities within a technology-intensive context, especially when they cut across product and service domains. While an "n of 1" is difficult to generalize from, a deep dive within one firm over many years provides a level of variation by which we can hold the larger firm context constant. If we believe that a firm's course has a high level of path dependence based on its founders' imprinting, culture, and values, then a longitudinal case of one can examine the process by which a firm grows, struggles, and competes within the backdrop of technological change and competitive rivalry.

The case for services within technology firms has been dominated by stories of IBM and the formation of IBM Global Services under the leadership of Lou Gerstner. Although IBM was generating billions of dollars in revenue from services prior to Global Services, the creation of Global Services represented a sea change at IBM. When Gerstner signed on at IBM, the firm was experiencing a major downturn and most industry pundits were calling for the dismantling of Big Blue into smaller, more nimble technology firms. Gerstner kept the firm intact, but formalized a greater shift towards services. And so the story goes. What many take away from the Global Services lesson is that when a tech firm is in trouble, then it's time to play the services card. Why? If the product portfolio is no longer competitive either due to market saturation or lack of competitive differentiation, where will the established firm generate revenue? One answer is to enter and/or expand into services. A similar story comes through from Cusumano's work on the software industry. Finding it difficult to create a second hit product, the software product business collapses and the firm dies a slow death on life support from a maintenance service business (Cusumano, 2004). These two stylized examples represent the conventional wisdom within hardware and software technology product companies. HP, Xerox, and Dell

seem to be following a similar script as each mature technology firm has made a multi-billion dollar services company acquisition in recent years. Scott McNealy, co-founder and former CEO of Sun Microsystems, was reported as describing services as "the graveyard for old tech companies that can't compete."[13]

Within EMC, this chapter examines the entry and evolution of professional services during a period of unprecedented growth but also following a catastrophic collapse. Our conventional models would concur that services as a complementary capability plays a major part during market collapse, but what about during periods of growth? What is the story there? Is there a story there? The section that examines EMC's services strategy during its big growth phase asks the question, when and why is an incremental, complementary capability so difficult to implement? The subject of firms struggling with disruptive change is a well-known theme within academic and practitioner circles for the management of innovation. Tripsas and Gavetti (2000) show the struggle of Polaroid in managing the transition from traditional (silver halide) to digital photography. Christensen (1997) showed a repeated cycle of disruptive change coming from the low-end suppliers within the rigid disk drive industry. Although they had the technology, the incumbents were either late or completely missed the emerging markets that disrupted the status quo.

The counterfactual is that somehow incremental change must be far easier to digest and integrate – at least to the extent you get past differences in organizational cultures. Tushman and Anderson (1986) call this situation competence-enhancing change and make the case that industry leaders are more likely to promote incremental types of innovations so that they can leverage existing resources and competences. The strategic management literature on corporate diversification debates the value of related versus unrelated diversification moves. The case behind related diversifications boils down to exploiting synergies between the core business activity and the new expansion business opportunity. Resource similarity is argued to be the mechanism that facilitates these synergies that ultimately result in economies of scope (Penrose, 1959; Rumelt, 1982). Examples cited are technological resources such as patents (Silverman, 1999), common employee routines (Chang, 1996; Farjoun, 1994), and similar managerial logics (Prahalad & Hamel, 1990; Tanriverdi & Venkatraman, 2005). Although empirical results are

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[13] New York Times, "IBM shrugs off loss of contract it once flaunted," Sep 16, 2004.

mixed, related diversification is portrayed to be the preferred type of diversification (Palich, Cardinal, & Miller, 2000; Rumelt, 1974).

The innovation management literature has mostly ignored the topic of incremental change under the assumption that it is easy or perhaps uninteresting. The chapter examining services within EMC during a period of market growth answers the question, when and why is incremental competence-enhancing change so difficult? Given top management cognition and support of the complementary capability's importance, why is its implementation so difficult? What are the limits of complementary capabilities and how do they change over time?

The results suggest that some incremental changes fall into a category I call competence-extending change – change that is related (diversification literature), complementary, and competence-enhancing (innovation management literature) relative to the core technological knowledge. What's clear is that the complementary capability builds on the firm's existing know-how in the market and does not destroy existing competence in storage technology. Yet the competence-extending complementary capabilities require a new organization with very different operational models and organizational routines than what resides in existing product and customer service businesses. Competence-extending change seems to make sense at a strategic level yet creates internal organizational tensions that require a modified alignment of incentives to execute effectively. Firms must balance short-term market expectations (maximize product sales) with a plan to adapt to emerging long-term market trends and dynamics (distributed computing giving rise to more solutions that use more complex combinations of products).

4.3   Methods and Data

This research is based on an in-depth, inductive case study of the evolution of professional services within the EMC Corporation. Given the open-ended nature of my questions concerning the strategic role of services and the relationship between services and a firm's strategic evolution, this approach seems most useful for theory building (Glaser & Strauss, 1967; Miles & Huberman, 1994; Yin, 2009). In addition, by taking a long-term historical perspective, we gain insight into the evolutionary nature of a firm's strategic process relative to the when, why, and how the firm chose to build a new complementary set of capabilities and the organizational implications. This case provides an opportunity to open the black box on strategic

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choice in what I call incremental disruption, balancing current incentives and organizational alignment during incremental change.

This case study is an opportunity to explore the dynamics of complementary capabilities, specifically the entry and evolution of new-to-the-firm complementary capabilities. Prior research shows that complementary resources and capabilities are important to commercialize an innovation (Teece, 1986) and also that the value of these assets can change over time . This study provides evidence on the complexities of incremental change.

This paper relies on data from the following sources: (1) data from company 10-K and annual reports, (2) custom search results of the LexisNexis Academic database that include company press releases and industry news articles in trade magazines and newspapers, (3) archival data from over 2300 investment analyst reports of EMC obtained from the Investext (Thomson One) database covering 1992-2010, (4) oral histories from all three CEOs – one of whom was a founder – available from the Computer History Museum and the Computerworld Honors Program archives, (5) data from 12 personal interviews with current and former managers who have had direct involvement in planning, building, and growing the professional services footprint at EMC, and (6) presentation materials available from the Technology Professional Services Association (TPSA) annual summit of November 2006. Although I present the data collection process in sequential stages, the actual research process was highly iterative. The data collection process discussed here was also influenced by insights gained from analyzing the quantitative data outlined in Chapter 3 and preliminary open-ended interviews with individuals from Red Hat, Unisys, Hewlett-Packard, IBM, i365 (a Seagate company), and TPSA.

4.4   Analysis

The analysis involved a highly iterative process. Initial selection of EMC came from examining the 10-K reports and picking up a clear signal of the creation of a professional services business in 1997. Preliminary interviews with EMC in spring 2009 provided useful insight into the evolution of their professional services approach. With former employees responsible for the initial planning and startup of the professional services business still living in New England and willing to participate in the research project, I decided to move forward with a case study of EMC. Later follow-up discussions with current employees in spring 2010 provided further access to participants with more recent knowledge of this evolution. A total of 12 one-

hour interviews were conducted, transcribed, and annotated into approximately 270 double-spaced pages. Key themes and relationships were highlighted from these interviews.

Table 4.1. Interviews with current and former EMC employees

Name	PS-related job at EMC	Date	Interview	Tenure	Other background information
Brad Ashbrook	Market Strategy & Pricing Analyst, EMC Global Services	Mar 31, 2009	In person	2000-	
Kevin Kittridge	Director, Global Services Strategic Research	Mar 31, 2009	In person	2008-	Business analytics experience in financial services industry
Brian Garvey	Analyst, Global Services Strategic Research	Mar 31, 2009	In person	2006-	Former engagement manager at a management consulting firm
Tom Roloff	Senior VP, EMC Consulting	May 11, 2009	In person	2005-	Management consulting experience
Alan Sarasohn	Former Managing Director, EMC Professional Services	Jun 14, 2010	In person	1997-2000	Prior software and services company experience
Anonymous	Former VP, EMC	Jun 18, 2010	Phone	1995-2001	DEC Consulting; partner at management consulting firm
Jeff Sands	Former Planning Manager, EMC Professional Services	Jun 25, 2010	In person	1996-2000	Former marketing manager within DEC Consulting
Sandy Hamilton	VP of Infrastructure Consulting Practice, EMC Consulting	Jul 16, 2010	Phone	2008-	Former partner and founding member of Information Solutions Consulting at Accenture
Ed Berndt	VP, EMC Global Services -- Americas	Jul 19, 2010	In person	1999-	Systems engineering experience at IBM
Dave Cox	VP of Application Consulting Practice, EMC Consulting	Jul 23, 2010	In person	2004-	Engagement manager at McKinsey; EMC account
Patrick Dennis	VP, EMC Global Presales Organization	Jul 27, 2010	In person	2000-	Systems engineering; services sales
Bob Scordino	Area Sales Manager, EMC	Oct 2, 2010	In person	1987-1989, 1990-	Over 20 years within sales at EMC
Bob Fusaro	Former Regional Manager, EMC Professional Services	Oct 6, 2010	In person	1997-2007	Professional Services Regional manager (6/97-5/01)

The EMC analyst coverage data includes investment analyst reports from 1992-2010, transcribed quarterly earnings conference calls starting from Q2 2002, and transcribed executive keynote speeches at analyst conference events. A timeline of major professional services events was created from the investment analyst data, interviews, annual reports, and Lexis Nexis news articles. Figure 4.1 provides a list of key search terms used to identify major services events.

Search terms for EMC services events and information in analyst reports and Lexis Nexis news database

EMC

professional services
customer service
implementation services
integration services
consulting [services]
information solution
solutions consulting
global services
storage services
migration services
managed services
technology solutions
service
services organization
services oriented
services revenue
services business
technology services
deferred revenue
maintenance
professional maintenance
authorized services
warranty

Figure 4.1. Search terms: analyst reports and Lexis Nexis search

Following the approach from Tripsas and Gavetti (2000), I created a timeline of capabilities, search activities, and managerial beliefs from 1979-2010. Since this study is about the evolution of complementary capabilities, it was important to capture not only the PS events but also the larger internal context as well as external competitive conditions. The broader internal context highlights the evolution of other complementary capabilities such as the new software business that began in 1994 and the customer service (CS) organization that was instrumental during a product quality crisis in 1989. The timeline helped to highlight major themes and major relationships between PS movements and other processes. The primary analysis focuses on years 1996-2010, but the analysis also includes a description of the culture that was imprinted as of 1995 by the founders and key employees.

The analysis fits approximately into four time periods: 1979-1995 (pre-dot-com and pre-PS era), 1996-2000 (dot-com growth), 2001-2002 (dot-com collapse), and 2003-2010 (EMC 2.0). Other than the pre-PS era, each period focuses on EMC's approach to complementary professional services capabilities with the discussion organized into opportunity identification,

strategic intent, strategic actions, and resulting capabilities and beliefs. Following the last time period, I think more broadly across the time periods to examine the evolution of capabilities – core, supplementary, and complementary – during a very dynamic period in the IT industry.

Figure 4.2. Evolution of capabilities, search, and beliefs at EMC

Capabilities

1995
- Symmetrix storage
- Motivated direct sales force
- "Whatever it takes" CS

2000
- Symmetrix storage
  - **Mainframe & open sys**
- **Innovative EMC software**
- Motivated direct sales force
- **EMC solutions focus**
- "Whatever it takes" CS
- **PS implementation services**

2002
- EMC storage technology
  - Symmetrix high-end
  - **Clariion mid-tier**
- Innovative EMC software
- Motivated direct sales force
- EMC solutions focus
- "Whatever it takes" CS
- PS implementation services

2010
- EMC storage technology
  - Symmetrix & Clariion
- **Infrastructure software**
- Motivated direct sales force
- EMC solutions focus
- **Channel partner programs**
- "Whatever it takes" CS
- PS implementation services
- **PS consulting services**

Search activities

Pre-1995
Technological
- Memory boards for multiple h/w platforms
- Symmetrix: RAID storage innovation
- Productize EMC s/w

Services
- Customer satisfaction via CS

1996-2000
Technological
- Symmetrix innovations
- Storage interoperability
- EMC Symmetrix s/w
- Networked storage (SAN and NAS)
- Mid-tier/modular storage

Services
- CS
- Build consultative PS org

2001-2002
Technological
- Seamless storage portfolio (Symmetrix & Clariion)
- EMC and multi-vendor s/w platform (AutoIS, WideSky)
- Networked storage

Services
- CS
- PS implementation services
- Consulting alliance: Accenture
- Formalize partner program

2003-2010
Technological
- Storage portfolio (Symm & Clar)
- EMC and multi-vendor infrastructure s/w (ILM, cloud computing, virtualization, etc.)
- Networked storage standards

Services
- CS
- PS implementation
- EMC Consulting
- Partner programs

Beliefs

1995
- #1 in mainframe market
  - Healthy profits, but declining market size
- Open systems opportunity
  - Slim profit margins, but growing market size
- First-mover advantage
- Increased competition
- Avoid commoditization
  - Symmetrix software
  - Build consultative PS

2000
- Storage leadership via interoperability and solutions
- Continued growth in enterprise data storage
- Premium pricing for EMC solutions
- Upside in EMC software product business
- EMC strength w/o partners
  - HP breaks off
- Pursue mid-tier market
- PS enables solutions

2002
- Rethink everything
- Revitalize Symmetrix
- Expand to mid-tier w/Clariion
- Partner friendly
- Greater emphasis on multi-vendor software for growth
- Shape networked storage standards
- Extend PS capabilities through external partners

2010
- IT infrastructure technologies
  - Storage products
  - Infrastructure software
  - Solutions orientation
- Acquire emerging techfirms when necessary
- Complementary services
  - Product led
  - Services led
- Clear segmentation that enables channel partner opportunities

4.5 EMC in Storage Technology

4.5.1 EMC's foundations: 1979-1995

Imprinting by the founders: 1979-1990

In the days of strong consumer technology brands such as Apple, Google, and Facebook, many people are not familiar with the EMC Corporation. The story of EMC evokes many of the classic themes of "successful" technology firms: founded by engineers, radical technological innovation, humble beginnings, meteoric growth, world domination in their market space, and eventual product market calamity.

On the other hand, the EMC story is not a completely classic high tech story in that the two founders, Richard Egan and Roger Marino, were beyond their engineer tinkering days. Egan and Marino knew one another from Northeastern University where they received undergraduate degrees in electrical engineering in 1961. Egan exercised his engineering talents on early computer memory systems at Honeywell, Cambridge Memories (later named Cambex), and MIT where he worked on the Apollo Program sponsored by NASA. While at MIT, Egan took many graduate level engineering courses but did not formally earn a masters degree. His last corporate position before EMC was as the general manager of the memory systems division at Intel.

Following his undergraduate work, Marino took technical sales positions at Computer Controls Corporation (3C) and RCA – each time in the area of memory systems. By the time they started EMC in 1979, Egan and Marino had logged over three decades of experience that spanned R&D, marketing, sales, and general management in the computer memory systems business. The 'C' person has remained a mystery. He pulled out of the venture soon after the company name was registered, but Egan and Marino refused to pay another $85 to register a different name.[14]

While legend often states that Egan and Marino started out as furniture salesman, their initial focus was to start a manufacturer's representative business. In other words, Egan and Marino started an independent sales company to call on small customer accounts on behalf of a large manufacturer for whom a direct sales approach is only cost effective for large customer accounts. At the time of founding, Egan and Marino had neither a formal business plan nor a tangible engineering idea. EMC was a sales organization. As a means to furnish their small

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[14] Computer History Museum, "Oral History of Richard Egan," September 17, 2008.

office with furniture, they reluctantly agreed to represent a computer office furniture manufacturer as their first product line. Soon afterwards, EMC began to represent *real* high tech manufacturing firms with a special focus on memory systems products. Their most lucrative relationship was with Intel for whom they sold memories (DRAMs) and microprocessors.

The idea to develop their own memory product came after calling on a customer at the University of Rhode Island who was complaining about the high price of memory for Prime Computer systems. Although memory was expensive in those days, $36,000 per megabyte for Prime Computer memory was excessive even back then. Prime held a monopoly position for its memory and customers were locked in. With no competition from third-party plug-compatible memory vendors and following a brief investigation of the opportunity, EMC decided to develop a plug-compatible Prime Computer memory circuit board with a better price/performance ratio than what was currently offered by Prime. With the University of Rhode Island secured as the first customer and test site, EMC hired some engineers and entered the plug-compatible memory business with an offering for Prime Computer hardware platforms in 1981.

By 1990, EMC had expanded their plug-compatible memory product business to support several midrange hardware platforms: Prime, DEC VAX, HP 3000, Wang VS, and IBM midrange systems (System/36, System/38, and AS/400). Unlike platform leaders today that encourage third-party complementary innovations by publishing open APIs and standard interfaces, proprietary platform vendors often worked to thwart the efforts of plug-compatible complementors in an effort to keep customers completely locked in. For example, Prime sued EMC but later dropped the lawsuit when Egan threatened to counter sue for monopolistic behavior.[15] DEC threatened to sue EMC over the plug-compatible VAX memory boards. That suit never materialized once the EMC legal team pointed out some holes in the DEC VAX patents.[16]

In 1987, EMC started expanding beyond memory technology and into disk subsystem storage technologies. Rather than focusing on raw components such as memory chips or disk drives, EMC focused on areas where they could add value through custom hardware engineering and intelligent software. In the storage subsystem area, EMC introduced storage controllers, which were the intelligence that sat in front of the commodity disk drive components. However,

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[15] Computerworld, "Five things you don't know about EMC," July 4, 2007.
[16] Computer History Museum, "Oral History of Richard Egan," September 17, 2008.

this business proved to be more difficult than they expected. The problems in this business nearly resulted in the firm collapsing. A batch of defective parts from NEC created a major crisis that nearly bankrupted the firm. EMC stood by their commitment to customer service and repaired the defective devices in the field, but the added expense left the firm with no cash in 1989. This was a defining moment for the firm that likely shaped its commitment to customer service even to this day. Future CEO Mike Ruettgers, brought in as President and COO in 1988, believes that many of those affected customers remained loyal EMC customers having seen the firm's customer service commitment during tough circumstances.[17]

Historically, the proprietary computer hardware platform vendors dominated the peripheral products business. Before EMC entered the plug-compatible memory market in 1981, Prime was the sole source for Prime Computer system memory products. The platform vendor determined the interface and technical specifications for these peripheral devices while the third-party complementors imitated the platform vendor's design and technology. The best competitive advantage that a plug-compatible vendor could hope for was based on time to market (first mover among other plug-compatible complementors) and price/performance rather than from patents or other defensible forms of intellectual property. Although EMC went public in 1986 on the NASDAQ and later moved to the NYSE in 1989, their patent grant portfolio was nonexistent in 1989 having only recently filed two patents.

In September 1990, EMC launched what would become its flagship storage product – Symmetrix. While targetted for the high-end IBM mainframe storage market, the EMC Symmetrix did not follow the conventional script for a plug-compatible vendor. Instead of replicating the large disk design of the IBM 3390 and selling it cheaper, EMC launched a plug-compatible product with a radically different architecture known as RAID (Redundant Array of Inexpensive Disks).[18] RAID technology was a cutting-edge topic within computer science and engineering circles in the late 1980's. With microprocessor speeds rapidly increasing, I/O technology (storage in particular) was not increasing at the same rate. At the time, disk technology was considered slow. Rather than increase capacity through building bigger disks based on slow technology, the RAID concept was to increase storage capacity by putting together a large number of small, cheap commodity disks (Patterson, Gibson, & Katz, 1988).

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[17] Computerworld Honors Program, "Michael C. Ruettgers Oral History," May 2, 2001.
[18] The RAID acronym later came to represent Redundant Array of *Independent* Disks.

With the popularity of PCs rapidly increasing, 5 ¼" and 3 ½" disk drives were a cheap commodity. While RAID solved the capacity issue, the technology suffered from performance issues.

EMC combined the RAID principles with cached memory and intelligent software algorithms to solve the performance problem. They called it Integrated Cached Disk Array (ICDA) and hence, the Symmetrix was born. For approximately the same price as the equivalent IBM 3390 large disk technology product, Symmetrix provided comparable capacity and often better performance in one-fifth the floor space of the 3390. The smaller footprint meant lower costs for power and cooling. This was a radically new technology for the high-end, IBM-dominated storage market space.

The Dawn of Symmetrix: 1991-1995

Symmetrix quickly began to take off. Rather than maintain the new storage business and the existing memory business, EMC divested itself of the memory business in 1992 by selling it to Cambex. The ICDA technology primarily embodied by Symmetrix became the flagship product for the firm. In those days, it was unheard of for a third-party plug-compatible complementor to outperform the platform vendor – and especially when the platform vendor was IBM. Moreover, it was also unheard of for a third-party plug-compatible vendor to deviate from the technology architecture used by the platform vendor. Symmetrix was radical on many levels.

4.5.2 Capabilities: 1995

While this section highlights a set of distinctive capabilities that EMC had by 1995, it is intentionally limited to those areas that are most salient for the discussion about complementary capabilities in professional services.

Technological innovation: Symmetrix at the high end

By the end of 1990, EMC had barely made a dent in the mainframe storage world. IBM was the dominant vendor with 78% market share with Hitachi (a mainframe-compatible vendor) in a distant second position with 12% market share. Although the Symmetrix was launched late in 1990, its 0.2% market share in 1990 only slightly increased to 1.8% in 1991. By the end of 1995, EMC had accomplished what no other plug-compatible vendor had ever done and what

moreover seemed impossible back in 1990. In a few short years, EMC had outmaneuvered the platform leader, IBM. EMC's rapid progression is shown in Table 4.2.

EMC was the first vendor to commercialize the RAID technology within the high-end mainframe storage market. The first competitive response did not arrive until 1994. EMC launched a few other storage array products between 1992 and 1995, but the Symmetrix product line was the clear anchor of EMC's market position and fortunes.

By 1995, Symmetrix storage technology was the core competence of the firm, which covered product development and manufacturing activities. EMC had sold off their memory business and was now EMC, The Storage Architects.[19]

Table 4.2. Worldwide GB shipped mainframe storage market share, 1990-1996

Vendor	1990	1991	1992	1993	1994	1995	1996
EMC	0.2%	1.8%	5.1%	16.8%	32.4%	40.7%	42.5%
IBM	76.0%	69.1%	60.8%	48.4%	36.6%	36.9%	31.5%
Hitachi	12.2%	20.2%	22.7%	24.5%	18.8%	12.3%	14.1%
STK	2.8%	1.6%	0.8%	0.1%	4.5%	8.6%	8.7%
Amdahl	8.8%	7.3%	10.6%	10.2%	7.5%	4.5%	3.0%
Others	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%

Source: International Data Corporation, 1995 and 1996

Direct customer account management

Technological innovations do not magically turn into profits for the firm. To fully commercialize an innovation, complementary resources and capabilities are essential (Alan Hughes, 2006; Helfat, 1997; Milgrom & Roberts, 1995; Stieglitz & Heine, 2007; Teece, 1986; Tripsas, 1997). The sales and distribution approach is an important activity to get the new innovation to market. EMC preferred a direct sales approach. In some ways, EMC's direct sales force was like an IBM sales force – blue suits, white shirts, etc. But that may be where the similarity ends. EMC preferred new college graduates – primarily alpha males. Many of them were former collegiate hockey and football players who were once described as, "a bunch of ex-athletes running through walls at 100 miles per hour."[20] Sales training at EMC consisted of a structured, 90-day boot camp where everyone was taught the ins and outs of selling. This structured sales training, referred to as EMC University, was started as far back as 1984.[21] Given

[19] See US Patent and Trademark Office: http://tess2.uspto.gov/bin/showfield?f=doc&state=4010:ls8bs0.2.1.
[20] BusinessWeek, "EMC: High Tech Star," March 15, 1999.
[21] 1987 EMC Corporation Annual Report.

that the firm was founded as an independent sales organization (i.e., manufacturer's representatives), a strong sales culture is not surprising.

When asked to describe the sales force back in the 1990's, one sales manager who has been in the sales organization since the late 1980's summed it up simply, "very competitive [and] very aggressive."[22] The reputation of the EMC sales force was well-known beyond the boundary of the firm as one investment analyst described it, "EMC's 'no excuses' sales culture executes day in and day out."[23] See Table 4.3 for a further description of the sales culture during the 1990's.

Table 4.3. EMC sales organization and culture during the 1990's

[22] Interview with Bob Scordino, October 10, 2010.
[23] Wells Fargo Van Kasper analyst report, "EMC Corporation," February 1, 2001.

Source	Representative evidence
"Boot camp" sales training	
Bob Scordino	"Back then it was very basic sales 101 [training], which was one of the things that attracted me to it. It was a very formal 90-day program broken up into modules. It was a very straightforward process. This attracted me. I wanted some good sales training."
Bob Scordino	"One day out of the week would be basic sales 101 training, i.e., audio tapes you could go buy at Barnes and Noble. What that ingrained in you was that sales was ultimately a numbers game. You need to be smart. You need to be organized. You need to understand your competition and your products, but ultimately you need the energy and drive to continue to be able to take 'No' for an answer and move on [but then later] circle back to the customer."
Norms and expectations	
Bob Scordino	"[It was] very strict in terms of how you operated everyday. In the office by 7AM. You did your internal type work between 7-8AM. From 8AM-5PM, [you did] nothing but customer facing. [At] 5, 6, 7, 8PM – you did whatever you needed to do to be responsible for your customers."
Bob Fusaro	"But there was also that image, it's EMC. At that time, I remember wearing a white shirt and a tie to work everyday. Blue suit, white shirt and a tie. Like the old IBM."
Bob Scordino	"They would rank everybody and put it up so all could see. So you knew exactly where you stood because we all had the same quota regardless of your territory which was set from on high. Back then was kind of the Wild West in terms of opportunities..."
Bob Scordino	"The immersion into the field was immediate. You had a manager who was both your mentor and your manager. He gave you a chunk of physical territory and the world was your oyster."
Bob Scordino	"Yes, [I would cold call] as high [ranking] as possible. That was part of the basic training. We had an elevator pitch that we worked extensively so that when you got that person on the phone you had something to say. You had your hook. You asked for your meeting. If deferred, at least try to send something in the mail... and then you do a followup. You'd be surprised. I got many meetings where it took me 12-18 months to get through perseverance... You were expected to know everything there was to know about your product and the competition."
Bob Fusaro	"[In] the field office, part of the culture then was to fire at least 5% of your staff on a quarterly basis -- the bottom 5%. So stack ranking was a term I became very familiar with -- every quarter. Some quarters it was 10% and some quarters it was only one or two people. ... This came out of Jack Welch [former CEO of General Electric]. Jack Welch was always a proponent of stack ranking your people and getting rid of the bottom 5% and bringing in the performers... You look around and say I have 15 guys and they all did 125% or higher of quota. Why would I fire anybody? 'Yeah but [somebody else] had some people that did 250% of quota. So they did twice as much as these guys. These guys aren't performing.' Those are the conversations that would go on. I don't have anybody that's failing, they're all exceeding. It's just that constant give and take, that tension that was always there. People had made 125% of quota, kicking ass on their comp plan, and could still get let go."
Strong incentives	
Alan Sarasohn	"These sales guys were making big, big, big, big money – seven figures."
Bob Fusaro	"[In the 90's,] EMC was [virtually] printing money. You had 23-24 year old kids still wet behind the ears making a million dollars a year."
Bob Scordino	"['Club'] was strictly an achievement club. It was Club 101. If you made 101% of your annual quota, then you went on this all expenses paid 3-day trip. The top 10% of people who made Club were considered Platinum Club, which meant an extra day and upgraded accommodations or something like that. That was the motivation... It was primarily about making money. It varied over the years but the incentives were always there especially in the 90's and into early 2000."

Perception relative to direct sales at systems vendors	
Bob Scordino	"We did [an alliance] with HP for a while. It was a major culture clash. Just completely different go-to-market mentality. ... First person I called was a woman and I left a message. Another woman called me back and said, 'We job share.' I said 'What?' [She said,] 'We're working moms.' That was so foreign to me. That was quite a while ago. I remember hanging up the phone and saying, 'Job share?' And they all had a handful of named accounts. That's risky. Why would you ever [limit yourself to] five accounts? How do you maximize your income when you only have five places to go? [It] just blew my mind. In hindsight, they were there for the longer haul. [HP] had a very broad product offering. They were selling the customers printers, servers, services, and things that were all foreign to me. I just wanted to jam another Symmetrix into another truck. We were laser focused."
Bob Scordino	"HP was a technology company that did sales. EMC was a sales company that did technology."

Commitment to Symmetrix	
Bob Scordino	"Symmetrix was the answer to any problem you had."
Bob Scordino	"Centriplex was our attempt at the midrange but we didn't do it well. We weren't really focused on it. And it was tough... The way I viewed it and the way I think most [sales] people viewed it was you're better off fighting for Symmetrix... We had our issues over the years but generally speaking, it was such a solid platform that if I could get you to pay the premium, it made my life a lot easier. It rarely had issues and if it did, we were all over it. We had the support in place. We understood the environment. It all made sense. So if you're going to bang your head off the wall selling something, do you want to sell a Toyota or a Dodge? I think you're going to sleep better if you own a Toyota."

Power	
Alan Sarasohn	"The egos were pretty big there. Because you came from IBM, that wasn't highly regarded. Because you came from HP, that wasn't highly regarded... The guys who really wielded the power there were the guys who grew up there. The guys who came in as recent college grads and got taught a way to sell and taught a way to behave and taught a way to manage sales people. I don't know what it's like there today, but when I was there that's what ruled the roost big time...big time."
Tom Roloff	"The other dominant culture is the sales culture, which at EMC is the dominant culture. The sales organization owns the customer. They are responsible for the account relationship. We have very 'Type A' people within sales who want to own the agenda with the customer."

Customer service

In addition to the well-trained and highly-motivated direct sales organization, another key complementary capability was Customer Service (CS). A culture within CS developed that was obsessed with quality and customer satisfaction. However, a focus on quality was debatable during the crisis of 1988 and 1989. Poor product quality nearly bankrupted the firm in 1989. Although the reported source of the problem was a defective part from one of its component suppliers, at no cost to the customer EMC replaced the defective units. If quality and customer service were questionable in the late 1980's, that crisis helped to drive a deep commitment to those ideals from there on. A do-whatever-it-takes culture developed in CS and that together with the direct sales approach complemented Symmetrix very well in those early days.

From a revenue perspective, Customer Service was not managed as a profit and loss organization. It was a cost center although EMC staff often describe it as an investment center. Stated differently, the cost of support services were bundled into the price of the Symmetrix. The customer saw one price for the Symmetrix and that included pre-sales support from systems engineers, installation, and three-year warranty covering spare parts and break/fix support. Towards the end of the warranty cycle, the typical scenario involved upgrading the Symmetrix to a new version – referred to as a refresh or "flipping it."[24]

From a technological perspective, the Symmetrix included a feature called Auto Call that automatically notified the customer support center when an error was detected at a customer site. Sometimes EMC support would know about a customer's problem before the customer did. In high-end markets with enterprise customers, there is little room for error. Through its large support staff, worldwide support centers, and remote diagnostic tools included with the Symmetrix, EMC did whatever it took to support a successful installation and maintenance of the Symmetrix. See Table 4.4 for a further description of the Customer Service culture.

Table 4.4. EMC Customer Service culture

Source	Representative evidence
Whatever it takes culture	
Bob Scordino	"[The Symmetrix] was such a solid platform that if I could get you to pay the premium, it made my life a lot easier. It rarely had issues and if it did, we were all over it. We had the support in place. We understood the environment. It all made sense."
Computerworld, 6/15/92	"EMC's technical support is as good as IBM's, the users said. The vendor regularly checks in to clear up trouble before it impacts operations. Symmetrix mirroring and hot replacement allow EMC technicians to fix problems without downtime, where IBM technology still requires some downtime for replacement."
Madison Securities analyst report, 12/20/99	"EMC differentiates itself from its competitors with distinctive customer service. While EMC charges higher prices for its products, customer service is free. EMC's reputation as being fanatical about keeping customers happy is legendary in their industry. EMC's attention to servicing its customers is an effective barrier to competition."
Managing Customer Service, September 2001	"How did they get here? EMC got really good at customer service only after it was really, really bad, according to Judge's account. He reports that when Mike Ruettgers joined EMC in 1988 as executive vice president of operations and customer service, '[the] company's products were failing left and right and EMC itself was on the verge of bankruptcy. The biggest crisis involved a batch of faulty disk drives that EMC had shipped to customers.' Ruettgers, who was hired as a 'high-tech troubleshooter,' toured the country, 'meeting with customers in a desperate bid to contain the damage to EMC's reputation.' He acted as 'a kind of executive punching bag, absorbing as much anger as he could in an hour-long meeting and then moving on to the next one.'"

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[24] Flipping it refers to purchasing a new product version rather than maintaining the current older unit.

A cost/investment center

Jeff Sands	"Services were a cost center, not a profit center. When customers bought a Symmetrix, it came with remedial maintenance for three years. The goal was every three years, it was upgraded and traded in so [we] didn't need to worry about selling services. For those customers who wanted to keep their Sym, there were service contracts available that the service people would sell if the customer wanted it. But the goal was never really to sell services as a revenue stream for the company. [It] just wasn't thought of that way."
Brad Ashbrook	"Specific to EMC, we have always been on the [maintenance] services side more of an investment center. It was more the strategy, from a business standpoint, primarily to have customer satisfaction and technical support that was beyond reproach and would be part of the brand."
Former PS planner	"At EMC, Customer Service was free. When you bought something, it was 'premium priced' into the price of the product. There was no separate invoice for Customer Service. And sales support was free as well."

Hardware installation and break/fix support

Alan Sarasohn	"Prior to this new [PS] organization, everything EMC did for services was bundled in. They had a huge Customer Service organization. It was highly regarded internally and externally. Internally, 'it's free.' It doesn't cost Sales anything to bring these guys in. And it makes the Sales [person] look good because [Customer Service] makes the customer look good. The Customer Service organization was predominately hardware install and break/fix [support]."
Brad Ashbrook	"Back then, services were mostly related to installing and implementing the solution and keeping it running. Bascially an installation/implementation and ongoing support. There wasn't any consulting. The pre-sales activity was really kind of a sales engineering function as opposed to calling it heavy duty solution architecting or that sort of thing. It was more like, 'What do you need?' and, 'Let's put the order together.' It wasn't part of the services. Functionally, it was really more a sales engineering function than a pre-sales function."

Remote support technology

Brad Ashbrook	"So there's a distributed, around the clock, remote support capability [where] most of the systems we sell have this remote connectivity capability where they report back problems. We used to call it Dial Home... [It helps in] identifying a problem and dispatching somebody and resolving it remotely."
EMC press release, September 1990	"The system also offers key hardware redundancy and is equipped with an 'auto call' capability, which automatically notifies an EMC service center of a system problem or future system need, such as a replacement part."
Managing Customer Service, September 2001	"[EMC's remote monitoring] preventive approach is so effective, according to Walton, that 'most of the time, we address problems before the customer even knows that there's an issue.' One key to this approach is the sensors that are built into EMC's storage systems that perform more than 1,000 diagnostics, monitoring 'such things as temperature, vibration, and tiny fluctuations in power, as well as unusual patterns in the way data [are] being stored and received.' Each machine 'checks its own state of health' every two hours, and if it finds anything amiss, it gets on a dedicated line to EMC's call center in Hopkinton, Ma. and the 80 people trained to respond to machine-generated queries to the tune of 3,500 calls a day. In about a third of the cases, a customer engineer is dispatched 'to lay hands on the box.' Why? One customer, Joe Lindsay, senior director of operations and system engineering for Ad Force, explains his experience on the EMC Web site: 'It amazes people here that an EMC engineer will show up with a drive and we've never even called. The fact that the system calls home and reports an error and EMC dispatches someone to repair it without any intervention from us instills confidence that our systems are running fine and we're not the only ones watching.'"

4.5.3 Beliefs: 1995

This section intends to capture the set of managerial beliefs that were guiding decision making as the firm moved through the mid-1990's. Some overlap with the current set of capabilities, but most are based on future intent and positioning that the firm wanted to obtain.

First mover advantage

First movers can build strong brand loyalty, establish a reputation for being innovative, and benefit from learning before rivals (Lieberman & Montgomery, 1988). However, when future market directions are clouded in uncertainty and innovations are easily imitated by competitors, first-mover advantage turns into a disadvantage. Often a fast follower can leapfrog over the first mover by not repeating the same mistakes. Not so in this case. EMC was the first mover into the mainframe market with a RAID product and for a decade was virtually untouchable. As competitive RAID products faced numerous delays, EMC's first-mover advantaged stretched into nearly a four-year lead by the time Storage Technology (STK) and IBM launched their storage array products for the mainframe in 1994.

Competitors are entering

By the end of 1990, it was not obvious that EMC would have a multi-year advantage. STK had started to describe their plans for a RAID product as early as February 1990.[25] STK was the leader in tape drive storage systems and was considered to be the main rival to compete against IBM in the mainframe storage market. The STK Iceberg 9200 Disk Array Subsystems was the topic of much discussion in the press and was expected to launch in 1992. Unfortunately, the firm continued to over-promise and under-deliver until finally releasing the product in May 1994.[26] Despite the long delays, Iceberg was recognized as a very innovative product in the trade press – called "the hottest innovation in the high-end computer market" in 1994 by one industry trade magazine.[27] Although its features were very novel, the STK Iceberg was far behind EMC in terms of units shipped. EMC had shipped nearly 1,000 of its most-profitable high-end Symmetrix units by the end of 1994.[28]

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[25] Computerworld, "Storage Tek faces turbulence," February 26, 1990.
[26] See Computerworld, "Iceberg finally thaws out," May 2, 1994 and InformationWeek, "IBM's storage sell – is RAID offering too late to challenge competing vendors?" July 4, 1994.
[27] InformationWeek, "InformationWeek most important products of 1994 – Iceberg," December 19, 1994.
[28] Letter to Stockholders, 1995 Annual Report.

IBM dominated this market and no one expected them to remain on the sidelines. Less than a month after EMC launched the Symmetrix in September 1990, IBM announced their intentions to eventually enter the RAID market.[29] Since "no one ever gets fired for buying IBM equipment," that pronouncement was likely good enough to encourage many mainframe customers to wait. The IBM 3390 and 3380 high-end disk storage systems used a technology that was often referred to as SLED (single large expensive disks) technology. However, SLED was the gold standard by which all other plug-compatible vendors closely emulated until EMC entered with a RAID product. Some believe that IBM viewed EMC more as a minor annoyance back in 1992.[30] That would be tough to refute given EMC's quality and financial problems in 1989 and their near-zero market share position in 1990. By 1995, EMC was clearly on IBM's radar. In June 1994, IBM released their first RAID product – the IBM RAMAC Array Family.[31]

By 1995, the high-end market was becoming a three-horse race between EMC Symmetrix, IBM RAMAC, and STK Iceberg. EMC had a first-mover advantage. STK had great technology, but was late to market and was in a vulnerable financial position. IBM had deep resources, a large customer base, and a broad product portfolio. IBM began dramatic price cuts of its RAMAC array in 1995, which forced EMC and STK to lower their prices. With a broad product portfolio, IBM could weather a short-term price war. On the other hand, smaller vendors such as EMC and STK who saw their profits dip during this period were more vulnerable.[32] The competitive field was only going to get more crowded in the future as Hitachi Data Systems (HDS) and Encore Computer Corporation were also expected to launch storage array products.

Differentiation, diversification, and complementary capabilities

With the threat of increased competition from IBM and STK and a possible erosion of profit margins, EMC looked to create stickiness for its storage offering. In addition to increased competition, the price per megabyte was steadily dropping. EMC would need to find a way to

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[29] Computerworld, "IBM announces disk array plan," October 15, 1990.
[30] Computerworld, "Price battle set for host storage; IBM addresses EMC's rapid rise as RAID vendor," March 14, 1994.
[31] InformationWeek, "IBM's storage sell – is RAID offering too late to challenge competing vendors?" July 4, 1994.
[32] InformationWeek, "Array Price Wars – IBM's entry hurts the anticipated profits for StorageTek and EMC," April 24, 1995.

sustain their competitive advantage and avoid the threat of commoditization. One former manager recalls a conversation he had with CEO Mike Ruettgers where Ruettgers discussed his vision for EMC and the threat of commoditization.

> *"He was very articulate about it. I don't remember his exact words, but it had to do with, 'I know there's more value we can bring to our customers. With hardware bcoming more and more commoditized, we needed to differentiate ourselves more and not just with the brand of EMC but with what we actually offer to and deliver to our customers.'"*[33]

One way to create more value and reduce easy head-to-head product comparisons was to expand (i.e., diversify) into related areas. Although Symmetrix was a hardware product sale, it was surrounded by a set of unique complementary software features. Originally these features were bundled with the Symmetrix and not monetized. As a way to create differentiation, EMC believed that it could monetize some of the software. By expanding its market offerings into complementary software products, EMC could create a unique storage offering that combined multiple products together by leveraging its portfolio. Moreover, the appeal of software products is that they have gross profit margins of over 90%.

In 1994, EMC launched its first software product, the Symmetrix Remote Data Facility (SRDF). With SRDF, a second Symmetrix could be remotely located thousands of miles away. SRDF enabled data to be replicated or "mirrored" in real time between the Symmetrix devices located thousands of miles apart. The classic scenario was that the host computer (i.e., the mainframe) was responsible for initiating and performing the data backup processing. This was a procedure done during off hours as it often required hours to complete and thus rendered the host computer unavailable for normal data processing tasks. With the SRDF software, this off-hours backup processing could now be offloaded from the mainframe to the Symmetrix storage products running the SRDF software.

SRDF was a strong complementarity in the economic sense (Milgrom & Roberts, 1995). If a customer purchased a Symmetrix and then decided to purchase SRDF, by default they would need to purchase a second Symmetrix unit. In 1995, the list price for SRDF was $125,000 per software license while a high-end Symmetrix ranged from $829,000 to $3.4 million.[34] Not only did SRDF create stickiness between EMC and its customers, it defined a new category of

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[33] Interview with Jeff Sands.
[34] See EMC press release, "EMC ships mainframe disaster recovery solution that restores data in minutes," October 3, 1994 and EMC press release, "EMC Corporation sells additional high-end Symmetrix Systems to U.S. bank holding giant," May 1, 1995

technological capability for the high-end storage market. Since it was specific to the Symmetrix environment, SRDF made the EMC Symmetrix more than just another mainframe storage plug-compatible device. One former manager explains:

> "[If] Hitachi comes in at a lower price point, [the customer can] call [their IT] guys up and wheel out the Symmetrix and wheel in Hitachi. Plug it in. You're good to go over the weekend. But if [the Symmetrix] is connected to SRDF for remote mirroring, that's not so easy to do. Now you've got data centers in the U.S. mirroring data to Singapore. So you can't take out the EMCs in the U.S. and put in Hitachi because it won't now talk to the EMC devices in Singapore."[35]

In 1995, EMC generated revenues of $20 million in software product sales. This was a major accomplishment for a firm that had been organized to develop, manufacture, and sell hardware products. To emphasize what a surprise a software business was from EMC at time, one former manager who started at the firm in 1996 describes his early impression of the firm as, "EMC at the time was a very box-oriented, hardware-oriented company."[36] This hardware orientation was also the way that investment analysts viewed EMC. Another former manager comments on the typical analyst impression of EMC trying to monetize software and later monetize services in 1997,

> "But a lot of [analysts] said that it will never fly. 'You're a hardware company. You can't sell software. And you can't sell services.'"[37]

Further complicating the software business expansion, SRDF represented a new category that was unfamiliar to customers. The evidence suggests that during the early days of SRDF, the sales reps were *selling* the software products as part of a Symmetrix sale, but customers were not *installing* the software. If SRDF was not installed and running, the Symmetrix was just another IBM 3390 plug-compatible device that could just as easily be unplugged and replaced by a competitive offering. One former manager explains:

> "It was a barrier to entry play to really make sure that the software is going to get sold. The EMC sales guys would say 'You're buying all the Symmetrix [units]... for another $100,000 buy SRDF, buy MMTF, buy the backup system... Another few hundred thousand dollars on your $5 million order. What's the big deal? Give me a solid. Help me out. I'm the poor sales guy. You may not need it today. You'll need it tomorrow and this way you'll have it. I won't charge you for maintenance until you start using it.' The worst thing for EMC was for that software not to be installed and to just sit there. That was a big concern. Because now someone is going to eventually say, 'Gee, who bought this software

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[35] Interview with Alan Sarasohn.
[36] Interview with Jeff Sands.
[37] Interview with Bob Fusaro.

and how is it being used? Why did you buy this?' So it raises a lot of questions as to why it even got done. And until it got installed, setup, used, and integrated into the fabric, you lose the barrier to entry.[38]

In addition to monetizing some of the software features, EMC was starting to consider how additional value could be created by monetizing complementary capabilities in services. However, not the break/fix customer service that was "free" and came bundled with the Symmetrix. For example, EMC released its first monetized service offering called Symmetrix Data Migration Service (SDMS) in November 1995. SDMS provided a way for customers to migrate data between mainframe and open systems environments.[39]

Another complementary capabilities idea in services being considered was a professional services business. Given that some of the software products were being sold but not implemented, EMC was at risk of not leveraging their portfolio advantage. One former manager explains that a professional services business could help ensure that the software was being properly implemented:

> *"They felt that there would be value added to the customer and to EMC by having a professional services organization own the planning, installation, and [deployment] design [layout] of these software products. The software products were fundamentally to build barriers to entry. They only worked with EMC products. Think about it. It was mirroring which meant everything was being replicated. The more software you bought, the more hardware you needed.*[40]

See Table 4.5 for further discussion about the various dimensions to differentiating the EMC products towards the end of 1995.

Table 4.5. Entry barriers, differentiation, and stickiness

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[38] Interview with Alan Sarasohn.
[39] InformationWeek, "EMC device does two jobs – new enterprise storage platform can handle data from mainframes and Unix computer systems," November 20, 1995.
[40] Interview with Alan Sarasohn.

Source	Representative evidence
Monetizing software products	
Bob Fusaro	"That was the other thing we had to get people passed is the idea that software is free. [Some sales reps would say], 'It's on a CD. How much does the CD cost?' It costs a buck, [but] there's a little bit more to the cost of software than that."
Brad Ashbrook	"At the time, it was very mainframe intensive. It was basically substituting from buying the same thing from IBM. It was hardware. A lot of the competitive feature-functionality though was software, but it was more or less sold as kind of a bundle. If you buy this, you get all of this feature functionality. Over time, as the competition got a little bit stronger -- little by little -- that software functionality was unbundled out and became separate optional line items, upgrades, and things like that."
Alan Sarasohn	"They had some software that was bundled in with the Symmetrix devices that had to do with mirroring, remote mirroring, and backup. They pulled those out as separate sellable products."
SRDF made the Symmetrix sticky in accounts	
Alan Sarasohn	"[If] Hitachi comes in at a lower price point, [the customer can] call [their IT] guys up and wheel out the Symmetrix and wheel in Hitachi. Plug it in. You're good to go over the weekend. But if [the Symmetrix] is connected to SRDF for remote mirroring, that's not so easy to do. Now you've got data centers in the US mirroring data to Singapore. So you can't take out the EMCs in the US and put in Hitachi because it won't now talk to the EMC devices in Singapore."
Selling vs. implementing the software	
Alan Sarasohn	"The [software] products were good but they were rough around the edges. They weren't intended for you. They were intended for EMC technicians to install and setup through CS. It wasn't intentional. It's just the way it turned out. They fundamentally were a hardware company. There's a lot of software involved but it wasn't user software."
EMC specific software and professional services	
Alan Sarasohn	"They felt that there would be value added to the customer and to EMC by having a professional services organization own the planning, installation, and [deployment] design [layout] of these software products. The software products were fundamentally to build barriers to entry. They only worked with EMC products. Think about it. It was mirroring which meant everything was being replicated. The more software you bought, the more hardware you needed."
Migration service offering between mainframes and open systems	
InformationWeek, November 20, 1995	"Meanwhile, Symmetrix Data Migration Service (SDMS) is EMC's first formal service offering to assist customers in moving from mainframes to open systems platforms without disrupting current computing operations. With SDMS, downtime is minimized to as little as 15 minutes-the time it takes to unplug the old storage device and connect the new one... EMC's SDMS services are priced from $18,670 for the Symmetrix 5100 to $40,090 for the company's high-end 5500 model."
EMC press release, January 8, 1997	"Reliance, one of the nation's largest property-casualty stock insurance groups, completed the migration in 24 hours over two weekends using EMC's Symmetrix Data Migration Services (SDMS), compared to a nine-month IBM migration it had undergone just one year ago. 'I was astonished how easy and seamless SDMS made it to migrate a terabyte of data,' said Donald Bowker, Reliance's Information Systems Director. 'Last year it took us nine months to move 750 gigabytes of data -- three-quarters of what we moved with EMC -- from IBM 3380Ks and 3390 Model 2s to IBM Model 3s. There was an unbelievable amount of stress, time, and cost associated with that migration.'"

Expand into the open systems markets

By 1995, EMC competed in two storage markets: mainframe and open systems. Open
systems were computer hardware platforms that ran UNIX or the Microsoft Windows NT

operating system. While gaining momentum in the mainframe market with Symmetrix, EMC formed a Client/Server Division in 1993 (renamed Open Storage Group in 1994) to enter the open systems market. EMC acquired Array Technology in 1994 and that gave them access to a small open storage product called ModArray. The firm introduced Centriplex in 1994 as its entry into the open systems market. Ruettgers wanted to push hard into the open systems market, but not everyone was as enthusiastic about it.

One sales manager comments on the feeling among the sales organization about the Centriplex product back then.

> "Centriplex was our attempt at the midrange but we didn't do it well. We weren't really focused on it. And it was tough... The way I viewed it and the way I think most [sales] people viewed it was you're better off fighting for Symmetrix... We had our issues over the years but generally speaking, it was such a solid platform that if I could get you to pay the premium, it made my life a lot easier. It rarely had issues and if it did, we were all over it. We had the support in place. We understood the environment. It all made sense. So if you're going to bang your head off the wall selling something, do you want to sell a Toyota or a Dodge? I think you're going to sleep better if you own a Toyota."

The open systems market had very different dynamics than the mainframe market. Table 4.6 highlights some of the differences between the mainframe and open systems markets in 1995. The most prominent difference was that the open systems market catered to a more price sensitive audience as can be seen in the difference in price per megabyte. Although the overall mainframe market was big, it was not growing. Pundits had been predicting the demise of the mainframe for years, but the installed base was in no hurry to abandon their fully operational mainframe investments.

Table 4.6. Market opportunities headed into 1996

	Mainframe	Open Systems	Networked
Market size and potential	Large but stagnant	Small but growing	Tiny with large potential (unknown)
Economics of data storage*	$3 per MB	$1 per MB	Similar to open systems
Host computer operating environment	IBM mainframe and mainframe compatible operating environments	UNIX (HP-UX, IBM AIX, Sun Solaris, AT&T SystemVR4, Sequent DYNIX) Microsoft Windows NT IBM OS/2 IBM OS/400 Novell Netware	Doesn't matter
Computing model	Centralized in "glass house"	Distributed but often in separate silos	Distributed and networked together
Proximity to host computer	Co-located	Not co-located	Doesn't matter
Attach model	Direct attached	Direct attached	Network attached
Connectivity	ESCON, Bus and Tag	SCSI, Fibre channel	IP based

* Source: Computerworld, "Storage prices plummet," December 19, 1994
    Computerworld, "EMC to seek top dollar for Unix disks," May 15, 1995

Big growth was projected for the open systems market, but there were doubts as to how profitable the firm could be. The cost per megabyte was declining across all markets and the economics of the open systems market did not seem attractive. EMC launched a stronger entry into the open systems market in 1995 with the Symmetrix 3000 product line priced at approximately $2 per megabyte. Would customers be willing to pay a premium for a product category that seemed to be on a fast track towards commoditization? Were the high-end features of a Symmetrix overkill for the price-sensitive open systems market? Table 4.7 highlights the struggles that the open systems storage market posed for EMC and its customers.

Table 4.7. The struggle to expand into the open systems market

Source	Representative evidence
Resistance to open systems market	
Alex. Brown report, Nov 1994	"EMC management forecast $200 million in revenue contribution from these products in 1995..."
BusinessWeek, March 15, 1999	"Calling a meeting, Ruettgers scribbled the figure $200 million on a whiteboard, announcing it as the revenue target for the [Symmetrix 3000] product's first year. With few executives convinced of any [open systems] market at all, EMC's vice-president of marketing, Harold P. Ano, turned to his neighbor and whispered: 'He's nuts.' Early results were not encouraging. At the end of March, 1995, EMC's sales staff hadn't really gotten behind the push, and Symmetrix sales were 50% behind target. To make matters worse, Ruettgers had told the outside world of his $200 million target. Now, he had to shift EMC into overdrive or risk losing confidence. One evening he ordered huge crates of the unsold equipment into the offices of his sales managers. Climbing over the big boxes to get to their desks, staffers found a Ruettgers note demanding that the crates stay put until sales were on track. 'I wanted them to know this was not business as usual,' he says. It took three months to clear the offices."
Michael Ruettgers Oral History, May 2, 2001	"In 1994 we made it public we were going into the open systems marketplace. To get everybody inside the company to focus, I had to tell people outside of the company what we were going to do. So the goal for '95 was to have $200 million in sales and so at a point during the year it became very clear that we were real short of that on a tracking plan. So I wanted to do something dramatic that people would understand that this was a serious problem. So I had all that inventory put in the offices of people who worked for me, and it didn't get out until it got sold.
Implications on engineering and support resources	
Brad Ashbrook	"That started evolving to where the technology got more complex...more bits and pieces and larger scale. [We] started to move beyond the mainframe context to more open systems which have a lot more boxes you have to check to make sure it's going to work and to qualify work. More engineering intensity in terms of all the interoperability as well as the architecting of the solutions. Instead of just plugging it in, it was a big configuration implementation project to design it and keep it running. So that dragged more service requirements particularly pre-sales but also started to pump up the intensity of the support."
Implications for customers such as CIOs	
Former PS planner	"It was only Symmetrix [at the time] – [the] mainframe product. The business became more complicated and they went to a distributed storage product to support Sun, HP, and Compaq. CIOs were saying, 'Not only can we not get a handle on all the data storage needs of the mainframe, but now people have storage on their desktops.' CIOs were struggling to know where all the data was to organize, store, and provide it to end users within the company in a way that supported the service level agreements that they had."

Although this was a well-documented point of contention within the firm, CEO Ruettgers continued to push the firm into this emerging market. Ruettgers went as far as to publicly set open systems sales projection targets of $200 million, $400 million, and $800 million for 1995, 1996, and 1997, respectively. Many inside the company were not convinced of the open systems opportunity, especially given that revenues were only $24 million in 1994. With the open systems and mainframe revenues in Table 4.8, it's not very difficult to understand why a $200 million target for open systems didn't seem realistic at the end of 1994. Legend has it that after lackluster open systems sales in Q1 1995 were not on track for the $200 million target, Ruettgers

had the excess inventory stacked in the offices of some of his managers and not removed until the units were sold.[41]

Table 4.8. EMC hardware revenues ($million) 1993-1995: mainframe vs. open systems

Storage market	1993	1994	1995
Mainframe	620.18	1177.04	1425.53
Open systems	19.08	24.32	200.89

Source: EMC 1995 10-K report

Interoperability between mainframe and open systems environments

From a technology perspective, the mainframe and open systems versions of the Symmetrix product line shared a common technology architecture – MOSAIC:2000. Although the product line was often refreshed with larger capacity disks, more cache memory, and more connectivity options, the MOSAIC:2000 architecture persisted from the initial launch in 1990 until 2003.

EMC was the only storage vendor that used one common product architecture across mainframe and open systems environments. While each environment had its own separate Symmetrix device, EMC began offering special software – Enterprise Storage Platform (ESP) – that enabled each product line to work across both environments.

Rather than focus on an isolated open systems product, EMC combined a common technology architecture, the ESP software, and the SDMS migration service to facilitate interoperability across mainframe and open systems markets. While not yet a capability in 1995, EMC's interoperability positioning reflects how the firm considered moving forward into new market opportunities.

By the end of 1995, EMC was the new leader in the mainframe storage market and had achieved its goal of $200 million in the open systems market. After a couple of early attempts in the open systems market with the ModArray and Centriplex, Symmetrix became the anchor for both the mainframe and open systems markets.

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[41] Computerworld Honors Program, "Michael C. Ruettgers Oral History," May 2, 2001.

4.6 Let the Good Times Roll: 1996-2000

Considered by some pundits as one of the Four Horsemen of the Internet economy, EMC was well-positioned as the dot-com boom unfolded.[42] One manager recalls the optimism of the period:

> *"In the 90's, the main product was Symmetrix... That combined with the forces outside ... the rise of the Internet. And the 'promises of the Internet' that the VCs were all excited about. Money was getting thrown at us, at Cisco, and a bunch of other folks pretty readily. Symmetrix was our answer to any problem you had. I'd come in and listen intently and I'd say, 'Geez, I think I know what the answer might be.'*
>
> *But the good news is even though in a lot of cases [Symmetrix] was overkill for a particular situation, it was still a very robust, reliable, and high-performing technology...*
>
> *Again, especially towards the end of the 90's... Everyone was feeling good. No matter who you talked to, in the back of their mind if you planted the seed, 'Yeah but your business is going to grow 50% and you have to be ready for it. If you don't have the best of the best, how can you expect to be responsive to this dynamic growth that you're potentially going to have? This is the only platform that can support that type of growth.' Again, if they believed in their company whether they were an Internet startup or a more traditional firm, they'd say, 'Yeah, it's worth a premium to have that backboard, ... to know that no matter what happens, I'm ready.' It worked well."[43]*

Unlike the prior period, the competition intensified for EMC during the dot-com boom. Competitive storage array products from IBM, STK, and HDS were now available and EMC management and investment analysts were expecting some level of price erosion with the increased competition. IBM had demonstrated a willingness to spark price wars. HDS had indicated that it was going for market share. STK had shown great vision but was constantly plagued by poor execution. One desperate competitor with a good-enough plug-compatible device could mount a massive price erosion campaign all in the name of market share.

A first-mover advantage, a technological innovation, a motivated direct salesforce, and a "whatever it takes" customer service culture were a tough combination for any new competitive offering to topple – even one from IBM the mainframe platform leader. As an independent storage vendor, EMC focused on interoperability across multiple environments: mainframe, several versions of UNIX, and Microsoft Windows NT. The computer systems vendors who were diversified into storage were more focused on optimizing for their specific hardware platform.

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[42] BusinessWeek Online, "Commentary: The Four Horsemen of the New Economy," October 2, 2000.
[43] Interview with Bob Scordino.

EMC continued a set of incremental innovations to the Symmetrix line that culminated in the release of the Symmetrix 8000 product line (also known as Version 5) in 2000. Whereas the 3000 natively supported open systems and the 5000 natively supported mainframes, the 8000 natively supported both mainframe and open systems environments without the need for the ESP software. The Symmetrix 8000 product line would mark the fifth generation built around the MOSAIC:2000 architecture.

From the launch of Symmetrix in 1990, the direct salesforce and customer service have been two key complementary capabilities that have enabled EMC to profit from their innovation. A complementary software business began to emerge towards the end of the prior period. Table 4.9 shows how the software business grew from $20 million in 1995 to be $1.44 billion in 2000. The expanding software product portfolio grew in value as a complementary capability and the products were specific to the Symmetrix platform. With the competitive offerings putting pressure on Symmetrix hardware margins, the software business provided a much-needed boost in revenues and profit margins. EMC software capabilities were transitioning from a complementary experiment offered by a hardware-oriented firm in 1994 to a supplementary business with a big financial performance upside in 2000.

Table 4.9. EMC software revenues ($ million): 1995-2000

Revenues	1995	1996	1997	1998	1999	2000
Software	20.00	76.44	176.86	445.40	821.70	1435.10
Overall	1921.28	2273.65	2937.86	3973.74	6715.61	8872.82

Source: EMC 1996-2000 10-K reports

The firm was also looking to explore new complementary capabilities in fee-based services, which was a different focus from its traditional "free" whatever-it-takes CS. This section specifically focuses on the formation of a professional services business and organization. At the end of 1995, professional services was only an idea.

> "As it was explained to me when I was interviewing in 1995 with Jack Egan (son of co-founder Richard Egan and Executive Vice President of Sales and Marketing), there were three areas they were interested in – one was building a professional services organization."[44]

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[44] Interview with a former manager who was involved in planning the professional services business.

4.6.1 Opportunity identification: The need for professional services

The idea for fee-based services was not the intended services model when Symmetrix was launched in 1990. The process was emergent as EMC managers started to sense a new set of issues that were not apparent in 1990. From an evolutionary economics perspective, the firm was undergoing a process of search (Cyert & March, 1963; Levitt & March, 1988; March & Simon, 1958; Nelson & Winter, 1982). In recent years, several studies have focused on the topic of technological search, which is a very important issue for firms in technology-intensive industries (Fleming, 2001; Fleming & Sorenson, 2004; Katila & Ahuja, 2002; Rosenkopf & Nerkar, 2001; Stuart & Podolny, 1996). As an innovator, EMC was active in technological search as it sought to navigate the mainframe and open systems markets with various storage hardware products. Yet the firm was also active in pursuing software technologies, all of which were consistent with a local search as they all were specific Symmetrix storage arrays.

EMC began to extend its local search scope beyond technological search and into a search for new services as it learned that its market position required more than just the best technology. The SDMS migration service was a temporary bridge between mainframe and open systems markets. At the end of 1995, the firm was considering building its own professional services organization.

From a very broad perspective, professional services may consist of some combination of installation, implementation, customization, consulting, systems integration, and systems design. Sometimes outsourcing is included as well (Lah, O'Connor, & Peterson, 2002). Entering into 1996, EMC Customer Service was primarily "free" pre-sales support, installation, and break/fix technical support. When EMC was focused on only the mainframe market, customer service was simple. Support personnel went and plugged in the Symmetrix to the IBM mainframe. The mainframe recognized the device as if it were an IBM 3390 disk drive. As EMC moved into the open systems market and built up its software portfolio, the service model became much more complex. Figure 4.3 shows three interconnecting forces that were simultaneously putting pressure on the traditional EMC customer service model – competitive differentiation, shifting market dynamics from centralized to distributed data, and profit pressure.

Shifting market dynamics
(centralized to distributed)

Software product business
Solution architectures
Beyond plug-compatible products
Project implementation

Open systems & networked storage
Distributed data brings increased complexity
and increased service requirements

**Professional
Services
opportunity**

Competitive
differentiation

Profit
pressures

Competition
Stronger substitutes
Price erosion
Commoditization

Figure 4.3. Professional services opportunity

Competitive differentiation

This was a core belief in the prior period as competitors were entering the market. Key to this situation was expansion into complementary businesses. The emerging EMC software product portfolio was creating a set of functionality beyond the conventional 3390 feature set. But as a new category within the storage industry, EMC software like SRDF required more than a 3390-compatible product selling motion and also required a deeper level of service engagement in terms of planning and implementation. EMC software was viewed as the key to Symmetrix differentiation – inside the firm and within the analyst community. Although a complementary professional services business could generate incremental revenue, its primary value would be in creating value for the emerging software business whose value greatly enabled more Symmetrix unit sales. A professional services business could make certain that the EMC software was not only sold but also implemented within an EMC-friendly architectural layout at the customer site.

Shifting market dynamics: centralized to distributed data

Even within a centralized mainframe computing environment, SRDF and other EMC software products were now enabling data to be manipulated in real time between geographically dispersed locations. Similar to the mainframe market, the open systems market was a direct attached storage device (DASD) environment. However, open systems were a more distributed

computing environment. Therefore, the Symmetrix had to be connected to multiple computer systems (via Fibre Channel) rather than just a single mainframe (via ESCON).[45]

Back in Table 4.6, a third opportunity besides mainframe and open systems was shown in the nascent network attached storage (NAS) market. Also a distributed environment, NAS devices were connected over a common network using the Internet Protocol (IP) and therefore did not need to be directly attached to the storage device. Compared to a direct attached environment, NAS was more complex to set up and support. From EMC specific software innovations to industry evolution towards networked storage, distributed computing and data environments created a more complex setting for the installation and support of EMC products. One informant describes the different characteristics of the open systems market.

> "That started evolving to where the technology got more complex. ... More bits and pieces and larger scale. [We] started to move beyond the mainframe context to more open systems which have a lot more boxes you have to check to make sure it's going to work and to qualify the work. More engineering intensity in terms of all the interoperability as well as the architecting of the solutions. Instead of just plugging it in, it was a big configuration implementation project to design it and keep it running. So that dragged more service requirements particularly pre-sales but also started to pump up the intensity of the support."[46]

Profit pressures

The existing "whatever it takes" customer support culture in 1996 was a cost-heavy service model. In a simple centralized direct attach environment, the current CS model can persist as long as the product profit margins remain attractive. With a few years of experience in distributed environments, open systems arrays, and SRDF deployments, the implications on the support model seemed clear. With increased competition and aggressive tactics from IBM and others, the Symmetrix monetization model at the end of 1995 was somewhat vulnerable to price erosion and expanding customer service costs in the emerging distributed data opportunities – a bad sign for profitability measures. One analyst describes the overall pricing concerns that EMC faced in early 1996.

> "Relative to last year's brutal mainframe [storage] pricing environment (40% declines), EMC looks for a moderation in price erosion in 1996 based on greater software content

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[45] This is an overly simplistic comparison between these two environments. In the case of the mainframe, one cable connection between Symmetrix and mainframe is a single point of failure. For fault tolerance and redundancy, more sophisticated configurations were most likely used in real customer situations.

[46] Interview with Brad Ashbrook.

for many of its storage products. However, we caution that Open Systems pricing will be more competitive as EMC currently receives a premium."[47]

A professional services business could recoup some of the costs involved in what had become a more complex environment for deploying hardware and software storage solutions. One informant described the managerial thinking behind this new services idea.

"Here we had a guy go out making a sales call, next thing you know he's in doing what we would call a storage assessment. If you would sell a distributed storage product, you had to go out and figure out all of the different devices and how you were going to connect them all. They [customer service] would do this for nothing. Somewhere between the three of them [CEO Mike Ruettgers, EVP Sales & Marketing Jack Egan, and SVP Customer Service Dan Butler], they said, 'Hey, wait a minute this is a line of business. We need to start charging for it.'"[48]

4.6.2   Strategic intent: build it

Identifying an opportunity for a professional services capability did not necessarily mean that EMC could or would provide this capability. During this period, Symmetrix was the heart and soul of EMC. The software products complemented Symmetrix and were beginning to also provide a promising supplementary revenue stream. The idea for a professional services business was to be yet another complementary capability. Next, the firm needed to consider the strategic alternatives: build, buy, or partner.

Partnering won't work

In 1996, the big accounting firms (Accenture, Ernst and Young, Deloitte, etc.) provided IT professional services and were quite capable. However, EMC had achieved its success mostly within IBM accounts using a direct salesforce. Although IBM struggled between 1991 and 1993, Gerstner got them back to profitability in 1994. A reinvigorated IBM had the resources to cause serious damage to EMC efforts. While the EMC direct salesforce was known for its aggressiveness, IBM remained an influential presence in every mainframe account that EMC called on. EMC did not want to relinquish *owning* the EMC-client account relationship. Partnering with an independent professional services firm was viewed as introducing the risk of losing account control. Doing so would open up the door for potential opportunistic behavior

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[47] PaineWebber report, "EMC Corporation," January 30, 1996.
[48] Interview with a former manager who was involved in planning the professional services business.

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from the partnering firm (Williamson, 1985). In a partnering model, a revenue sharing arrangement could weaken EMC's share of the profits.

Furthermore, partnerships were not a big focus for EMC prior to 2000. According to Joe Tucci, the successor to CEO Mike Ruettgers:

> "[In 2000], we were a company that sold only direct. We were actually a horrible company to partner with...very tough."[49]

The tradeoff here hinged on the issue of account control. On the one hand, EMC could fully maintain its account control position and somehow develop a professional services capability over time. On the other hand, EMC could partner for the professional services capability and set up some governance structure to minimize loss of account control and possible opportunistic behavior from a services partner. One former manager explains why partnering for professional services would not work.

> "EMC was a very control freak kind of company. If they were going to do this, they were going to own it. They didn't mind that we contracted with external consultants to help us build it, but it was going to be our business. It was going to be EMC branded. ... The other part was...we really want to own these accounts. And remember the mindset of our account managers. It's harsh to say, but there was this lack of trust. 'You want me to allow this consultant from [an independent services firm] to come into my account to build an architecture and I've got to trust they'll do it with me in mind? Hmm...' And besides, if it was done with a partner, the account manager probably wouldn't get revenue credit for it. We'd have to pay the consultants and the margin model would have been very different. So the thought was right up front, if we're going to build, we're going to own it."[50]

Let's build it

The decision was made to build a professional services business. As shown in Figure 4.4, the idea had several key factors in its favor that a new corporate venture needs to gain traction: senior management support, available resources, customer interest, and build on existing EMC storage know-how.

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[49] Computerworld Honors Program, "Joseph M. Tucci Oral History," April 30, 2004.
[50] Interview with Jeff Sands.
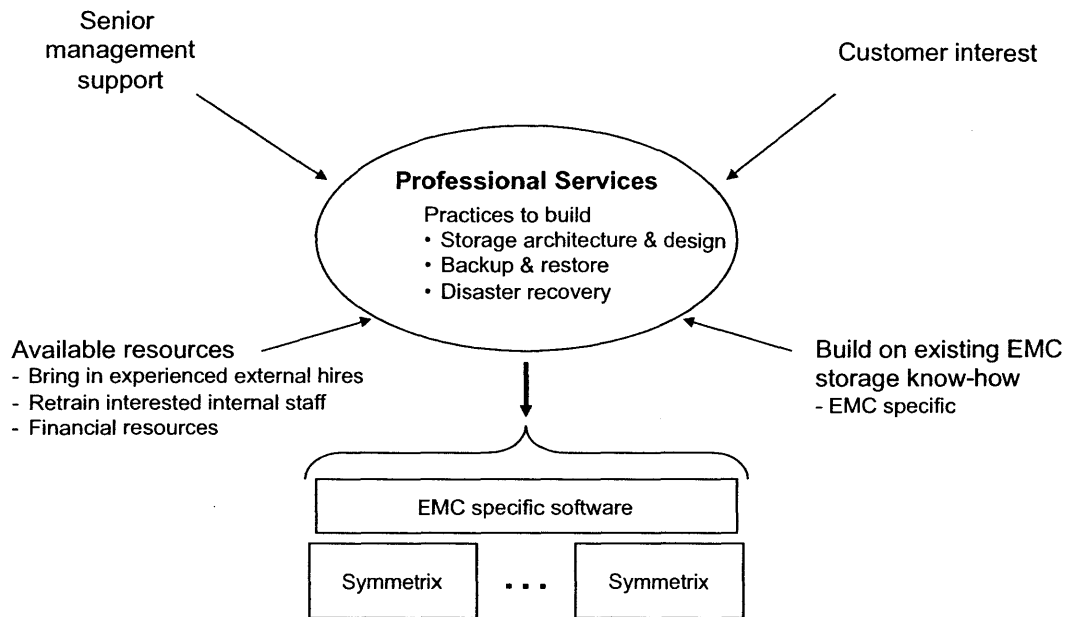
Figure 4.4. Potential key success factors for EMC Professional Services

Senior management support

Internal technology ventures can often be started as skunk work projects that fly underneath the radar of senior management, but the more general case is that senior management support is required for the mobilization of critical resources. The evidence from middle managers suggests that CEO Mike Ruettgers was the primary sponsor of the idea as one of the original planners suggests, "My manager asked me to build the plan as a request from Mike Ruettgers."[51] One informant who joined the firm after the early planning phase makes the case that only Ruettgers could have pushed this idea forward at the time.

> "*I think that Ruettgers was probably the driver of it. He was a pretty forward thinking guy. If anybody else had put that on the table, it would have gotten squashed.*"[52]

In addition to Ruettgers, Jack Egan (Executive Vice President, Sales and Marketing) and Dan Butler (Senior Vice President, Customer Service) were co-sponsors. Considering the alternative approaches, these EMC executives ruled in favor of *build* so that EMC could maintain account control. Prior research in strategic management and corporate entrepreneurship suggests that successful corporate ventures are those where senior managers limit their

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[51] Interview with one of the planners of the professional services organization.
[52] Interview with Alan Sarasohn.

contribution to strategic recognition and leave the planning to the middle managers (Burgelman, 1983). Recognizing that professional services was different than customer service, EMC senior managers brought in experienced hires who understood this new business.

> *"Jack Egan was running Sales; Ruettgers was President [and CEO]; and Butler was [running] Customer Service. Somewhere between Jack Egan saying, 'Here's more revenue I can make;' Dan [Butler] saying, 'I run services and I'm happy to manage this;' and Ruettgers saying, 'This sounds like a great idea. One of you two figure this out.' Hence me. Both of them knew it was a great idea but neither one came from professional services to know what the differences were. They knew there were differences. So when I walked in and said, 'Oh yeah, I did this before at DEC [Digital Equipment Corporation] and spent the last two years as a partner at [a professional services firm]. So yeah, I know about this business.'"*[53]

Available resources

With executive-level support, EMC had to decide what level of resources it was willing to invest in professional services. EMC senior managers thought it best to bring in external hires to lead the planning effort. These outside managers brought previous experience building a similar business at Digital Equipment Corporation (DEC). Their task was to write a business plan, determine an appropriate fit within EMC, obtain buy-in from senior managers, and make final recommendations to Ruettgers.

The formal planning process began in 1996. The plan was to build a consultative capability for EMC specific technology that enabled deployable solutions with the Symmetrix as the foundation layered with one or more products from the emerging EMC software portfolio. This approach was in line with EMC management's attempt to move the firm beyond what likely would become a commoditized IBM 3390 plug-compatible product category. One former manager describes his early impression.

> *"I wasn't there during the beginning process of this, but somehow they made a decision to pursue a potential revenue stream from services. And he (Ruettgers) thought about a consulting business and that led to [...] contacting me. I went through a series of interviews there and was brought in in June (1996). And the reason I know it was June is because when I got hired, I was told that within 90 days, [...] and I would be sitting in front of Mike Ruettgers to present a business plan for a new EMC professional services business. I looked at [...] and said, 'What did I get myself into? What did you bring me in*

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[53] Interview with one of the planners of the professional services organization.

here to do?' Knowing the culture of the company, am I being programmed to fail before I even start?"[54]

At the time, EMC had the financial resources to invest in this new business. One former manager shares:

> *"It absolutely felt like a startup... except my [formal and informal stakeholders]... some of them I saw all of the time and some I never saw. The guys I never saw were the bigger snipers. I certainly had no constraints on spending. The company was doing unbelievable. You wanted to invest in this, they invested in it. I had recruiters and I paid fees and I hired guys. I was on the road 80% of the time."*[55]

Build on existing EMC storage know-how

IBM was one of EMC's main competitors. IBM was diversified across all major sectors of IT products. Moreover, IBM Global Services was starting to emerge as a major strategic position for IBM under CEO Lou Gerstner. IBM Global Services was one of the largest IT professional services organizations in the industry and its scope included solutions combining IBM and even competitors' products. This was a source of great internal friction during this period (Gerstner, 2002).

By contrast, the scope of professional services for EMC was to be limited to EMC products. Although this was not an R&D-intensive technological change, EMC's intent to build a professional services organization was to be aligned with its pre-existing know-how (Klepper & Simons, 2000; Makri, Hitt, & Lane, 2010; Tushman & Anderson, 1986). One former manager describes the intent as follows:

> *"From my experience at DEC and knowing what happened with DEC Consulting, I knew that if we tried to compete against the big consulting firms, we'd have been dead. We'd have been killed. We had to position this as, 'We are EMC. EMC has always brought you top quality. We're now expanding the value we can bring to you by offering this kind of service to you to help you better understand your IT environment as things become more distributed.' Remember back, some of the research was that CIOs were losing control. When things got distributed, budgets got distributed also. The play was, 'bring control back to you by giving you this visibility.' It all stemmed from, we are EMC. We're not IBM Global Services. We are EMC. Our expertise is storage. We're not going to help redefine your IT infrastructure. We're going to look at your storage component of that and see*

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[54] Interview with one of the planners of the professional services organization.
[55] Interview with Alan Sarasohn.

what we can do to optimize it. We always played to our niche and where our competences and expertise were.[56]

Customer interest

During the planning process, customer interest was also gauged during an EMC Customer Council meeting. The Customer Council was an annual event where the most influential customers had a chance to shape future EMC directions. EMC management believed that an organic approach would give them time to learn, time to determine an appropriate organizational fit within EMC's aggressive culture, and time to experiment with the PS practice areas before committing precious resources.

> *"We actually went to an EMC Customer Council. They brought in their best customers into really nice locations. Literally opened the kimono and said here's our product direction and whatever direction. Got customers to say if we were to do this feature, what platforms would you want first, second, third, etc. [EMC managers] actually listened to them and would play back... we heard 100 customers on these topics and here's what you all said, and here's what we're going to do about it. It was a really customer intimate type of relationship. During one of those councils...in 1996...I was asked to put forth professional services as a possibility. We need to figure out how to make money here. I was asked to write the business plan to do professional services and to go before the Customer Council and ask, 'If we build it, will you buy it?' The answer was yes and yes. It was a compelling business proposition."*[57]

Warning: the organizational linkages may not be easy

During technological change, the incumbent innovator may need to establish new organizational linkages between new and existing complementary capabilities (Taylor & Helfat, 2009). Whereas new technology innovation projects can be isolated with few prior organizational constraints, the new professional services business had to form new organizational linkages with other well-established complementary organizations: sales and customer service. The sales organization was aggressive and competitive with a strong incentive system. Customer service had a "whatever it takes" culture to guarantee customer satisfaction. The linkage between sales and customer service was mature and very efficient. To alter the existing organizational linkages had some risk that Ruettgers was aware of.

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[56] Interview with Jeff Sands.
[57] Interview with one of the planners of the professional services organization.

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"I remember asking Ruettgers about the culture of the company and about how open they would be to accepting this new concept. Think about it, [professional] services are intangible and soft. You can't put your arms around it. You can't watch something brown spin fast and collect data. You can't put it in a box. So I asked him... and he said, '...This will be a challenge because I don't know yet if as a company we're ready for this, but I know it's something we need to do. So your challenge is to go off and investigate and to come back to me with your recommendations.'"[58]

4.6.3 Strategic action

Given the potential for success and the risks of integrating a new organization, EMC management believed that an organic approach would give them time to experiment, time to learn, and time to determine an appropriate organizational fit within EMC's aggressive culture before committing too many resources.

Internal acceptance and resistance

Prior to making final recommendations to Ruettgers, the planning team spoke with other EMC senior managers. What surprised many of these senior managers was not the idea of professional services – interpreted by the planning team as a sign that Ruettgers and team had already been discussing this strategic opportunity – but rather that new external hires would be the ones planning the business. I gather that this had more to do with a NIH (not invented here) culture at EMC in those days rather than the existence of a prior professional services capability within the firm (Katz & Allen, 1982). On average, most managers were supportive of the idea.

"Most of the other people on Mike's management team were acceptable of it and I had to believe that before I came on board, they had to be talking about this. This wasn't something Mike woke up one morning and said I need to hire someone to do this. It had to be part of a discussion about the strategic direction of EMC that his management team normally would have. When I approached them about this, it's not like (they said), 'What the hell is this? What do you mean?' They already knew about this. They knew that somebody somewhere along the line was going to come and talk to them about it. They just didn't know it would be the new kid on the block. They thought it would be somebody internally who would have been hired or named to do this."[59]

The Customer Service (CS) and Sales organizations began to process what the implications of a new Professional Services (PS) organization would be on their respective organizations. CS management believed that PS should be structured underneath CS. CS was

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[58] Interview with Jeff Sands.
[59] Interview with Jeff Sands.

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also concerned that an influx of new hires put in a consultative capacity could create bigger problems for the firm due to a lack of experience with EMC technology. This was somewhat addressed by putting new PS hires through some of the standard training curriculum. Table 4.10 shows some of the concerns from Customer Service.

Table 4.10. Mild push back from the Customer Service organization

Source	Representative evidence
Jeff Sands	"As you would expect when I talked to the SVP of [Customer] Services at the time he wanted to know why Professional Services [shouldn't be] reporting into him. [His rationale was], if it's services it's mine. This is when you had to do the dance and say to him that this is different. I had to be careful. I'm dealing with an SVP here. I had to be careful to say to him that you're not running a revenue stream for the company. You're running a cost center. I kept using the words, this is very different. This is a softer sell, this is very different. This is more aligned with a consulting business than a services business. In fact if I hadn't had the bad experience at DEC, we would have called it EMC Consulting but it was the wrong term. By calling it EMC Professional Services, it was a better term. It was more acceptable from a market permission point of view."
Jeff Sands	"CS leadership was very friendly and supportive with me. They certainly questioned how I would be able to find people and hire people and get them up to speed fast and not create bigger problems for them by putting untrained people out there making recommendations. This was a fair concern. We hired guys and put them through some of the training. We did the best we could."

The biggest resistance came from the Sales organization – from the top all the way down to the bottom. Sales personnel perceived that the new PS practices would lengthen the sales cycle, require a different level of sales engagement conversation that they were neither trained nor incentivized to have, and undermine their sales goals. Although some initial buy-in was obtained from Sales management during the planning phase, the most influential sales managers were very reluctant and only consented once PS planners agreed to structure the new PS organization underneath the Sales organization. Even under the Sales organization, the PS practice was vehemently resisted during the rollout. Table 4.11 provides evidence of strong resistance from the sales organization as seen from the perspective of the middle managers responsible for planning and building the professional services organization.

Table 4.11. Strong resistance from the Sales organization

Source	Representative evidence
Jeff Sands	"The guy running sales was the toughest nut. Once we convinced him that it was going to report to him and we were going to hire a manager who had experience working with sales people and would become a part of his team, he was more accepting of it. I still come back to this concept that the EMC sales force at the time... being cut throat. That was the mentality. I remember at the beginning of the process...this is almost a quote. I had sales account managers look at me and point their finger at me, 'If you touch my account without telling me, you're dead, you're dead.' That's when I went back to [...] and said, 'What did you get me into here?'"
Jeff Sands	"The challenge was the sales organization from the top all the way down to the field people. It was sales and sales operations -- that whole entire function of sales needed to be 'sold.' I chose that word carefully. Not convinced, they had to be 'sold.' ...What value was this going to bring to them?"
Former PS planner	"The sales guys viewed the professional services organization as a deterrent. They called it the 'sales prevention team.' It was viewed as elongating the sales cycle that they were measured on. They said, 'I can sell $200,000 of services but I will be fired because I'm being measured on pushing boxes.'"
Alan Sarasohn	"So now the sales force looks at me and says, 'Wait a second... We're in the business of transactions. Show the product, sign. Get the product in, sign. Buy more, sign. You Alan are causing the customers to think. We don't want the customers thinking.' I was viewed as someone in the way of the sales guys making their quotas because I had this relatively small dollar offering – you know $200,000 compared to several million dollars – that they were being pressured to put on their price list and sell which would have the customers thinking about, 'What storage do I really need? How should I allocate it? Do I have too much? I have too much? Are you kidding me?' Imagine this."
Bob Fusaro	"The challenge frankly wasn't in selling to the customers. The challenge was credibility within the EMC sales organization. EMC was printing money. You had 23-24 year old kids still wet behind the ears making a million dollars a year. 'Don't screw around with my sales. Don't get in my way. Don't slow me down. No I don't want you talking to this customer. I'm in the middle of a big deal and all this is going to do is confuse it.' So the biggest aspect of the education had to occur internally not externally. You get in front of a customer and the customer would go, 'Holy crap. That's just way cool stuff. I need to know more.' But the challenge was getting in front of that customer because the EMC sales rep owned that account."

EMC Professional Services rollout

A soft launch of EMC Professional Services was done in 1997. Consistent with the original plan, the formal announcement in early 1998 positioned the business as a consultative endeavor. The practices emphasized storage-related problem areas and solutions without directly mentioning Symmetrix.[60] Table 4.12 highlights the three practices that were announced: storage architecture and design, backup and recovery, and disaster recovery. When peeling back the layers of the practice areas, one would not be surprised to find some combination of two or more non co-located Symmetrix units, EMC software like SRDF, and a plan to integrate this into the customer's environment.

Table 4.12. Early practices announced by EMC Professional Services

[60] EMC press release, "EMC launches worldwide professional services business," February 2, 1998.

Professional Services Practice	Description	EMC Product Toolkit*
Enterprise Storage Architecture and Design	establishes the most effective enterprise storage architecture, enabling clients to consolidate dispersed data, break down the walls between mainframes and open systems, and realize the benefits of advanced information management, protection and sharing techniques	Hardware: Symmetrix; Software: Symmetrix Enterprise Storage Platform, Symmetrix Data Migration Service
Enterprise Storage Backup and Recovery	helps customers manage information by maximizing system availability while providing scalability, reliability and protection for critical enterprise business information	Hardware: Symmetrix; Software: FDRSOS, EMC Data Manager, Symmetrix Backup/Restore Facility, Symmetrix Remote Data Facility, TimeFinder
Enterprise Storage Disaster Recovery and Information Protection	identifies ways to minimize the effect of unplanned outages, eliminate delays during routine procedures, and protect valuable enterprise data	Hardware: Symmetrix; Software: Symmetrix Remote Data Facility, TimeFinder, Symmetrix Data Migration Service

Source: EMC press release, February 2, 1998
* Based on researcher's estimates and September 16, 1997 SmithBarney analyst report

Mobilization of resources

The goal was to create a consulting capability to be implemented as a revenue-generating professional services business based on EMC-specific enterprise storage know-how. EMC had many capable engineers, customer support, and sales staff who were experts in EMC storage technology. However, the firm was very limited in resources with the skillset and experience needed to run a professional services business. While some customer support staff were able to be retrained, most of the staffing came from outside of EMC.

The challenge was how to embed EMC know-how into a new organization that required a different set of organizational routines (Nelson & Winter, 1982). EMC management decided on an organic approach to bring people in with professional services organizational experience and train them in EMC storage know-how. Although the firm had the available financial resources, the challenge was how to quickly turn those financial resources into enough human resources (i.e., scale) and into a capable organization (Helfat & Lieberman, 2002). One former manager comments on the challenge of quickly mobilizing organizational resources.

> "So when I got there, there was a fair amount of planning already done. I got a playbook approximately 60% done and I had to figure out how to set this up organizationally which was complicated because I'm one guy. It's a $2 billion company. How do you find enough people with the skillsets really fast so that you can actually convince people that you can get this job done? ... The hardest thing was organizationally. It's a new organization... viewed as competitive to Customer Service [and] confusing to Sales. Sales had marching

orders and strict quotas. [They would say,] 'Get out of my way. Get the f out of my way.'
How do you scale it globally fast? That's hard."[61]

By the end of 1997, EMC Professional Services had approximately 100 employees. At the launch in February 1998, the firm was reporting 120 employees with a plan to triple that by the end of the year. One news article quoted Ruettgers as saying that "the company had 120 [professional] services workers, but could use 1,000."[62] The professional services group doubled between 1999 and 2000 to approximately 600 employees, perhaps a sign of more executive attention from new President and COO Joe Tucci and unmet expectations from acquisitions of a 500-person French professional services firm Groupe MCI and the Year 2000 services specialist firm Millenia III in 1998. Joe Tucci, former Chairman and CEO of Wang Laboratories, led Wang out of bankruptcy and facilated the transformation of Wang from a computer industry manufacturer to an IT services company. Tucci was not brought in to transform EMC in that way, but he certainly understood the potential of professional services.

While EMC had no plans to compete directly against IBM Global Services, indirectly EMC was competing against IBM in the labor market for employees to staff the new organization. This was during a period when IBM Global Services was aggressively ramping up. During this period alone, Table 4.13 shows that IBM hired 84,000 new employees for its professional services division.

Table 4.13. IBM Global Services hiring: 1996-2000

IBM Global Services	1996	1997	1998	1999	2000
New hires	15,000	15,000	18,000	17,000	19,000

Source: IBM 1996-2000 10-K reports

Awkward organizational fit

The evidence suggests an ongoing tension at an organizational level as to where the professional services organization should fit structurally within EMC. With an organic growth approach, the organization was too small to be a standalone organization. Initially placed under the Sales organization, PS was perceived as not aligned with the standard product-oriented

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[61] Interview with Alan Sarasohn.

[62] The Boston Herald, "EMC gunning for name recognition: data storage vendor seeks to widen fame," February 19, 1998.

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Symmetrix business model formula that had been successful up to that point. Some sales team members equated PS with "sales prevention"[63] and were heard saying, "get out of my way."[64] This suggests that early in the process PS was perceived not as a complementary function, but rather as a substitute or sales deterring activity.

Over time, the organization was structured under CS. While the organizational linkage between PS and CS was more cordial, the fee-based PS practices were being given away for free during the sales process. Bob Fusaro recalls this challenge in Table 4.14.

Table 4.14. Free vs. fee-based professional services

Source	Representative evidence
Bob Fusaro	"One [sales] rep at a time. One district manager at a time. One customer at a time...very much a missionary activity. But what ended up happening, especially early on, is when it came time to close the deal... you know negotiations are going on and margin is king for these guys... You know, they're bootstrapping so they ... corporate and the field ... they didn't have the same quota and margin pressures with professional services that they did with the current product line. What would end up happening very often is ..., 'OK, we have a TimeFinder sale and a services implementation, but I've bundled that in with the deal. Don't worry, I'll make you whole on the next one.' So if I'd heard that one more time..."
Bob Fusaro	"I [had to] throw in services for free. Yeah. People were very afraid and so as a result they didn't manage that aspect of a particular sales cycle with a particular customer very well. They didn't know how to... [The sales rep was] concerned about the margin on traditional hardware sales. If they can do anything to enhance that and get them over the line... quarterly pressures, etc. [They'd say,] 'Here's what I'll do. I'll throw in a services aspect in this for you.' And they didn't get dinged for it. Early on, we're just trying to get a toehold. For the first year or so there weren't many pressures so long as my regional VP bought in and signed off, I didn't have any issues. When we started to develop some additional successes and started to bring on more staff... and obviously now we're paying these folks... now the first notion of a P&L gets introduced for services... [around] the middle of 1998. Here's a P&L. Well it wasn't even quite like that. Develop a P&L for it. Because again, they didn't know. And so what's a good margin for services? What's a good utilization rate? Utilization rate? What's that? What's bench time? So we were really starting from that."

With the structural uncertainty came a lot of turnover in the PS management ranks as the firm went through leaders from outside and inside the firm. The rate of management turnover was described by one informant:

> "We had multiple Vice Presidents of [Professional] Services and it was more a title than an actual... Some of these folks couldn't spell services. Some could, but [they] didn't get the culture... It was a parade [of managers]. Honest to God, it was a parade."[65]

Consulting capability?

By the end of 2000, the consensus from internal and external sources suggests that the EMC PS organization had developed an implementation services capability. A consulting

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[63] Interview with former EMC VP who was part of initial PS planning.
[64] Interview with Alan Sarasohn.
[65] Interview with Bob Fusaro.

business had proved to be much more difficult to organically build from within a product-oriented culture. Another challenge involved generating revenue from the PS practices. Due to the relative size of PS compared with a Symmetrix, sales people resorted to the classic "whatever it takes" CS model that treats the cost of services as bundled in with the Symmetrix.

Given the difficulty in mobilizing enough resources quickly, establishing functioning organizational linkages, and limiting the degree of professional services management turnover, it is not surprising that the original intent of a consulting capability was not realized by 2000. Most analysts viewed the organization's competence as simply an implementation level capability up until 2002.[66] While culture clashes often hinder the integration of mergers and acquisitions, even an organic approach was very difficult to implement. What was intended as a value-enhancing complementary activity for EMC-specific products was vehemently resisted since it was perceived as misaligned with the core competence of the firm and its dominant business model.

4.6.4 Resulting capabilities and beliefs: 2000

EMC began this period as the enterprise storage market leader. By the end of this period, EMC was recognized as the fastest growing stock of the decade on the NYSE. Only Dell and Cisco grew faster, both of which were traded on the NASDAQ. By 2000, the firm had reached $8.9 billion in annual revenues and was experiencing an all-time high gross profit margin of 59.2% during Q4 2000. The record high gross margin reflected how customers perceived an EMC solution relative to competitive offerings, an increasing contribution from high-margin EMC software products, and industry-wide growth optimism. Customer confidence in an EMC solution was reflected in their willingness to pay a 2x premium for an EMC solution over competitive offerings. The increasing software contribution was reflected in $1.4 billion in EMC software revenues in 2000 compared to $20 million in 1995. The dot-com boom resulted in an explosion in digital data where storage became a central issue. Historically in the computer industry, the computer system was considered core while storage was considered periphery. Data storage had not necessarily replaced the computer system as the central issue in information technology, but storage was viewed by many CIOs and IT managers as the unifying agent across a heterogeneous mix of proprietary and open systems platforms.

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[66] Salomon Smith Barney report, "EMC: IBM-PWC transaction not expected to impact EMC," August 1, 2002.

Capabilities: 2000

The core capabilities of the firm were by and large very consistent with what they were at the beginning of 1996. EMC carved out a unique position by leveraging the Symmetrix MOSAIC:2000 architecture to interoperate across all major enterprise computing platforms – mainframe, the various flavors of UNIX, and Windows NT. As an independent vendor, EMC was not constrained by pre-existing not-supported-here platform choices that the systems vendors were held captive to. EMC was the only vendor who leveraged one architecture to serve the diverse needs across the various platforms. With the release of the Symmetrix 8000 product line (Version 5) where each device was capable of supporting all platforms.

Perhaps the key growth driver during this period was the EMC software portfolio, anchored by SRDF, TimeFinder, and ControlCenter. Backed by the "whatever it takes" CS culture and the new implementation services offered by PS, a tightly-integrated solution of EMC hardware, software, and services was hard to beat by the end of this period. Various partnerships were formed by competitors in an effort to knock EMC from its dominant position – IBM and STK, IBM and Compaq, HP and HDS, Sun and STK – but EMC had managed the transition from a one-hit peripheral product (Symmetrix) vendor to a diversified storage technology provider with similar market power of the 1980's IBM for whom no IT manager could get fired for buying from.[67]

Beliefs: 2000

But signs of cracks in the armor were starting to show in 2000. Large storage arrays such as Symmetrix were being disparaged as monolithic whereas the smaller arrays were considered modular and flexible. The reasoning here was not relative to the internal architecture – of which MOSAIC:2000 was very modular having supported mainframe and open systems platforms – but rather was about how tightly integrated the controller and disk drives were within the cabinet. Symmetrix was a tightly-integrated arrangement of the controller and disk drives, which meant that the Symmetrix was best for large deployments. During this era of growth, optimistic customers were willing to pay the EMC premium even though the storage capacity often far exceeded their current needs. However, EMC management decided to plug the "modular

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[67] Madison Securities report, "EMC Corporation," April 19, 2000.

storage" gap in their product portfolio by purchasing Data General in late 1999 primarily for its midrange Clariion storage product line. But through 2000, the primary emphasis in terms of engineering and sales resources remained focused on Symmetrix hardware and software.

HDS had launched a competitive storage array product with faster internal bandwidth and higher capacity than the Symmetrix in 2000, but EMC managers believed that the EMC hardware, software, and services solution would continue to differentiate the firm even from competitive products that could outperform the Symmetrix. Perhaps the biggest EMC management belief was in their growth projection for 2001 – 35% growth to $12 billion in revenues. They told analysts that the gross margins of 59.2% were not sustainable but would likely remain in the mid-50s.

By 2000, EMC was the dominant storage vendor. While EMC provided interoperability with external platform and software providers, partnering was not a big focus. HP was one of only a few EMC partners. EMC and HP had a partnership dating back to 1995. Having just announced a three-year reseller extension in early 1999, EMC and HP broke off the agreement in May 1999. EMC was very confident at the end of this period – stock of the decade on NYSE, customers willing to pay a 2x premium, a large and loyal installed base of customers, and continued growth projections for data storage.

4.6.5   Findings

At the beginning of 1996, EMC Professional Services was only an idea. In this section, I explore the key themes and relationships relative to the startup and implementation of professional services as a complementary capability at EMC. Specific emphasis is on the why and how during the period 1996-2000.

From products to architectures

Similar to the 1991-1995 period, Symmetrix was the core economic engine for EMC during 1996-2000. As one might expect from an incumbent, innovation within EMC was very incremental during this period. Changes were made to accommodate more systems platforms and advances in disk drive technology easily folded into new models of Symmetrix. However, from an innovation perspective, the Symmetrix was largely a close derivative of its original design and architecture.

Perhaps the most innovative activity – also largely incremental and related – was coming from a growing portfolio of complementary products that surrounded the Symmetrix. Specific to the Symmetrix product line, EMC software products emerged as a very promising revenue and gross margin contributor. Combinations of EMC software and the Symmetrix were being positioned to solve higher-level business problems such as disaster recovery and backup/restore. These "solutions" leveraged the value of EMC's expanding portfolio. These new solutions fit in with a broader trend throughout the industry – the transition from centralized to distributed computing environments.

The emergence of professional services signals a much larger trend where EMC looked to leverage the value of its expanding portfolio of products. But more than just a broad set of independent products, the portfolio was being leveraged through market offerings that recombined the individual products into a larger solution to solve a business problem (Davies, 2004; Fleming, 2001; Kogut & Zander, 1992). A higher level sell requires a higher level conversation – one at an architectural level. However, this is similar yet different from an architectural innovation where existing components and subsystems communicate in new ways to create a novel end product (Henderson & Clark, 1990). During the planning stage, some account managers understood that professional services was not simply about implementing a product bundle. The combination of Symmetrix and EMC software products required a conversation at a higher level of abstraction – i.e., an *architectural* level of conversation.

> *"If it's our standards and our architecture and they need more storage, they drop in another [EMC] box and it just fits right in because it's our architecture. Slowly they came around to that...the sales guys. But as you would expect, their next question was, 'Who's going to sell this? I'm not going to sell it. I can't talk those terms.' As we build this business, we'll hire consultants who know how to do this. [We'll] train them on our stuff and then let them go sell. That's where the roadblock came up. 'No way. I'm not letting anyone go into my account, especially to talk at that level without me."*[68]

In addition to a different level of conversation, the account managers also picked up a misalignment in timing. By adding the professional services component, the perception was that the sales cycle would be extended and thus create friction for short-term sales goals. Hence, the new professional services organization was the *sales prevention team*. While leveraging the portfolio, the unintended side effects result in incremental disruption.

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[68] Interview with Jeff Sands.

Competence-extending local search

With everything revolving around Symmetrix, it is easy to see that a professional services group during this period was intended as a complementary capability (Milgrom & Roberts, 1995; Teece, 1986). The established firm is always more likely to search locally, i.e., close to its existing base of expertise so that synergies can be realized (Helfat & Lieberman, 2002; Klepper & Simons, 2000; March & Simon, 1958; Penrose, 1959; Tushman & Anderson, 1986). The strategic management literature on related diversifications says that firms are more likely to expand into areas where existing resources can be shared {(Rumelt, 1974; Tanriverdi & Venkatraman, 2005) or where resources are complementary (Makri, Hitt, & Lane, 2010). On the other hand, a startup firm is more likely to initiate disruptive change that destroys the incumbent's existing competence base. The intent of EMC Professional Services was to leverage EMC-specific storage expertise. This was a local search for a new EMC-specific services mission.

At the crossroads of the management of technological innovation and organizational change, we understand quite well that firms have a difficult time dealing with disruptive change. In Christensen's research on the disk drive industry – a setting very close to the EMC context – incumbent firms struggled to transition to smaller form factor disk technology as the installed base of customers seemed disinterested and the good-enough technology took root in new markets (Christensen & Bower, 1996). In the EMC story, Symmetrix technology remained a dominant force for a decade. The firm successfully took the technology into a new market (open systems). If anything, Symmetrix was the disruptive technology in a follow-the-leader IBM 3390 plug-compatible world in 1991.

The strategic intent for professional services was not to extinguish prior competences in storage technology, sales/account management strategies, or the customer support culture, but rather to build on those competences. The transition to professional services was a local EMC-specific search, yet it required a new set of resources and competences that did not exist within the firm – what I am calling competence-extending local search. Competence-extending local search does not uproot the existing knowledge base as one might see incumbents struggle with during disruptive technological change. Instead, competence-extending local search complements the existing knowledge base, but also extends it into new directions. Prior research suggests that firms are more likely to mobilize new complementary resources through mergers,

acquisitions, and alliances (Harrison, Hitt, Hoskisson, & Ireland, 1991; Harrison, Hitt, Hoskisson, & Ireland, 2001; Karim & Mitchell, 2000). While mergers and acquisitions very often fail, EMC chose to build a professional services practice using an experimentation and an organic hiring approach. Experimentation is often viewed as part of a technological innovation process (Thomke, 1998; Thomke, 2003; Thomke, von Hippel, & Franke, 1998). However, EMC's build slowly approach to professional services demonstrates that the innovator may experiment in other areas besides how to create a new technology.

EMC management recognized in late 1995 that they did not have the resources, the experience, or the competence to build a professional services business. The key managers responsible for the initial planning and implementation were hired from outside the firm. Not intended to destroy the "whatever it takes" customer service culture, the professional services business was designed to extend EMC's services model. Compared to the customer services business, professional services was intended to be a revenue-generating line of business with its own unique set of organizational routines (Nelson & Winter, 1982) – time sheets, billable hours, utilization rates, bench time, project management, and customer engagement independent of the account representative. The new organization would require a new administrative systems and managerial logic (Prahalad & Bettis, 1986). EMC managers did not want professional services hidden under the "free customer service" umbrella. While some customer support engineers were retrained to be professional services consultants, the majority of the consultants were hired from outside the firm.

The new organization would also require competence-extending behavior in the sales process. Building off of the Symmetrix-centric sales expertise, the professional services practice required new skills more in line with a consulting business. The salesforce was certainly equipped to offer consultative product-related advice when appropriate, but the key difference was that professional services required an architectural level conversation. This conversation was about how various products fit together to solve a business problem rather than a product-centric competitive analysis. This conversation needed to occur with a high-level manager such as a CIO rather than with the data center manager whom the average sales rep connected with.

Internal credibility gap

Another perspective on the difficulty of complementary change came through from current staff who have been in sales or very close to sales operations earlier in their EMC career. Although a misalignment of incentives is a big hurdle to overcome, another chasm that the new professional services business had to cross was a credibility gap. Especially between 1996-2000, EMC was a vendor of premium-priced products. Therefore, the sales organization is very hesitant to put anything before a customer that they perceive will not deliver an experience consistent with other premium-priced EMC offerings. To do otherwise puts the customer account at risk. At the end of 2000, EMC was known for customer attrition rates of less than 1%.[69] One could argue that even if sales management had bought into the idea of professional services, the new organization faced an internal liability of newness for two reasons (Aldrich & Auster, 1986; Stinchcombe, 1965). First, could the new organization with new external hires truly deliver a quality EMC experience? That was a legitimate concern expressed by the customer services organization and most likely an indirect concern of the sales organization. Second, how quickly could the new organization scale up so that it has reasonable geographic coverage? Even if the quality of delivery existed in one of the sales regions, the organization has to scale across most of the sales regions to be taken seriously. Therefore, the firm has to balance the tension between adding resources to scale the new practice (i.e., adds cost) and developing credibility with Sales and Customer Service in order to finally develop a capability in professional services. This is what I call the services dilemma.

4.7 Expectations vs. Market Collapse: 2001-2002

In early 2001, EMC management was full of optimism. In January, Joe Tucci became the third EMC CEO after serving one year as President and COO. Mike Ruettgers transitioned from CEO to Executive Chairman of the Board. Having enjoyed a first-mover advantage and a three-year headstart, competitors HDS and IBM had finally caught up with their storage arrays. In fact, the HDS Lightning array had higher performance and higher capacity than a Symmetrix.

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[69] February 21, 2001, Wells Fargo Van Kasper analyst report.

4.7.1 Crisis management

Despite the increased competition, EMC had managed to differentiate itself from the competitors who during 2000 had developed storage hardware products that had finally caught up to and in one case (i.e., the HDS Lightning storage array) had surpassed the capabilities of a Symmetrix. However, the solutions approach that integrated EMC hardware, software, and services differentiated EMC in the marketplace. At an industry level, networked storage environments – SAN and NAS – were projected to eventually displace the simple direct-attached model. These new sophisticated usage models created greater demands on implementation and integration within the customer environment.

While discussing fourth quarter 2000 results with analysts in January 2001, Tucci and team began to reiterate what Ruettgers and team had been forecasting for 2001 – 35% revenue growth to $12 billion. Five growth drivers were named: 1) networked storage (SAN and NAS), 2) more EMC software, 3) international expansion, 4) large consolidated storage data centers ("information plants"), and 5) professional services due to a shortage of IT professionals.[70]

By mid-2001, it was becoming increasingly clear that conditions were radically changing. First, a major economic slowdown was reducing sales volumes as customers began to hold off on IT purchases. Making a tough situation even worse, the 9/11 terrorist attacks crippled two major EMC customer segments – financial services and the airline industry. Second, the competition between EMC, IBM, and HDS intensified to a new level as these vendors competed for a smaller sized market where customers no longer felt compelled to pay the EMC premium. In customers' eyes, there was no longer a significant differentiation between EMC Symmetrix, IBM Shark, and HDS Lightning. This resulted in downward pricing pressure on the storage vendors as each fought hard not to lose market share. EMC management decided to slash prices in an attempt to hold market share. As the vendor who charged premium pricing during the dot-com boom, price slashing was relatively more painful for EMC than most other vendors.

The confidence expressed to analysts in January 2001 soon turned into a worst-case scenario from 2001-2002. Fewer Symmetrix unit sales coupled with much lower average selling prices resulted in massive losses. Not only did EMC miss its projected 35% growth estimate of $12 billion in 2001, but sales revenues would not reach that level until 2007. Far below expectations, EMC sales revenues only reached $7.1 billion and $5.4 billion in 2001 and 2002,

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[70] Robertson Stephens analyst report, "EMC Corporation," January 23, 2001.

respectively. As shown in Figure 4.5, Symmetrix gross margins plunged from 56.6% in Q4 2000 to 7.8% in Q3 2001. By Q4 2002, hardware gross margins had moved slightly upwards to 16.4% – a far cry from 2000 levels. The massive losses in 2001 and 2002 forced EMC into some tough restructuring decisions.

Source: A.G. Edwards estimates, February 27, 2003.
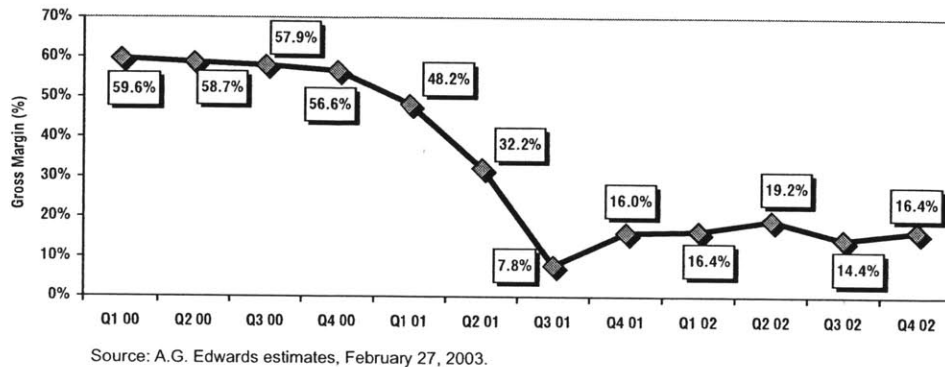
Figure 4.5. EMC quarterly hardware gross margins: 2000-2002

Capabilities or liabilities?

The combination of the economic slowdown, intense competition, and reduced demand for high-end storage rendered many of EMC's capabilities into liabilities.

The high-end storage strategy

Although the Symmetrix MOSAIC:2000 architecture provided an advantage for interoperability between mainframe and open systems markets, the Symmetrix was packaged as a tightly-coupled arrangement between the RAID controller and the disk drives in one box – what some competitors described as "monolithic." Customer demand for high-end, monolithic storage such as Symmetrix was waning in favor of low-end, modular storage devices. During the dot-com boom, overly optimistic customers were very willing to pay the Symmetrix premium and deploy storage systems that far exceeded their immediate needs. Many industry analysts believed that EMC had waited too long to refresh its product architecture, and the new internal crossbar switch architecture of the HDS Lightning surpassed Symmetrix in both performance and overall capacity. Moreover, HDS had reseller agreements with HP and SUN, which meant a greater distribution for the Lightning array. For the last decade, Symmetrix had anchored the firm as the enterprise storage leader. Given the competitive landscape and the shift in IT spending, the Symmetrix-only advantage had evaporated. Although EMC had acquired a mid-

tier offering (Clariion) during the October 1999 Data General acquisition, EMC had effectively ignored the Clariion product line into early 2001.[71]

Direct salesforce

CEO Tucci attended an analyst conference (Gartner) in 2001 and nearly half of the EMC customers in attendance – approximately 70% of the audience – expressed dissatisfaction with EMC's aggressive sales tactics. Although the EMC solution contained unmatched value, customers felt as though EMC was arrogant and customers were being bullied into buying EMC products.[72] By 2001, many customers were more than willing to consider even a good enough competitive offering.

EMC-specific software

In the latter half of the 1990's, EMC developed an impressive portfolio of complementary software products that ran only on the Symmetrix. This software functionality was at the heart of the value for which customers were willing to pay the EMC premium. With Symmetrix margins being compressed from increased competition, EMC software capabilities emerged as also a strong contributor of supplementary revenues and profits. was the way to keep overall margins at healthy levels. However, since EMC software products were tightly-coupled to Symmetrix sales, the EMC software strategy was vulnerable as Symmetrix lost market share.

Moreover, the industry was shifting towards the emerging networked storage technologies of SAN and NAS that required multi-vendor interoperability standards. This trend would enable greater choice for customers while simultaneously weakening vendor-specific advantages. Competitors were exchanging software APIs and standards efforts were being pushed.

Rethink everything

Given the magnitude of this crisis, EMC management had to rethink everything.

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[71] See Computerworld Honors Foundation, "Joseph M. Tucci Oral History," April 30, 2004. Also Frank Hauck, EMC Executive Vice President, "The C in EMC – Part 2," posted Feb 4, 2010 on YouTube.
[72] Frank Hauck, EMC Executive Vice President, "The C in EMC – Part 2," posted Feb 4, 2010 on YouTube.

Storage hardware strategy

The mid-tier storage arrays such as the Clariion featured a modular packaging arrangement where the RAID controller and disk drives could be in separate cabinets. The modular packaging provided customers with the flexibility to add storage capacity in smaller increments – a desirable situation when IT budgets get compressed during an economic slowdown.

Partnerships

As EMC began to think more seriously about its Clariion mid-tier storage offering, the firm needed to also think more about building a channel partner program for it as the lower Clariion price points did not provide large enough incentives for a direct salesforce. EMC had demonstrated little interest in maintaining reseller and OEM relationships having ended a reseller agreement with HP in 1999. Shortly thereafter, HDS and HP formed a reseller partnership where HP could resell the HDS Lightning array. Given the present crisis, EMC switched gears in October 2001 and signed a five-year reseller agreement with Dell for the Clariion product line.

Software strategy

EMC began to shift away from its former Symmetrix-specific software strategy. Due to the current crisis, the software had lost some of its value as a complementary/supplementary capability as it was tightly-coupled to a weakened Symmetrix platform. One major endeavor by EMC to lead an interoperability effort was the introduction of its Automated Information Storage (AutoIS) software strategy in October 2001. At the heart of AutoIS was an EMC-led effort to establish a multi-vendor storage management middleware platform known as WideSky. If successful, EMC technology would be well positioned to capitalize on the next wave of enterprise storage trends. However, a platform leader must be able to develop compelling APIs and encourage participation from complementary vendors (Gawer & Cusumano, 2002). The most influential complementary vendors just happened to also be EMC's primary competitors. By 2001, the EMC advantage had been largely built on a go-it-alone position in storage hardware and software. EMC was the big target that all competitors in this space were going after – the large hardware systems vendors (IBM, HDS, HP, and Sun), the small niche players (Network

Appliance), and the software vendors (Legato and Veritas). Competitors were not willing to let EMC control the evolution of an industry-wide platform.

As another sign of its shifting software strategy, EMC announced a major reorganization into three business units in November 2001. Of note was that the software organization was removed from under the Symmetrix business and made into a standalone business unit. An EMC specific software strategy did well as a tightly-coupled and loosely-coupled organization under the Symmetrix business unit, but a multi-vendor software approach required the firm to decouple the software from the EMC specific hardware platform if the firm wanted to be a serious multi-vendor software player. This was a sign that the software strategy was now transitioning from a hybrid complementary/supplementary state to certainly a decoupled supplementary state with future potential to evolve into the core.

Services strategy

The next section explains in more detail how the services strategy shifted during this crisis.

4.7.2 Opportunity identification for professional services

The opportunity for professional services moving out of 2000 was driven by three factors: the perceived need to market solutions rather than just products, increasing deployment complexity with the continued emergence of storage in distributed environments, and a modest growth opportunity.

The professional services practice had the potential to play a major part in combining EMC hardware and software products together into a customized solution for an individual customer and thus make EMC very sticky in the customer account. Was professional services going to be a true revenue-generating business or yet another bundled service offering like customer service? The formation of EMC Professional Services was less than smooth and it was of marginal value by 2001.

As a sign of its potential value to EMC executives, professional services was designated as a growth driver for 2001. Therefore, this complementary capability had emerging value as the firm planned for a year with expectations of 35% growth – i.e., before the market collapse.

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4.7.3 Strategic intent: build out professional services

In early 2001 as a sign of its potential value to EMC executives, professional services was designated as a growth driver for 2001. EMC management communicated to analysts its intent to further build out professional services by doubling staff from 600 to 1200 by the end of 2001. Table 4.15 shows a consistent message of intent conveyed by EMC executives to the analyst community. Despite the rough start, this complementary capabilities had emerging value as the firm planned for a year with expectations of 35% growth – i.e., before the market collapse.

Table 4.15. Analyst perspectives on EMC professional services, early 2001

Source	Representative evidence
Buckingham Research analyst report, 1/23/01	"The shortage of IT professionals means a significant opportunity in professional services (EMC plans to double personnel in 2001)."
Robert Stephens analyst report, 1/23/01	"The shortage of IT staff continues to drive the need for storage services. EMC plans to continue the build-out of its professional services team as well as services via its partners. EMC currently has 600 people in its own professional services department, and it expects to double this number by the end of 2001."
Morgan Stanley analyst report, 1/24/01	"According to EMC, two new growth drivers will be information plants and a services network. Information plants are large, central depositories of digital information that leverage economies of scale... Secondly, EMC's services network will help companies overcome the shortage of qualified IT professionals. There are about 600 employees in EMC's [professional] service division today and the company aims to double this number by the end of 2001."
Wells Fargo Van Kasper analyst report, 2/21/01	"In addition, the company offers pre-sale custom integration services to help enterprises architect and implement complex and mission-critical storage infrastructures... The increasing complexity of SANs, coupled with the tightening pool of qualified IT technicians, represents a significant opportunity for EMC's professional services business. We anticipate that EMC's storage services will be an important growth vehicle in 2001."

4.7.4 Strategic action

The projected growth plan for professional services staffing reflects EMC management's belief that the organization needed scale. Its scope as mostly an implementation capability was to persist into 2001.

Another hallmark of EMC had been its services approach – primarily led by the Customer Services organization. Since the historic CS model was that of an investment center where the cost of support services was bundled within the price of a Symmetrix for no extra charge, the CS organization was not expected to be a profit and loss business. The goal was customer satisfaction.

As storage deployments became more complex, EMC sought to build a revenue-generating Professional Services organization. Under a continuing growth scenario like in the previous decade, EMC management's intent was to scale the PS organization from 600 to 1200 personnel. The crisis of 2001-2002 where EMC's entire business model was being re-examined provides an opportunity to understand the role of complementary capabilities – specifically professional services – in the midst of dire circumstances within a high technology product company. By the end of 2002, EMC management had indeed continued with their original intent to further build out PS as the overall practice grew to approximately 1600 professionals. Of note are the three other moves that EMC management made between 2001 and 2002.

First, the day-to-day PS operations were inefficient. The selling motion and the delivery motion were not in sync. The technical consultants (formerly called systems engineers) were often the EMC employees who scoped out and sold the implementation project to the customer during a sales engagement. Once sold, the project was *thrown over the wall* to the PS project management team who was responsible for the delivery of the project (i.e., the implementation). Too often the PS implementation team thought that their colleagues in sales had over promised to the extent that the project would not be profitable or could not be completed. Therefore, EMC management combined the PS sales and delivery groups into one organization to increase efficiency in scoping and delivery of projects.

Second, EMC announced a five-year outsourcing agreement with Accenture in October 2002 to form a consulting organization called Information Solutions Consulting (ISC). This announcement was significant at many levels. It was an admission that EMC had not been able to create the consultative business capability that it initially intended during the original PS planning in 1996. The struggle to organically hire enough managers and individual contributors with a consulting business skill set and to integrate that function with an aggressive revenue-maximizing account management culture was a difficult process. While customers were willing to pay the EMC premium during the growth decade of the 1990's, EMC was hard-pressed not to break the rhythm of what was a winning formula. With the conditions such that the EMC premium model had been severely punctured, the desire for a true consulting capability had been renewed. During the 2001-2002 crisis, ISC was yet another sign that EMC was now willing to seriously consider partnerships in areas where its strategy was deficient. As for the resources to staff ISC, each firm would contribute approximately 100 employees to the effort by the end of

2002. Consistent with its moves towards a platform-agnostic software strategy announced in 2001, ISC was designed as an effort to build a platform-agnostic consulting capability. The expectation was that Accenture resources would quickly provide both the platform-agnostic and consulting legitimacy that EMC lacked in the marketplace.

Third, in October 2002, EMC announced a professional services partner program called the Authorized Services Network (ASN). This was a formalized program to create a standard set of certified practices around EMC products by which small and large professional services partners would provide a consistent experience for smaller EMC accounts not covered by the direct salesforce.

Table 4.16. Professional services restructuring, 2001-2002

Source	Representative evidence
Combining PS sales and delivery organizations	
Ed Berndt	"One of the other factors is we brought in a new CEO, Joe Tucci who came from a services company... I think he was very cognizant of what the potential was. We can take that piece and grow it. That and the fact that the entire bottom dropped out of our market and everything crashed... the stock goes from 100 down to 3. It's like hey, we've got to do something. And that's when we put pre-sales and delivery together. That's when we basically started having a bunch of pre-sales guys driving delivery. So you weren't doing delivery for the sake of PS. You were doing delivery for the sake of the benefit of the customer as a whole and the solution as a whole. Now you had guys that had been working with the sales folks for years saying, 'Trust me, this is the right thing to do.' I think that had a lot to do with it."
Dave Cox	"[We] finished 2000 with $8 billion and planning for $10-$12 billion in 2001 and wound up with $5.5B [in 2002]. So that caused the company in 2002 to step back and say, 'perhaps I really need to do things differently.' And that started this whole go-to-market overhaul... One of the things that came out of that was a change in services strategy. So in 2002, we essentially created the services organization that exists today around design and implementation services around product. I'm gonna take the pre-sales folks and the delivery folks and put them together into one cohesive service organization... I think that's different at EMC than in some other areas. Other companies have their sales engineers separate from the PS implementation folks. What we found was that created a huge gap between those two organizations. And you'd have a pre-sales engineer who would effectively throw things over the fence. The delivery guys were measured on a separate P&L ... who would take that and say, 'Hey I can't deliver this. You didn't scope it right. This is too hard. There's not enough money in this for me.' It just created all kinds of hate and discontent... and so we squished those organizations together in a single unified management team to try to solve those problems. That was 2002."

Outsourcing agreement with Accenture

Dave Cox	"Even before [the Information Solutions Consulting group], EMC tried a couple of times to organically build a consulting team. That's hard to do... very hard to do which is one of the reasons that they partnered with Accenture to go really try and do something creative around how do we build [a consulting organization] now."
Ed Berndt	"He basically said we should be going in well in advance and saying, 'Let me help you design your 3 and 5 year plan.' Because if I the hardware dealer can define your 3-year plan, then I know exactly what you're going to need. I'm going to be there every step of the way. But we didn't have that consultative bend. We had implementers. You can't just go out and hire people like that...We didn't know how to sell it because we were product salespeople so we made an agreement with Accenture."
Ed Berndt	"Assessments are very, very hard unless you have a very loyal customer set. If someone was 100% EMC installed, you could go in and say Mr. customer, I want to do an assessment. I want to go in there and I want to understand what your utilization of your curr disk space is. do you have the proper paths? Could we speed things up? Do you have redundancy, backup, ...? That's an assessment, but that's very impl specific. It's how do I make my impl better? Versus the Accenture thing which was, what am I going to become? What are my service levels for the other people in my company? Very different conversations... They were CIO based conversations versus all of our product-led service conversations were with the director of tech services [or] the director of the data center. So you were talking to totally different people."

PS partner network: Authorized Services Network

Ed Berndt	"We're doing all these implementation services. It's starting to take off and we don't have enough people. So we've got to subcontract to ... who do we subcontract to? And the answer is ... whoever you were comfortable with who wasn't going to screw you and was going to make sure he always had someone there on time. And that's who we used. Suddenly we said, no, we're going to get approved guys. You've got to use these guys if they're available. That was the start of it. We've actually remade that program 3-4 times over the years. We're now on something we call the Preferred Partner Program."
Ed Berndt	"There's two different types of partners. There are partners where you both go in and win together. There are partners [who] you subcontract business to... That's not a real partnership. That's a business relationship because if all of sudden I decide that I have no business for you this month, but you built your business... expecting $1 million from me. And all of a sudden I turn off the spigot. I could put you out of business. That's not a partnership. That's just a business relationship that you hope continues on. [ASN] was more for us and our customers to know that they have someone who knows what they're doing when they walk in. Versus someone ... who comes in and just opens up the manual. You want someone who's done it multiple times."
Patrick Dennis	"If you look at the company's history, we were on the road to $12 billion dollars in 2001. Shortly thereafter, that didn't appear to be an attainable goal ... because of what happened in the market. So there are ... two things that happened there. One, we considered more diverse revenue streams and we ... also considered whether or not our service cost heavy model was really the model that allowed us to get the most value for the sale of our product and service. There's probably an argument to be made prior to 2002 that it was difficult to determine if a relationship with a client was profitable because the amount of service that you offered to every client was high regardless of their total spend."

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4.7.5   *Resulting capabilities and beliefs: 2002*

Given the state of affairs from 2001-2002, what had been capabilities during the prior decade were now potential liabilities. As the flagship product that anchored EMC through the prior decade, the Symmetrix was being outpaced for the first time by a competitive offering (HDS Lightning) with better performance and higher capacity. Formerly touted for its modular MOSAIC:2000 architecture that enabled interoperability across open systems and mainframe environments, Symmetrix was occupying the high-end storage category that was now considered monolithic and less desirable during an economic downturn. Future sales of the highly successful software products such as SRDF, TimeFinder, and Control Center that created differentiation for EMC were now vulnerable since they were Symmetrix specific functionality. Many customers felt bullied during the purchasing process and considered the aggressive, results-driven direct salesforce arrogant. The big financial incentives for the salesforce were now signs of a bloated cost structure. The customer service culture was strong and committed but with slashed Symmetrix prices, the customer service cost heavy model could not be sustained for long tied primarily to a weakened Symmetrix business. The professional services organization provided implementation services for complex projects, but the scope, scale, and financial model were still sources of internal struggle.

The line between capability and vulnerability can be quite thin (Leonard-Barton, 1992). As EMC was forced to rethink its entire business model, its list of capabilities was not clear in 2002. Aiming to build on a decade of storage expertise, EMC management began moving the company beyond its traditional sweet spot of core competence in high-end storage arrays. It remained to be seen whether these new directions would become capabilities or rigidities slowed down by internal organizational frictions. At the top of the list, plans were in motion to refresh the Symmetrix product line as the competitive storage arrays had caught up. But even a more competitive Symmetrix could not plug the mid-tier market product gap that EMC was starving for attention. With IT spending projected to be down, the flexibility of modular storage arrays was a sizable market opportunity for customers who wanted to add storage capacity in smaller increments. EMC management now believed that the Clariion product line had to be fully embraced. Management believed that partnerships were to be encouraged and embraced. The Clariion reseller agreement with Dell, the consulting services agreement with Accenture, and the

formal certification program for professional services partners were positive signs that the new EMC might be more partner friendly post 2002.

The software business was viewed as the primary revenue and profit margin growth driver for the future. Having grown from 3.4% to 16.2% of total revenues between 1996 and 2000, the software business was entirely dependent on EMC hardware. EMC management announced two key goals for software. First, a software contribution goal of 30% was announced as part of the 50/30/20 plan. Second, EMC should expand into multi-vendor (i.e., hardware platform agnostic) software opportunities. Several initiatives were announced as well as an organizational restructuring that elevated the software organization into an independent business unit on par with the hardware systems division. Separated from the hardware business, the software capability was transitioning into a decoupled supplementary capability with the intent to become core to the firm. Together with major cost-cutting programs, these new initiatives simultaneously were signs of hope and uncertainty heading into 2003.

4.7.6   Findings

The 2001-2002 period provides a unique opportunity to examine how a technology product firm strategizes with respect to its complementary capabilities during a severe market collapse. This was a time where EMC managers had to rethink everything.

Scaling up PS: build and partner

What was evident at the beginning of 2001 was EMC's intent to continue building out the PS organization under the assumption that the year would proceed approximately according to plan. Although the PS organization had demonstrated an EMC product specific implementation capability, the organization was very small.

As financial performance collapsed, EMC was faced now more than ever with the services dilemma. On the one hand, a professional services business is another revenue source that can help offset declining performance. On the other hand, scaling a small professional services staff adds a lot of cost. When your product market collapses is a questionable time to scale a slow-growth opportunity. What EMC implemented was a hybrid approach that concurrently had aspects of build and partner.

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As projected before the collapse was imminent, EMC added staff to the professional services organization during 2001-2002. Part of the growth in PS occurred when EMC managers combined the pre-sales engineers with the PS delivery teams. Although the PS organization was small and its initial formation had been bumpy, a few years were enough time to recognize organizational inefficiencies.

The establishment of the Authorized Services Network – a formal indirect professional services strategy – was the second part of the PS scale up decision. In the case of firms vertically integrating deeper into more value chain activities, prior research has shown that firms will often take a hybrid approach of make and buy concurrently (Parmigiani, 2007; Parmigiani & Mitchell, 2009). In the case of PS at EMC, the primary customer-facing governance model was to be EMC led. Services partners were used on an ad hoc subcontractor basis. EMC sought to put a more formal governance model around its services partners in order to ensure a certain level of quality.

Competence-extending local search revisited

Professional services as an implementation service for complex EMC-specific projects was taking hold. The struggle here became differentiating the PS implementation service from installation that came with customer service/support. Internally, PS was geared to handle complex projects that required weeks or months to implement such as an SRDF or SAN implementation. But for existing customers who became accustomed to the free customer service installation, being charged for an implementation didn't seem consistent with the EMC experience they were used to. This was often reflected in the behavior of the sales teams as they were often quite reluctant to charge for PS within existing accounts. The competence-extending behavior for PS implementation services had two components. First, the operational aspect of selling, scoping, staffing, implementing, and managing projects was in place. Combining the sales and delivery teams into one organization was a good sign that EMC was learning how best to fine-tune PS implementation projects.

The business of PS was the second competence-extending behavior for PS implementation services. Charging the customer for services was a big deal for a sales organization whose primary business came through existing customer relationships. The imprinted EMC bundled customer service approach meant free pre-sales assistance, post-sales

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install, and break/fix support. The boundary between the free-based CS and the fee-based PS was blurry.

While the PS implementation service was slowly taking shape, the goal of extending PS competences into a consulting business had been elusive. In 2002, EMC conceded that it needed help in this area when it created ISC. The joint agreement with Accenture would bring together EMC's storage expertise with Accenture's consulting expertise. This was yet another sign that EMC was rethinking everything. Although EMC had experience with reseller agreements with HP and Dell, a 50-50 business arrangement was new territory for a firm whose track record demonstrated a go-it-alone mentality. The ISC alliance consisted of 100 EMC people who brought storage expertise (local search) to the venture and 100 Accenture people who brought operational expertise in how to run a consulting organization (competence-extending local search). While the PS implementation business had been a slow-growth organic venture, ISC provided EMC with immediate access to dedicated external resources necessary to build a complementary set of competences that did not exist internally.

4.8 A Whole New World – EMC 2.0: 2003-2010

Looking forward following the 2001-2002 collapse, EMC management was expecting overall storage spending across the industry to range from flat to perhaps single-digit growth levels. While far from the high-flying days of the 90's, that was relatively better than the flat projections for overall IT spending levels. The big news in early 2003 was the launch of Symmetrix 6, which contained the new Direct Matrix architecture (DMX). Despite new opportunities for mid-tier modular arrays such as the Clariion, Symmetrix 6 represented EMC's commitment to continue technological search in high-end storage arrays (Katila, 2002). The new DMX point-to-point architecture offered a considerable increase in internal bandwidth versus the previous MOSAIC:2000 shared bus architecture and the switched architecture of the HDS Lightning. The total capacity remained below the HDS and IBM offerings but was expected to catch up in later upgrades. See Table 4.17 for a brief comparison.

Table 4.17. High-end storage comparison: 2003

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EMC, Hitachi Data Systems, and IBM High-End Storage Product Comparison

	Hitachi Lightning 9980V	IBM Shark Model 800	EMC Symmetrix Model 8730	EMC Symmetrix DMX 2000-P
Total Capacity (TB) *	150	56	56	42
Drives	1024	384	384	288
Architecture	Switched	Shared PCI Bus	Shared PCI Bus	"Direct Matrix"
Internal Cache Bandwidth	15.9GB/sec	4.8GB/sec	1.6GB/sec	72GB/sec
Cache (GB)	128	64	64	128
Connectivity	64 FICON or Fibre Channel	16 FICON 16 FibreChannel	16 FICON 96 FibreChannel	96 ESCON or Fibre Channel
Virtual Ports	4096	-	-	-

* Capacity computation assumes 146 GB drives for all products

Source: Bear Stearns report, "EMC Corp.," February 3, 2003

The plan was for Symmetrix 6 to re-establish EMC's competitive position in high-end storage devices. The hope was that a renewed Symmetrix family would help bolster Symmetrix gross profit margins that had taken a severe beating from 2001-2002. Unlike the early 90's where Symmetrix enjoyed a first-mover advantage, even a *better* Symmetrix in 2003 faced stiff competition from HDS and IBM offerings. Customers were now more likely to bring in all three vendors to compete for business.

EMC was putting more effort into the midrange storage area with its Clariion product line. Having ignored Clariion following the acquisition of Data General in 1999, the 2001-2002 collapse forced EMC to rethink everything – including its channel partner strategy having signed a reseller agreement with Dell. EMC was now expecting a greater product mix contribution from the Clariion line.

EMC also began another partner initiative in 2003 called the Velocity Partner Program. This was in line with the services partner program – ASN – announced in 2002. These new programs marked a big change from the go-it-alone days of the 1990's from a product strategy perspective and a partner strategy perspective. Tucci was quoted as saying, "Back in 2000, we were not an easy company to partner with on any level."[73]

The future promise from the software business was in driving revenue growth and bolstering profit margins. The biggest challenge was to push its new multi-platform software strategy called AutoIS. The EMC specific software – led by SRDF, TimeFinder, and ControlCenter – had made EMC's Symmetrix very sticky in customer accounts. Networked

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[73] 8/4/2003, "EMC revs up partner program – but will 'Velocity' speed channel adoption," VARBusiness.

storage (SAN and NAS), projected to surpass direct-attached storage by 2005 according to IDC 2002 estimates, was pushing the industry towards more interoperable standards across storage vendors. The biggest standard setting effort was with the Storage Networking Industry Association (SNIA). Similar to other vendors who participated on two fronts – SNIA and vendor-initiated efforts – EMC was active in SNIA and had launched the FibreAlliance (for SANs) in 1999, the WideSky middleware platform in 2001, and a few API cross-licensing collaborations with competitors. By the end of 2003, EMC had abandoned the FibreAlliance and WideSky in favor of the SNIA Storage Management Initiative – Specification (SMI-S) (Saghbini, 2005).

During the quarterly conference call with analysts to discuss Q3 2002 results, CEO Tucci offered an interesting state-of-the-firm comparison between 1999 staffing levels and his 2003 target level. While the overall staffing level is the same at approximately 17,000 employees, he highlighted net increases in services and R&D. The net reductions were happening in manufacturing and administrative functions. The message to analysts was clear: even during tough times, EMC was going to continue to increase investments in innovation and customer-facing activities (sales and services). Of special note was Tucci's comment about EMC's investment towards its professional services capabilities. With 2003 staffing levels projected to be the same as 1999 staffing levels, Tucci showed how manufacturing jobs were to have a net decrease while R&D and service jobs would have a net increase. Table 4.18 provides estimates of Tucci's comments to analysts.

Table 4.18. EMC staffing levels, 1999 vs. 2003 targets

Era of	Dot-com boom	Collapse	Recovery
	1999 actuals	Q3 2002	2003 target
Services	3300	5600	5500
Customer service	3000*	4000	
Professional services	300*	1600	
R&D	2000	3190	3100
Sales	X	X + delta	X + delta
G&A (includes Mfg)	Y		Y - 3800
Total employees	17,500	18,400	17,000

Source: Tucci remarks during Q3 2002 results on October 17, 2002
* My estimates based on Q2 and Q4 analyst reports in 2000 and 1999 10-K

X represents an unknown staffing level of Sales organization
delta represents the incremental staffing added to the Sales organization
Y represents an unknown staffing level of General & Administrative personnel
and includes Manufacturing staffing

4.8.1 Opportunity identification

At the beginning of 2003, the opportunity for professional services is driven by four factors very similar to the situation at the beginning of 2001: the perceived need to market solutions rather than just products, increasing deployment complexity due to the continued emergence of networked storage rather than direct-attached storage, demand from customers looking to outsource storage deployment activities, and a modest growth opportunity. Tucci reported during the Q1 2003 discussion with analysts that customers are asking EMC for help in the area of networked storage. Compared to EMC's initial entry into the mainframe plug-compatible product market in 1990, networked storage involves a greater level of complexity. Although efforts were ongoing with multi-platform software and networked storage that was interoperable with other computer and storage vendor equipment, EMC's advantage was in its Symmetrix hardware and Symmetrix-specific software. This was typically articulated as a solution. Professional services enabled solutions on two levels. First, the design, implementation, and integration of a storage solution were the domain of EMC Professional Services. This organization was building a fee-based implementation capability for EMC-specific products. Second, the newly formed EMC Information Solutions Consulting organization was to take a higher-level approach than the EMC Professional Services group. ISC was formed to enable EMC to develop a platform-agnostic storage consulting business capability. As networked storage was forecast to emerge, EMC moved to position itself as a capable vendor in multi-platform software with a multi-platform consulting services offering.

4.8.2 Strategic intent: build out professional services organizations

In July 2003, Tucci articulated to analysts that EMC's intent was to continue building out its professional services position, which was viewed as essential to deliver solutions (i.e., combinations of hardware and software products integrated into customer data centers) and a key area of investment and growth. While this message highlighted that professional services was important to EMC, the expectations on financial performance measures were left ambiguous. This suggests a continued expectation of professional services as a complementary capability that was tightly-coupled to the core capabilities. Tucci did not communicate nor was it implied by the analysts that professional services at EMC was expected to deliver large gains in sales revenue or profit margins. On the other hand, the software business was expected to offset the

revenue and gross margin declines in Symmetrix sales suffered in 2001-2002. This indicates an expectation of the software as supplementary with a potential to be core.

In the beginning of 2003, EMC was set to build a set of professional service capabilities that incorporated three governance models – build, buy, and partner. First, the EMC Professional Services organization launched in 1997 was known for its capability in implementation services. This organization was built primarily via an organic hiring process over the years. Second, Information Solutions Consulting was the newly established organization that was chartered to create a consulting capability for EMC via a joint agreement between EMC and Accenture. The organization was front-ended by EMC but was operationally structured as an outsourcing arrangement of dedicated Accenture resources. Third, the Authorized Services Network was a formal program established in 2002 to create a network of certified professional service partners that could provide the same quality level of service as customers expected from EMC directly. Therefore, the intent was to build out these three PS initiatives as the firm continued to restructure from the market collapse of 2001-2002 by reestablishing competitiveness in high-end storage, establishing a foothold in mid-range storage, and expanding into multi-platform software.

4.8.3 Strategic action

Product and technology expansion

Having seen firsthand how vulnerable they were with only a high-end storage array, EMC finally began to embrace a more complete storage array portfolio with the midrange Clariion product line. Building on the launch of the new Symmetrix DMX series, EMC management began to articulate a new commitment to faster product cycle times for the Symmetrix and Clariion storage arrays. They envisioned 12-18 month turnarounds as opposed to their former practice of 24-36 months.[74] Following the DMX launch in 2003, EMC launched incremental Symmetrix upgrades under the DMX-2, DMX-3, and DMX-4 banners between 2004 and 2007. The Clariion line produced a few upgrades to the CX product line up through 2008. Although the low-end Symmetrix DMX products utilized more modular packaging, an increased product mix contribution from Clariion sales was believed to be cannibalizing low-end

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[74] Faster cycle times were picked up in analyst reports such as UBS Investment Research, February 9, 2004 and Deutsche Bank, June 11, 2004.

Symmetrix product sales that had bigger margins. In any case, Symmetrix and Clariion were the foundation for direct attached and networked storage deployments throughout this period.

From a modest expansion into the software business in 1994 to software sales of $1.4 billion in 2000, the high-margin software business continued to show great potential as the primary revenue and profit growth engine for the future. Following the dot-com collapse, software became a major area for continued technological search (Fleming, 2001; Katila & Ahuja, 2002; Rosenkopf & Nerkar, 2001).

EMC management believed that the firm had to expand beyond EMC-specific software and into multi-platform storage software, as customers were now more likely to have (or consider) a networked environment of heterogeneous compute and storage devices. Having announced in 2001 a target contribution from software of 30%, EMC management continued to signal its intent to expand beyond the domain of EMC-specific software. The first move was in late 2001 when it made the software group one of three divisions in the firm – no longer structured under the Symmetrix division but now on par with it. Further evidence that EMC software capabilities were transitioning into a core competence for the firm, EMC acquired over 40 firms – the majority of them software firms – between 2003 and 2010. The smaller acquisitions were part of what Tucci called "tuck-in" acquisitions while the major acquisitions anchored the firm in various multi-platform expansion areas such as cross-platform backup and recovery (Legato Systems in 2003), content management (Documentum in 2003), virtualization (VMware in 2004), and security (RSA in 2006).

With so many acquisitions, there are numerous ways to think about EMC's technology expansions during this period. Perhaps the three biggest categories have been information lifecycle management (ILM), virtualization, and cloud computing. ILM covers a broad set of data management issues such as creation, storage, security, backup, recovery, archival, and disposal. Tucci announced the ILM strategy in late 2003 closely following the Legato announcement – the first big acquisition during the 2003-2010 era.

Virtualization is the process of creating a computing environment that is abstracted from the underlying physical devices. Virtualization works in a manner such that software applications believe they have more resources than are actually physically present. Virtualization technology is often used as an efficiency mechanism to increase the utilization of

pricey physical resources. EMC acquired a majority position in VMware in early 2004, which provided EMC with an entry into the virtualization space.

Cloud computing has many definitions. Simply speaking, cloud computing is a pooling together of computing resources irrespective of their true physical location such that users care only about data access and not about the location, size, and maintenance of the physical resources required for the data. Following the acquisition of Pi Corporation in 2008, EMC created a cloud computing division.

While profitability is largely driven by high-margin software products, EMC has intentionally remained in the business of storage array hardware products. The Symmetrix Virtual Matrix architecture (V-Max) was launched in 2009 as a high-end storage product for virtual and cloud computing environments while the Symmetrix DMX-4 line continued forward for more traditional data centers. In 2010, EMC brought together its storage platform expertise with virtualization technology and cloud computing by introducing the VPLEX architecture. VPLEX enables virtual storage, which together with virtual servers enables customers to build private clouds.

Building out EMC professional (implementation) services

Given the urgent need to restructure, EMC managers pursued an aggressive technology expansion strategy combining organic growth with growth by acquisitions. The newly emerged EMC was starting to look very different from the one projecting 35% growth for 2001. As the product portfolio continued to expand among a tough IT spending environment, Tucci viewed professional services as another area of growth and opportunity. In 2003, the overall EMC Global Services organization was structured into three entities: Customer Service, Customer Education, and the Technology Solutions Group (TSG). TSG became the overarching professional services entity within EMC, inclusive of the initial Professional Services (implementation and integration) organization and the new Information Solutions Consulting venture with Accenture.

Between 2003 and 2010, EMC has come to terms with EMC Global Services as an organization that offers implementation and integration services for a fee. Management continues to sense customer demand for these services, as customers are more willing to outsource non-core activities such as sophisticated storage implementations. The scope of this

organization has remained consistent across the period. First, it's coupled together as part of a product sale. In other words, PS is part of a product-led engagement. Second, it's specific to EMC products and technology – although some external products may be required to complete an implementation. Along the way, a design layout or architectural assessment may be warranted on how the various products fit together and should be integrated into the customer's data center. Ultimately, PS results in an implementation of EMC technology. Third, PS is targeted for EMC customers with whom there exists a direct account relationship. These are typically the enterprise customers. EMC management defined its customer segmentation boundaries in 2003: enterprise, commercial, and small-medium business (SMB) customers.[75]

The struggle with PS has never been with the difficulty of the work. EMC has always had individuals quite capable of performing the implementation, no matter how complex. As PS became a standard part of the organizational landscape within EMC during this period, the challenge has been with creating the *business* of professional services. With the creation of the Information Solutions Consulting group, the identity of PS is now clearly about implementation and integration. But a side effect of a clearer distinction between PS and consulting was a blurring of PS and CS. While the scope of a PS project was more complex than a straightforward install of an IBM 3390 plug-compatible Symmetrix to an IBM mainframe, many EMC account representatives and installed base customers simply viewed this through a "free CS install" lens. The sales teams are often hesitant to transition their customer accounts to this extended service model. With the large difference between PS and product prices, the sales teams often saw this as a risky account strategy. This puts PS in a vulnerable position as a P&L business if the sales teams resort to the free service model. On the other hand, services are complementary capabilities at EMC. One manager says,

> "Overall, EMC has never said we're going to be a services company. That's one of the differences between EMC and IBM. We've never said we're going to be a services company. We don't intend to be a services company."[76]

That creates a tension between the role of professional services – inclusive of consulting – as a complementary capability with the task of running the organization as a profit and loss

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[75] EMC held their investment analyst day event entitled Evolutions on August 6, 2003. In a post-event report on August 7, 2003, Deutsche Bank made a note about EMC management shifting from a one-size-fits-all market approach to a more segmented approach by enterprise, commercial, and SMB. Enterprise is the segment for direct sales while commercial and SMB are the channel partner driven segments.
[76] Interview with Sandy Hamilton.

business. Table 4.19 highlights some of the difficulties in establishing the *business* of professional services within the contex of a technology product company.

Table 4.19. The struggle to establish the business of professional services

Source	Representative evidence
The struggle to establish the business of Professional Services	
Ed Berndt	"The customer had been seeing all that for free. Now all of a sudden on a PO [purchase order] we're saying professional services $100K. Huh, what's that? We told the sales person, that's the way IBM does it... 'Mr. customer, total cost is a half million dollars.' ... So we had to start creating statements of work and have the customer sign off on it. Now the customer goes, 'OK, I just signed off that you're going to do 20,000 hours worth of work [and] you're not going to do it for free. Oh, that's that $100K? Well, I don't know if I want to do that. So if I do this myself, I save $100K? I'll do that option. Why do I want to give you the money when I have a bunch of coders right behind me and they can do it?' So we had to start arming the sales team with 'risk mitigation' and all those key phrases that will make someone very comfortable to go out and sell and install."
Patrick Dennis	"[Transitioning customers from free to fee is] hard to do. It's hard to do. It's less hard to [do] with ... what was the former Accenture section of the [consulting] offering because that was ... not a set of capabilities that we had before. So those looked like a new set of capabilities and therefore not as difficult to ask people to pay for those services. And most of the initial capabilities offered through the Accenture agreement were really very complementary to the product offers. Some of the initial things offered were business continuity design services that were more end-to-end, information management services... I think we called it information lifecycle management. Those were clearly different from capabilities that we had before so it wasn't as hard to explain to a client why you wanted to monetize those offers. It got more challenging in the gray line between implementation and professional services. That ... was a little bit more difficult to explain as was the line between support service and professional service."
Bob Scordino	"Yeah you know what, I remember there being a bit of angst around [charging for install]. You know what we did? We started out doing it as a redirect off the business. We started to pay the customer support function out the back door. If I sold a $500K system and it was a $10K basic install, I would book $490K and give $10K over to that group. ... And that was happening all over the place. No one wanted to broach the subject with the customer. And there's where I... honestly that's where I can't really tell you where the line changed. Then it became, OK guys the next time you sell them $500K do me a favor. Do the deal. Get the handshake but when you go back say, 'I need your help here. I gotta show...' and over time we just wore the customers down. Listen, it's still $500K but it's going to be $490K and $10K or $470K and $30K or whatever... Now it's become... it's pretty much second nature. It took a while though. It wasn't overnight. It was definitely a multi-year process."
Tom Roloff	"When I got here [in 2005], we were struggling with some very basic things... What is a gross margin in professional services? How do you insure that gross margins in professional services are maintained in a product company that thinks that services are essentially free and done as part of the product's overall margins? How [do you] separate a service and a product in the customer's eyes?"

As EMC expanded their technology portfolio into the categories of ILM, virtualization, and cloud computing, the service portfolio tended to follow suit. For example, a few months after Tucci announced the ILM strategy, EMC formally announced a new set of professional service offerings intended to "accelerate the implementation of ILM."[77]

While PS follows behind an EMC product, unlike CS, PS does not touch every product transaction within every EMC direct account. PS is relevant in direct accounts where two conditions hold. First, a certain level of complexity or sophistication is required to deploy the

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[77] EMC press release, January 26, 2004.

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technology. This tends to be around pulling multiple products together and integrating them into the customer's data center. Second, the customer chooses to outsource the deployment activities either due to lack of an IT staff capable of performing the implementation or the customer simply decides that a sophisticated storage deployment is not a core competence it needs to have. See Table 4.20 for evidence.

Table 4.20. Deployment complexity, user know-how, and professional services

Source	Representative evidence
Deployment complexity, user know-how, and Professional Services	
Ed Berndt	"The other reason is because customers... we started to become complicated. We started to have so many offerings and to integrate it all together on the customer site was not something you could do part-time. You wanted your [pre-sales] systems engineers to be able to sell more products. They can't do that if they're sitting there implementing the product that's already been sold. So put the [professional services] people doing what they're supposed to be doing... And go out there and have the pre-sales guys sell..."
Ed Berndt	"The west coast has the big challenge of ... that's Silicon Valley. All those [technology companies] can do everything themselves. They're saying, 'Hey I'm a technology company. I'm not going to hire your [professional services] guys to do this. I've got guys who can do this and run circles around you.' OK. It's hard to sell [professional] services there."
Ed Berndt	"Because our implementation services ... as our products get smarter [and] easier to install, we have to charge less for [the implementation] because you charge based on the hour. You take our NAS device when we first put it... it basically took 20 hours to install. Now it takes 20 minutes. What used to be a $25K install costs you $500. [As a] matter of fact to the point where it's so simple, nobody even buys it. They just do it themselves."
Patrick Dennis	"In PS today, we separate implementation service from consulting service. [The implementation service] has more value to a customer that doesn't have 12 people on staff who know how to make the thing work. So if you go to... pick a large bank since they all use our stuff... they have hundreds of units of product. Would you expect them to know how to plug it in? Probably, they have hundreds of it. We go to [Company A], they have one [person]. So to [Company A], they see more value in the implementation of that than maybe the bank. And not all the deals are the same. People [who need the] product ... to stay up and running 24/7 and [need] to use the advanced features, they'll probably see some value in [EMC] implementation [services]. If somebody's really just putting in test and development and using some basic capabilities, they might just do some of that on their own. You can create the right kind of value in any one of those segments and categories as long as you understand what you would expect the buyer's behavior to be."

Following the introduction of the Authorized Services Network in 2002 and the enterprise/commercial/SMB segmentation in 2003, EMC continued to push the certification of channel partners for product sales and for service opportunities in an effort to reach more customers and also as a way to scale more EMC-approved professional services.

Building out consulting services

Entering 2003, a clearer distinction in PS capabilities was beginning to take root. ISC was a true consulting business that was front-ended by EMC but was managed and operated through an outsourcing agreement with Accenture. This arrangement helped EMC to quickly gain access to the resources it had found difficult to mobilize via an organic hiring process.

Having started with approximately 200 consultants at the start of 2003, ISC was approximately 350 consultants by late 2004.[78] One manager comments on the difficulty of building a consulting capability.

> "Even before [Information Solutions Consulting], EMC tried a couple of times to organically build a consulting team. That's hard to do, very hard to do which is one of the reasons that they partnered with Accenture to go really try and do something creative around how do we build this now. So going back all the way to the beginning, it was always looked at as its own business unit."[79]

On the one hand, ISC helped EMC learn what it takes to operate a consulting business. On the other hand, EMC gave up some control by partnering with Accenture. As EMC management continued to learn that third-party boutique storage consulting firms and systems vendors like IBM were influencing IT spending decisions with early consultative engagements, EMC was being positioned as purely a product vendor. Although they had developed very capable support and implementation services, competitors with a consultative offering were greatly influencing conversations of storage strategy and architecture. One informant explains:

> "And [EMC Consulting] was in response to a third-party industry that had grown up doing storage consulting. They would go consult to a data center [or] CIO... and say here's what your strategy should be in terms of how you plan for storage, how you architect it... Ultimately it would end up in some purchasing transaction but all the consulting was being done mostly by other people. We used a lot of partners to do that. But [we] decided along the way ... that we wanted to bring a large amount of that capability in house. So through a combination of some joint ventures with Accenture as well as a bunch of acquisitions especially in Microsoft practices... that consulting business has grown very fast. They generally stop short of trying to sell the product. And that's one of the organizational tensions because generically if you think of yourself as a product company and you have a consulting arm, you would kind of expect them to ... push your stuff [EMC products]."[80]

By 2005, EMC began to re-evaluate the ISC outsourcing arrangement. Although ISC were dedicated resources for EMC, it didn't truly feel like an EMC capability – i.e., one that was direct and where EMC had control. There was a misalignment in business models. On one side was fixed price and the other side was time and materials. If too many projects are not scoped appropriately, fixed price can be unprofitable.

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[78] EMC press release, October 4, 2004.
[79] Interview with Sandy Hamilton.
[80] Interview with Brad Ashbrook.

A targeted effort to create an EMC-branded consulting capability began in mid-2005.[81] Moving forward from 2005, the ISC resources were acquired by EMC. Six technology consulting firms were acquired between 2005 and 2008 primarily building practices in Microsoft technology that fit well with EMC technology. See Table 4.21 for the list of firms acquired.

Table 4.21. EMC Consulting acquisitions

Firm	When	Description
Dolphin Organisationsberatung und IT-Projekte GmbH	Mar 2005	A Munich-based firm that provides IT consulting services
Internosis	Jan 2006	a 250-person provider of application development and managed services within Microsoft environments based in Maryland
Interlink Group	May 2006	a 180-person provider of Microsoft-focused services based in Colorado
Geniant LLC	Jun 2007	a provider of IT consulting services for Microsoft solutions based in Dallas, TX
BusinessEdge Solutions	Aug 2007	a business and technology consulting firm based in East Brunswick, NJ
Conchango	May 2008	a consulting and systems integration firm based in the UK

Despite acquiring the Accenture resources and several small services firms, EMC Consulting had to undergo a process of experimentation (Thomke, 2003), organizational learning (Kale & Singh, 2007), and developing internal and external credibility before it was recognized as being capable. The multi-year process of experimentation and learning began with an organic build approach, structural ambiguity, lots of management turnover, a joint venture, several acquisitions, and lots of uncertainty as to what best practice was for this type of organization within EMC. While EMC Consulting is not bound by product sales quotas, the organization has confronted similar themes as the initial 1997 PS organization faced – e.g., get out of my way, extending the sales cycle, and establishing credibility with the sales team. See Table 4.22 below.

Table 4.22. EMC Consulting: common themes with the 1997 launch

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[81] EMC press release, June 20, 2005 and The Business Times Singapore, "EMC Consulting sets up Asia-Pacific branch," July 11, 2005.

Source	Representative evidence	Similar to the 1997 launch
Dave Cox	"In consulting three years ago, most sales guys would say, 'Just stay out of my way. A -- I don't understand it. B -- I don't care about it. C -- I don't want you to risk my $5 million product deal by pissing off my customer with some $100K consulting engagement that goes sideways. Just get out of the way.'"	Get out of my way
Dave Cox	"We work with the account teams. That is the model. They are the model. And that has evolved over time whereas I think 3-4 years ago, I would have actually referred to them as a bottleneck. [They would say], 'You will not talk to my customer. Sell me first and then I'll let you sell the customer.' Whereas today, it's more parallel effort..."	Sales needs to be 'sold'
Patrick Dennis	"I would say that the sales cycle associated with a service and the sales cycle associated with a product are different. People need to appreciate that their primary avenue in go-to-market was going to be ... when you introduce consulting ... it's a different selling motion."	Difference in sales cycle
Patrick Dennis	"Well [there's] an education process ... that's a two-way street [between sales and PS]. People make this a lot harder than it is. It's really pretty simple and I can say this because I was in sales. In sales, your job is really very easy. You need to generate some amount of revenue in some period of time. And the second part that goes unspoken in sales that I think many people lose sight of is ... and preferably with a happy customer... because most of us weren't in a position to get a new set of customers the next year... So if you're not being let new into an account, the only thing you should do is go home and look in the mirror ... It has everything to do with what you're showing up with that day... What happened in consulting [is] they learned how to deliver. What happened in consulting [is] they had some offers that people wanted to buy. That's all. It's no harder than that."	Establishing credibility
Dave Cox	"So I think acquiring more, getting bigger, becoming more relevant from a size and scale perspective with good coverage across the country, changing the go-to-market... I would say those are the two biggest things that helped change the mindset. And there's nothing like anecdotes. Right? Every sales guy likes anecdotes. If somebody made the street made more money, they want to know why. Everytime you can go in and say, 'Here's an account I haven't been able to crack for 5 years because it's a [competitor's] shop, but these consulting guys came in and did ... whatever $50K assessment... now we're doing $200K in consulting. Now I can go in and they'll talk to me and I just made my first product sell.' Those kinds of things... spread like a virus ... and people start opening up. But that was a long journey."	Need for scale

Although 2005 was an inflection point towards creating the consulting business, it wasn't until 2008 that the formal EMC Consulting brand was introduced as a signal for both internal audiences (i.e., credibility) and external audiences (i.e., capability).[82] One informant comments:

"I think what [the consulting VP] tried to do [in formalizing EMC Consulting was to] make sure that there was both an internal and an external brand to the capabilities that he had because he thought those capabilities were meaningful enough that people would ... if people would pursue them and purchase them they would be satisfied. And that they were perhaps a different set of capabilities that most people would have expected from this firm."[83]

Now with adequate scale in resources, quality in delivery, internal credibility, and experienced managers, there still remains a natural tension between the product business and the professional services (especially consulting) business. One informant comments:

"[The consulting business] should be like an extension of the pre-sales sales cycle. But people that are in that business, they have to walk the line between being credible and objective and at the same time helping their teammates in the company. That's one of the classical dynamics in a product company that has a consulting arm... Is there synergy? Is there value that that consulting arm is driving for the product guys or vice versa? Or do

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[82] EMC 2008 10-K report.
[83] Interview with Patrick Dennis.

they really both have their own independent business models and they both generate revenue and profits but they don't necessarily have to then fit each other? It's kind of an open question."[84]

The consulting business faces a natural tension that depends on its expectations as an organizational capability and the degree of coupling with the core capabilities of the firm. If it is a complementary capability that is either tightly-coupled or loosely-coupled with the core, then the PS consulting business' primary mission must be to add value to the core and be aligned with the core's business model. Any deviation from this will result in organizational disconnects. If the consulting business is a supplementary capability, then it must provide a significant revenue and profit contribution to the firm and must be able to stand on its own. A supplementary capability can also be loosely coupled with the core whereby it is expected to provide some limited level of added value to the core.

4.8.4   Resulting capabilities and beliefs: 2010

The dot-com crash devastated many firms. Of the big publicly traded technology firms, EMC was one of the hardest hit survivors during that period. Entering 2003, Tucci and his team embarked on a new course following massive restructuring decisions put forth across 2001 and 2002.

Perhaps symbolic of EMC's core values and identity, EMC began 2003 with a renewed commitment to remain competitive in high-end storage hardware as it launched the Symmetrix DMX series. Although not easy, EMC demonstrated that it could embrace the midrange with a not-invented-here product offering – the Clariion. Having plugged the gap in its systems portfolio, EMC seemed ready to charge into a new world.

EMC managed to expand beyond EMC-specific software into vendor-agnostic categories. The primary thrusts into information lifecycle management, virtualization, and cloud computing have kept EMC innovative in the technology space and has continued to keep the firm relevant as a leading infrastructure technology firm.

EMC continued to commit itself to a solutions focus where hardware, software, and services are combined to address technology problems. Whereas a focus on Symmetrix only functionality left the firm vulnerable during the dot-com collapse, EMC continued to diversify

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[84] Interview with Brad Ashbrook.

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deeper into complementary/supplementary software segments that enabled it to further create higher-level scenarios that built on its existing storage expertise. Unlike EMC in the 1990's, the firm expanded aggressively into non-EMC software products and was certainly not shy about acquiring the necessary technology.

EMC got serious about partnerships. Its reseller agreement with Dell – although rocky during some periods – provides a key boost for Clariion sales. Even in professional services, the firm matured in its partnering ability having created a very functional services partner program that has evolved in recent years such that EMC is rated as the best partner for enterprise network storage and storage management software.[85]

Although Information Solutions Consulting with Accenture was eventually pulled in house, the EMC of the 90's would not consider such an agreement. EMC is well respected for its service competences within the industry having been continually recognized not only for its "whatever it takes" customer service approach, but also for its professional service offerings in consulting and implementation services.[86]

Although the firm is more than Symmetrix, the imprinting of the founders is still evident on the firm. While not the Wild West days of the 90's, the EMC salesforce remains a powerful organization and culture within the firm. Its direct, aggressive account management has perhaps become kinder and gentler over the years, but the same basic "get out of my way" tenacious account ownership remains. In addition, the "whatever it takes" customer service culture also is alive and well. The firm continues to honor customer satisfaction as its primary mission.

As a firm with a large portfolio of technology products, EMC management believes that it will continue to lead with technology. In interviews with current and former EMC personnel, it is clear that EMC management has no desire to do "services for the sake of doing services." In other words, EMC does not envision itself like IBM who does over 50% of its revenue in services. Nor does it see itself making a large professional service company acquisition like HP acquiring EDS and Dell acquiring Perot Systems.

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[85] August 25, 2010, CRN (formerly known as Computer Reseller News) ARC (Annual Report Card) awards. This is an annual set of awards that go to the best resellers as voted on by the value-added reseller community.

[86] August 17, 2010, "MarketScope for Storage Services, North America, 2010," Gartner RAS Core Research Note G00205421. Of the 10 vendors evaluated in the report, only EMC and IBM received a Strong Positive rating.

4.8.5 Findings

Architectures and not just products

As in prior periods, professional services appear to be architectural enablers for EMC. Again, architecture in this context is about how products get combined into a custom solution rather than the traditional internal product architecture view that looks at how components and subsystems get combined into an end product (Henderson & Clark, 1990). The implementation services enable EMC to combine its hardware and software products into higher level customized solutions through architecting, implementing, and integrating into the customer data center environment (Davies, 2004). This architectural approach seems to have kept the commoditization of enterprise storage away as EMC and its competitors push the consolidation of multiple segments together that build on midrange and high-end storage devices.

EMC Consulting provides a longer-term architectural view that operates at the level of concepts, business processes, and the like. And hence, a consulting engagement is completely uncoupled from a product sale and solution implementation. This can be a strange feeling within a firm that prides itself on its R&D and technology.

A side effect of the dozens of acquisitions EMC completed during this period is that now the firm has a massive product portfolio. This is forcing the firm to carefully articulate to customers and the investment community how all of these pieces fit together (Kogut & Zander, 1992). And that's a conversation about architecture (or solutions).

Competence-extending local search...again

The professional services portfolio at EMC builds on the storage-related technological know-how and expertise that EMC has built over the years and has become well known for. EMC's position in deployment services remained specific to the implementation and integration of EMC products. The challenge of competence-extending local search in implementation services occurred as the firm sought to build the *business* of professional services. EMC had capable systems engineers, technical consultants, and PS delivery staff who could deliver a successful implementation. The process of monetizing the implementation services even for complex projects faced resistance from sales teams and customers who sometimes did not perceive the difference between PS and "free install" from CS.

The new consulting services practice pushed EMC again into the territory of competence-extending search. The Information Solutions Consulting group highlights the two elements of competence-extending search – start with the existing local base and extend. The existing knowledge base was the 100 EMC storage experts (resources) added to the venture. ISC was to build on existing EMC know-how rather than destroy it. On the other hand, the 100 Accenture resources represented the consulting operational know-how that EMC found difficult to build organically – the extend component. This latter element was disruptive to EMC perhaps at two levels. First, EMC gave up some control although the Accenture resources were dedicated to EMC. Second, the consulting business involved different organizational routines in terms of sales cycles, level of storage-related conversations, and connections with people unfamiliar to the sales teams who are perceived as adding risk to existing customer accounts. This was again evident in the classic response from the sales team to anything perceived to disrupt their highly incentivized routines, "Get out of my way."

On the other hand, a consulting engagement does add an element of risk to an account relationship. If the engagement goes sour, the sales rep's account strategy could be jeopardized. These scenarios create an organizational tension between sales and consulting organizations. Incentives for sales reps are optimized to close deals as quickly as possible within fixed time periods (e.g., every three months). Such incentive systems drive the revenues and profits that get reported out to investors every quarter. Over time, EMC has learned that architectural discussions can open up new opportunities with new and existing accounts (Levitt & March, 1988; Zollo & Winter, 2002). However, architectural discussions cannot be managed like short-term product sales transactions. EMC has learned that architectural engagements like consulting require architectural decision-making. In other words, sales managers need to intervene to help balance the short-term product transaction with the longer-term architectural discussion that may result in a much larger set of transactions – but not during the current quarter.

From credibility to capability

Across this last period, we've again seen that a liability of newness (Stinchcombe, 1965) or credibility gap exists primarily within the firm. Although some customers have the IT staff to perform their own IT planning and implementation, customer demand for these professional services has persisted across this period. The credibility gap for professional services within

EMC came down to two issues: scale and quality. Without scale, there's not enough geographic coverage since PS is very people-intensive. Without scale, it's very tough to demonstrate relevance to a sales organization eager to find and share new ways to monetize EMC know-how. But the firm must balance scale with cost – the services dilemma. And even once a level of critical mass is achieved, the account teams must be convinced that the quality of delivery is consistent with the EMC experience that customers are familiar with.

For EMC, this has been a multi-year process (Nelson & Winter, 1982). The firm has received outside accolades as to its services capabilities. But even by its own admission, they see themselves in an ambiguous middle zone somewhere between IBM's aggressive services-led position (greater than 50% of revenue from services) and Cisco who has a strong partner-driven position.

4.9 Discussion

Complementary capabilities are important investments for firms looking to profit from their core technological innovations (Teece, 1986). In the typesetter industry, the sales/service network and the typesetter fonts were complementary resources and capabilities that enabled incumbents to survive disruptive technological change brought on by aggressive startup firms (Tripsas, 1997). Even in the computer industry, IBM's transformation under Gerstner is a story about survival and organizational renewal largely fueled by increased investments in what began as a product-led model with complementary professional services and evolved into a services-led model with what became IBM Global Services (Gerstner, 2002).

However, these insights about complementary capabilities are rather static. We know that technologies and industries evolve, but how a firm's strategy towards their complementary capabilities evolves over time is not well known. This section of the dissertation follows the entry and evolution of professional services within the EMC Corporation. The study specifically follows a complementary capability that has very different economic and organizational characteristics than the core R&D-intensive competence of the firm. What is somewhat puzzling is that expansion into the complementary business has aspects of a related diversification but also that of an unrelated diversification.

Heterogeneity of complementary capabilities

A professional services business is one category of complementary capabilities in EMC that began to emerge in the 1990's. Customer service became a defining complementary capability as far back as the 1988-1989 product quality crisis that nearly bankrupted the firm. The "whatever it takes" approach to customer satisfaction and the remote monitoring technology has made the bundled (or free) customer support model a key part of EMC's ability to profit from Symmetrix-based innovations. The bundled customer service model has changed very little over the years. The role of CS has been clear to EMC sales personnel and customers since the launch of the first Symmetrix in 1990. While EMC's CS model is commonly referred to in the industry as a cost center, EMC refers to it as an investment center. On the other hand, a professional services business was not part of the imprinting of the founders. PS was a business whose intent during its initial planning was to be an EMC-specific consulting organization and revenue generator (i.e., profit center). The more that EMC has expanded beyond the tight coupling of storage products and customer service into tightly-coupled fee-based PS implementation services and uncoupled PS consulting services, the more that it has encountered the challenges of competence-extending local search – see Figure 4.6. What was intended as incremental and complementary can in fact have disruptive organizational implications.
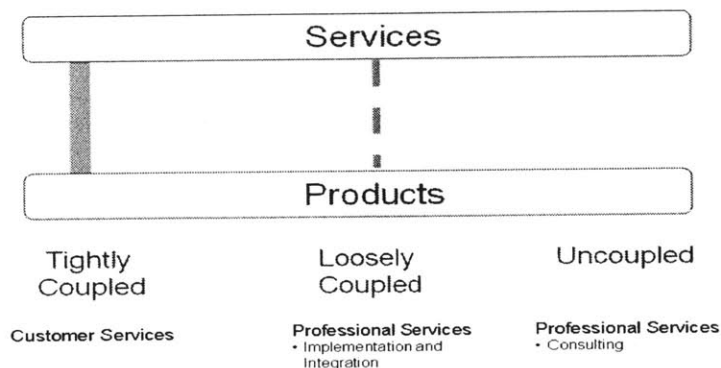
Figure 4.6. **Product-service coupling continuum (Anderson, 2008)**

The EMC software product business, another complementary capabilities, was launched in 1994. As an R&D-intensive complementary capabilities, within a few years the software business became a complementarity for driving additional Symmetrix hardware sales (Milgrom & Roberts, 1995). EMC management began to view its software business as the primary

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revenue and profit growth engine during the growth era and especially following the sudden erosion of Symmetrix gross margins during 2001-2002. With gross margins of approximately 90%, the allure of the software business was not surprising especially when Symmetrix gross margins dove from 57% to 8% in less than one year – see Figure 4.5. The software business began as an experimental complementary capability but emerged as the main contributor of supplementary revenue that EMC needed to survive. On the other hand, professional services did not occupy such a position within the EMC strategy. PS was known to cause a "headwind effect" on margins.[87] Before and after the collapse, PS was viewed as an architectural enabler of EMC solutions, an enabler of new opportunities within new and existing customer accounts, and a response to increasing deployment complexity. However, the dilemma with professional services was in needing scale to gain credibility, but labor-intensive scale means adding bodies and that's costly especially during a time of intense restructuring. Outsourcing means a loss of control and perhaps a loss of the account opportunities opened up by your outsourcing partners. This is the services dilemma that technology product firms who want to expand into labor-intensive service businesses must face.[88]

Managerial cognition is not enough

More recently, research on managerial cognition suggests that organizational change within technology-intensive firms hinges on senior managers' cognitive abilities to effectively sense, process, and guide the organization during a period of organizational adaptation (Kaplan, 2008; Tripsas & Gavetti, 2000). In the case of EMC during the era of growth, the transition towards a professional services business was very difficult in spite of CEO sponsorship, senior management buy-in, excess resources, careful planning by experienced [middle] managers, and preservation of the core product know-how. These elements suggest that the business of professional services was indeed viewed as a strategic direction for the firm during this period of growth. However, the evidence shows this was a very difficult transition.

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[87] Comment made by CFO Goulden during the Q4 2007 discussion with analysts held on January 29, 2008. Whereas maintenance gross margins can be relatively high, continued growth in professional services would have a dampening effect on overall service margins.

[88] The services dilemma is about balancing three areas: cost (scale), control, and credibility.

4.10 Implications & Conclusions

This study provides an opportunity to explore the dynamics of complementary business entry and evolution within a young technology firm competing in a fast-paced, highly competitive industry. As young firms achieve success in a market, the most difficult decisions often concern what to do next. Having established legitimacy and market power in one domain, when, how, and in what directions should the firm expand next? As the dominant microprocessor manufacturer for the PC industry, Intel has to wrestle with what else to do besides x86-based microprocessors. As the dominant volume operating system vendor for the PC industry, Microsoft has to wrestle with what else to do besides Windows. Technological change, competitive rivalry, and industry evolution are some of the more common factors that often force firms to expand, diversify, integrate, or innovate in new directions.

This study takes a unique position by studying these issues within a firm that is expanding across two very different business domains – R&D-intensive[89] and service-intensive domains. I argue that prior research focuses on expansion opportunities that occur within a single domain. For example, empirical studies in the diversification literature are dominated by studies exploring related diversifications from one R&D-intensive domain into another R&D-intensive domain. Relatedness has been measured using SIC codes (Montgomery & Wernerfelt, 1988), R&D intensity (Montgomery & Hariharan, 1991), cross-industry patent relevance measures (Silverman, 1999), human resource profile measures (Chang, 1996; Farjoun, 1994), manufacturer census measures (Bryce & Winter, 2009), and manufacturing product category measures (Lee & Lieberman, 2010).

This study found that strategic business entry into complementary business opportunities that can be classified as incremental change based on pre-existing know-how has difficulties. Prior research has shown the difficulty of organizational change following big disruptive exogenous changes that come from radical industry shifts or initiated by unencumbered startup firms pushing new technologies that destroy existing competences within established firms (Christensen & Bower, 1996; Tushman & Anderson, 1986). Within this study, I find that even with executive support, customer interest, experienced managers, and slack financial resources,

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[89] I use R&D-intensive to represent areas that require big upfront investments in product development. Traditionally, these were categorized as manufacturing-intensive domains. However, a non-manufacturing sector such as a software product business includes a large R&D component as well as other similar product-related activities – lifecycle, sales, and marketing.

incremental expansion opportunities that cut across R&D-intensive and service-intensive domains can be extremely difficult to integrate, manage, and create internal synergies from even when both domains share a common knowledge base.

In the case of new R&D-intensive projects, managers often have the luxury to locate the new opportunity in remote locations so as to not disturb existing practices. In the case of EMC's expansion into professional services, integration with existing organizations was required. While professional services built on EMC storage expertise and know-how, its business model was perceived as undermining the entire sales process – elongating the sales cycle, introducing undue risk, and possibly weakening account control. The professional services competences required a more architectural type of conversation and contact with a higher-level manager (e.g., CIO) than the existing account team had access to. During the initial planning and during the build up of the consulting business, these competence-extending changes did not initially represent opportunities for synergy with the sales team but rather threats to the fundamental commercialization model. However, the new professional services practices were eventually able to overcome some of the cross-domain difficulties but only after establishing internal credibility (i.e., overcoming internal liability of newness) and reaching a reasonable level of scale. But the challenge in reaching scale for a professional services business comes by adding people – and that's costly. Therefore, much of the managerial tension will have to do with how to quickly establish credibility and a reasonable level of scale without adding too much cost.

While EMC's decision to form a professional services organization was designed to build on its storage industry know-how, the professional services organization required a very different set of management practices, resources, administrative systems, and organizational competences than what existed for the Symmetrix business or the customer service organization. While not destroying existing competences, this expansion moved the firm into competence-extending territory. Although Symmetrix product-related know-how remained fairly incremental throughout this study, the competence-extending change was less about products and more about architectures – but not internal product architectures relative to how component and subsystems communicate. The architectural discussion here was about how products are combined together to create customized solutions for customers. Prior research has shown how architectural-related changes are often veiled when actors continue to focus on the component parts – or in this case

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the products – without thinking about how the larger system is evolving (Henderson & Clark, 1990).

The initial planners made the case that professional services at EMC would be different than customer services. After a tumultuous beginning marked by a lot of professional services managerial churn, the PS practice had developed an implementation capability for complex projects, but the monetization model was still in flux. Many of the account teams treated PS as CS – giving it away for free.

The managerial implications of this research are twofold. First, managers should not be blinded by the complementary nature of technology services. As we see with professional services, new competences with dissimilar operational models are likely to be difficult to implement especially where synergies are contingent on cooperation with existing internal organizations. Second, professional services don't scale as well as manufactured products and therefore the firm is not likely to fully integrate this function within the firm. Since existing channel partners are likely to be professional service providers also, the firm will need to manage some level of channel conflict.

5 The Evolution of Professional Services at Cisco

5.1 Executive Summary

In Chapter 4 I examined the evolution of professional services at EMC who preferred to *make*. In this chapter, I take an inductive approach to study the evolution of professional services at Cisco who prefers to *partner*. Through the use of public archival data and interviews with current employees, I explore the process of when, why, and how Cisco accesses new complementary organizational capabilities through its partners as both Cisco and its partners face a very dynamic environment from 1995-2010.

Similar to EMC in chapter 4, I find that Cisco begins with a dominant preference for professional services – in this case via partners – yet evolves into a more flexible approach as it simultaneously establishes a meaningful internal footprint in these complementary capabilities. The firm must manage a delicate ecosystem that reinforces Cisco's core identity as an innovator

(and therefore services as only a complementary side business), enables professional services partners to be capable on Cisco technology, and responds to large customers who have great market influence. If professional service partners don't invest fast enough to keep up with Cisco's aggressive technology expansion efforts, Cisco becomes vulnerable to head-to-head product competition and is tempted to invest more in Cisco professional service capabilities. If Cisco invests too heavily in professional service capabilities, the firm looks soft on innovation and service partners grow suspicious of Cisco's partner enablement motives. If Cisco doesn't up its investment in service capabilities, then its largest and most influential customer accounts who demand more direct Cisco involvement are vulnerable to competitors. This delicate balance grows increasingly unpredictable as Cisco's evolving technology strategy begins to collide with the core technology business of its long-term and largest professional service partners. This chapter illustrates how the innovator has flexible options to activate complementary organizational capabilities, but also shows how changing conditions may shift complementary partnerships into competitive rivalry or coopetition.

Similar to Chapter 4, the primary analysis in this chapter is split across four time periods. Each section considers the overall technology strategy and the evolving role of complementary professional services. Section 5.5 begins with a historical background on Cisco from founding to 1995. The section specifically highlights the development of three distinctive competences leading up to 1995: technological innovation with routers and IOS, online technical support, and customer satisfaction culture. I follow that discussion with an examination of 1996-2000 dot-com growth era as the firm began to establish its distinctive approach to innovation, the transition of switching products into a core business, and its build up of professional service partners. Section 5.6 covers the dot-com collapse of 2001-2003 and how the professional services business faired in the context of a major restructuring effort. Section 5.7 examines how Cisco emerged into the post dot-com era of 2003-2010 and the evolution of professional services as the firm aggressively diversified beyond routing and switching. Section 5.8 concludes with a discussion of common patterns across the various time periods.

5.2   Introduction

To further understand the key themes and relationships involved in the management of complementary capabilities (professional services) within high tech environments, I conduct a

case study of Cisco Systems, Inc. From the standpoint of innovation and strategic management, much has been written about Cisco since the late 1990's. Having made over 140 acquisitions between 1993 and early 2011,[90] Cisco's extensive use of acquisitions as a mechanism for innovation has received much attention (Bunnell & Brate, 2000; Chesbrough, 2003; Gawer & Cusumano, 2002; Paulson, 2001). Given that most mergers and acquisitions fail to meet ex-ante expectations, Cisco's approach stands out from the norm. However, a more complete picture is that Cisco utilizes a combination of internal development, partnerships, and acquisitions as a means for innovation.

From an evolutionary economics perspective, Cisco's approach to innovation utilizes both local search and distant search (Cohen & Levinthal, 1990; Katila & Ahuja, 2002; March & Simon, 1958; Rosenkopf & Nerkar, 2001; Rosenkopf & Almeida, 2003; Stuart & Podolny, 1996). Local technological search utilizes existing expertise to navigate into new technological paths. On the other hand, distant search is about how the firm can activate resources and capabilities developed by other vendors.

From the perspective of the boundary of the firm, Cisco's innovation approach provides the advantages of make, buy, and partner – better known as tapered integration or concurrent sourcing (Harrigan, 1984; Niels Peter, 2010; Parmigiani, 2007; Parmigiani & Mitchell, 2009). Whereas a make or build approach offers the firm control and an opportunity to develop an internal capability, a significant ramp in production is very costly to staff and the new resources may require a long time to learn and become competent. Therefore, gaining access to additional resources beyond the boundary of the firm can provide the firm with quick access to the skills needed in a dynamic environment. A buy or partner approach provides the firm with the opportunity to focus on its core competences while scaling production via external actors. However, the literature argues that a buy or partner approach leaves the firm vulnerable since the focal firm has no direct control over the required resources. In a worst-case scenario, a single-source exclusive partner can choose to behave opportunistically by holding up the focal firm.

The literature argues that a tapered approach provides the best of both worlds. The firm can control some of its inputs or outputs and hence benefit from learning while simultaneously

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[90] Cisco website accessed on July 27, 2011 –
http://www.cisco.com/web/about/doing_business/corporate_development/acquisitions/ac_year/about_cisco_acquisit ion_years_list.html.

enjoying the benefits of scale through its partners. But what are the limits of tapered integration? Under what conditions might the flexibility of tapered integration and concurrent sourcing create a dilemma for the firm?

The firm who can utilize flexible approaches to technological search (local-distant) and firm scope (make-buy-partner) decisions is generally believed to possess an advantaged position in dynamic environments (Chesbrough, 2003; Cusumano & Yoffie, 1998; Eisenhardt & Tabrizi, 1995; Fine, 1998; MacCormack, Verganti, & Iansiti, 2001). Cisco's approach to innovation is a prime example of flexibility for innovation. However, in this chapter I explore Cisco's approach to professional services. Largely viewed as a partner-centric model, on closer examination Cisco utilizes a flexible approach towards complementary professional services.

Unlike EMC's direct account management in Chapter 4, Cisco's commercialization strategy (i.e., go-to-market) has predominantly relied on channel partners.[91] While large technology firms such as IBM, HP, EMC, and Cisco conduct sales through a combination of direct sales account management and indirect channel partners, Cisco has historically been very strong in its channel partner model and that has shaped philosophy towards their professional services strategy. A turning point for Cisco came in 2001 when they shifted their channel partner reward system from an emphasis on volume of sales to an emphasis on value-oriented sales (Kalyanam & Brar, 2009; Sidhu, 2010).

As outlined in Chapter 2, organizational capabilities may reside across three different states: core, supplementary, and complementary. See Table 2.1 for a review. This chapter will examine the evolution of complementary capabilities in professional services for Cisco, a firm that began with a distinctive core competence in internetworking technologies, during a very dynamic time within the IT industry.

5.3   Methods and Data

This research is based on an inductive case study of how Cisco manages the need for professional services as its technology strategy has evolved and expanded across periods of growth, downturn, and re-emergence. Given the open-ended nature of my questions concerning the strategic role of services within a partner centric technology firm, an inductive approach

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[91] August 25, 2010, CRN ARC awards and March 10, 2011 Channel Champs awards. This is an annual set of awards that go to the best resellers as voted on by the value-added reseller community.

seems most useful for theory building (Glaser & Strauss, 1967; Miles & Huberman, 1994; Yin, 2009). In addition, by taking a long-term historical perspective, we gain insight into the primary levers that Cisco invokes to ensure that Cisco product value is maximized for end customers whether professional services are provided by channel partners, customers (do-it-yourself), or Cisco personnel. Whereas the EMC case focused on a firm with a historical preference for direct customer engagement, the Cisco case provides an opportunity to understand similar issues from a firm with a preference for channel partner (i.e., indirect) customer engagement.

This paper relies on data from the following sources: (1) data from company 10-K and annual reports, (2) custom search results of the LexisNexis Academic database that include company press releases and industry news articles in trade magazines and newspapers, (3) archival data from over 3500 investment analyst reports of Cisco obtained from the Investext (Thomson One) database covering 1990-2010, (4) transcripts of quarterly earnings calls between Cisco executives and investment analysts, (5) transcripts of keynote speeches given by CEO John Chambers at various technology conferences, and (6) data from six personal interviews with current managers who have had direct involvement in Cisco's approach to professional services. Although I present the data collection process in sequential stages, the actual research process was highly iterative.

5.4   Analysis

The selection of Cisco came from a conversation with Professor Michael Cusumano as we considered a comparable firm that took a different approach than EMC. With the help of Paul Bosco, General Manager of Cisco's New England Technology Center, I conducted interviews in late summer 2010 with current employees who have had direct involvement in shaping Cisco's professional services strategy between 2000 and 2010. A total of six one-hour interviews were conducted, transcribed, and annotated into approximately 152 double-spaced pages. Key themes and relationships were highlighted from these interviews. While the goal was to examine the evolution of Cisco's services strategy from the dot-com growth era onward, most of the interviewees joined the firm very close to the peek of the dot-com bubble.

Investment analyst reports and news articles provide coverage of Cisco between 1990 and 2010. The investment analyst database included transcripts of Cisco executive keynote speeches (primarily of CEO John Chambers) given at analyst conferences. The investment analyst

database also included transcripts from quarterly earnings conference calls with analysts starting from Q2 2002. Appendix 1 shows a timeline of major professional services events based on investment analyst reports, news articles, annual reports, and interviews. Figure 5.1 provides a list of key search terms used to identify major services events.

Table 5.1. Cisco interviewees

Informants providing perspective concerning professional services at Cisco

Name	PS-related job at EMC	Date	Interview	Tenure
1 Karl Meulema	Senior VP, Global Strategy & Operations	Aug 31, 2010	In person	2000-
2 Surinder Brar	Senior Director, Worldwide Partner Strategy & Programs	Sep 1, 2010	In person	2000-
3 Jonathan Ballon	VP, Office of Strategy & Planning	Sep 2, 2010	In person	2002-
4 Raja Sundaram	Senior Director, Worldwide Services Partners Organization	Sep 3, 2010	In person	1998-
5 Parvesh Sethi	Senior VP, Cisco Services	Sep 21, 2010	Phone	2000-
6 Stuart Doyle	Senior Director, Advisory Services	Sep 23, 2010	Phone	2004-

Search terms for Cisco services events and information in analyst reports and Lexis Nexis news database

Cisco
- professional service
- customer service
- customer advocacy
- advanced service
- advisory service
- internet business solutions
- consulting (service)
- advanced technology partners
- pre-chasm
- post-chasm
- transformational customers
- market adjacencies
- end-to-end solution
- market transitions
- architectural play
- architectural approach
- business architecture
- smart services
- service
- integration service
- services business
- connection online

Figure 5.1. Search terms for services-related events for Cisco

Following the approach from Tripsas and Gavetti (2000), I created a timeline of capabilities, search activities, and managerial beliefs from 1984-2010. The findings are split into four major periods: 1984-1995 (imprinting and early growth), 1996-2000 (dot-com boom), 2001-2003 (the downturn), and 2004-2010 (the recovery). See Figure 5.2. Since this study is about the evolution of a complementary capability, it was important to capture not only the professional services events but also the larger internal context as well as external competitive conditions.

Figure 5.2. The evolution of capabilities, search, and beliefs at Cisco

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Capabilities

2000
- H/w: routers & switches
- S/w platform: IOS
- Flexible innovation approach
- Customer satisfaction culture
- Channel partner network
  - Sales and PS
- Efficient web-based CS
  - Cisco Connection Online

2003
- H/w: routers & switches
- S/w platform: IOS
- Flexible innovation
- Customer satisfaction culture
- Channel partner network
  - **Shift from volume to value based incentives**
- Efficient web-based CS

2007
- H/w: routers & switches
- S/w platform: IOS
- Flexible innovation
- **Network-centric solutions**
- Customer satisfaction culture
- Channel partner network
- **Targeted Cisco PS**
  - With partner enablement
- Efficient web-based CS

2010
- H/w: routers & switches
- S/w platform: IOS
- Flexible innovation
- Network-centric solutions
- Customer satisfaction culture
- Channel partner network
- Cisco-and-partner PS model
- Efficient web-based CS

Search activities

Pre-2000
Technological
- Interoperability across multiple protocols
- Search: develop, acquire (early stage tech firms), and partner

Services
- Web-based CS
- Search: PS partners
- IBSG free consulting

2001-2003
Technological
- Strengthen the core
  - Routers and switches
- Advanced Technologies
- Search: develop, acquire, and partner

Services
- Web-based CS
- Search: Cisco (IBSG, Advisory, & Advanced) and partner PS

2004-2007
Technological
- Strengthen the core
- Advanced & emerging tech
  - e.g., data center virtualization
- Portfolio & architectural plays
- Geographies / globalization
- Search: dev, acquire, and partner

Services
- Web-based CS
- Partner alignment with new tech
- Search: Cisco and partner PS

2008-2010
Technological
- Strengthen the core
- Advanced & emerging technologies
- Portfolio & architectural plays
- Globalization
- Search: dev, acquire, and partner

Services
- Web-based CS
- PS partner enablement
- Partner alignment with new tech
- Search: Cisco and partner PS

Beliefs

2000
- Leader in network plumbing
- Fast growth
  - Scale through partners
- Flexible innovation
- Internal use of web technologies
- Partner-centric PS approach
- Avoid commoditization
  - "End-to-end solutions"

2003
- Leader in network plumbing
- Restructure for future growth
- Flexible innovation
- Partner-centric PS
- Increase Cisco PS investment
  - Strategic opportunities
  - Coordinate with partners
- Avoid commoditization
  - Differentiate via vast Cisco product portfolio

2007
- Move beyond network plumbing
- Aggressive growth
  - Technology & geographic opportunities
- Flexible innovation
- Partner-centric PS
- Increase Cisco PS investment
  - Strategic opportunities
  - Coordinate with partners
- Avoid commoditization
  - Differentiate via portfolio (architectural plays)

2010
- Beyond network plumbing
- Growth
- Flexible innovation
- Partner-centric PS
  - Enablement using tech adoption lifecycle model
- Increase Cisco PS footprint
  - Top 500 customers
- Avoid commoditization
  - Differentiate via portfolio (architectural plays)

5.5   Cisco in Networking Technology

This section provides a high-level of overview of Cisco from founding through 1995. The emphasis here is on the market opportunities in networking, the technological landscape of the networking industry, and other themes that are central to understanding the imprinting within the Cisco culture. Other references provide more in-depth coverage of the mainstream view of Cisco that primarily emphasizes the events surrounding the founding, multi-protocol router innovation, the benefits of the Internetworking Operating Systems (IOS), the internal culture, and the acquisition process.[92] Most of these works provide a lens into understanding how Cisco became the dominant vendor in networking technology up through 2001. This chapter is more interested in understanding the dynamics of complementary capabilities in services within the context of technological change and big macro industry-level change. As an earlier study of computer industry firms highlighted, this is an industry shaped not by one-time radical punctuated technological change but rather an industry that undergoes fast-paced continuous technological change (Brown & Eisenhardt, 1997).

5.5.1   Cisco's foundations: 1984-1995

Market opportunity identification

Cisco was founded in 1984 by Len Bosack and Sandy Lerner who both were employed at Stanford University as IT operations staff. The build out and usage of computer networks for such tasks as electronic mail and newsgroups was growing rapidly within engineering and science communities from the late 1970's onward. Most networks were simple local area networks (LANs) connecting PCs and workstations amongst co-located department members. In addition, large businesses were beginning to create wide area networks (WANs) that connected members across greater geographical distances than LANs.

A big problem during the early days of computer networking was the proliferation of network protocols of which many were tied to the influential computer vendors of the day such

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[92] Bunnell and Brate 2000, "Making the Cisco connection: the story behind the real superpower," provide a thorough picture into Cisco up through the dot-com bubble. Paulson 2001, "Inside Cisco: the real story of sustained M&A growth," and Ewers 2006, "Cisco's Connections: The tech giant has mastered the art of acquisitions," provide further insights into Cisco's standardized approach to acquisitions. Gawer and Cusumano 2002, "Platform leadership: how Intel, Microsoft, and Cisco drive industry innovation," examine Cisco's approach to innovation through their Internetwork Operation System (IOS) software as another example of platform dynamics.

as IBM, Digital Equipment, Apple, and Novell. A network protocol was the language that each computer node understood for sending and receiving data within the network. The networking component was often just another part of a larger proprietary vendor lock-in play – computer hardware, operating system, storage devices, software applications, development tools, and networking devices that implemented only the vendor's network protocol. While vendor agnostic protocols also existed, the numerous network protocols became a significant barrier to the exchange of data between networks within one organization.

The market opportunity that the Cisco founders pursued was to create a seamless way to exchange data between disparate networks. The idea was to connect networks across the Stanford campus, but later it was decided to pursue internetworking as a larger market opportunity. Cisco shipped its first AGS router in 1986 and soon emerged as the first *significant* mover in multi-protocol routers.[93]

Technological innovation

<u>Networking industry</u>

Cisco's technological identity as an innovative firm began as an innovator of multi-protocol routers targeted for data networks based on IP (Internet Protocol) technology. The IP protocol is responsible for taking a message from the source node, breaking it into smaller data packets for transmission across a network, reassembling the packets, and delivering the original message to the destination node. Cisco did not invent networking. Cisco did not invent router technology – i.e., internetworking. Other networking devices such as bridges, hubs, and gateways contained functionality to route messages between networks. The existing alternative technologies either transferred messages between similar networks (e.g., across two IBM SNA networks) or perhaps between two different types of networks. By 1993, Cisco's IOS software supported up to 16 network protocols including TCP/IP, SNA/SDLC, Novell IPX, OSI, XNS, DECnet, AppleTalk, Banyan VINES, and X.25.[94] Cisco's technology enabled the networking of

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[93] A former Cisco CTO claims that a firm called Bridge Communications actually shipped the first commercial router before Cisco was founded in 1984. Bridge Communications was eventually acquired by 3Com in 1987. See http://www.pbs.org/cringely/nerdtv/transcripts/013.html.
[94] Cisco 1994 10-K report.

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many networks and thereby the linking of geographically dispersed local area and wide area networks (LANs and WANs).

In its first public 10-K report in 1990, Cisco was reporting how its multi-protocol routers could support 14 different network protocols. While revenue figures primarily reflected the sale of "boxes" (i.e., the multi-protocol router hardware products), the Internetwork Operating System (IOS) software is believed to be the major breakthrough for Cisco. IOS enabled high performance across several network protocols. In addition, IOS provided a flexible platform for the future expansion of supported protocols while simplifying product upgrades (Gawer & Cusumano, 2002).

Cisco portfolio

By 1993, Cisco had the broadest product portfolio of any router vendor with products at the low-end (Cisco 300), mid-range (Cisco 4000), and high-end (Cisco 7000) of the router market. Routers accounted for 90% of revenues followed by 5% for terminal servers, and 5% for service and training.[95] Cisco was the dominant leader with an estimated 65%-70% share of the overall router market in 1993. Although Cisco had recently expanded its portfolio to capture mid-range and low-end opportunities, Cisco's strength was at the high-end (core backbone segment) of the market where its share was an estimated 80%.[96] At the high-end of the market, the firm relied primarily on a direct sales force. However, as the firm moved into the low-end and mid-range of the market, analysts believed that the firm would need to make inroads with channel partners.[97]

By 1995, Cisco was diversified beyond routers into the related area of LAN switching technology. Rather than an organic hiring and internal development process, Cisco moved into switching through a number of acquisitions between 1993 and 1995 such as Crescendo Communications, Kalpana, LightStream, and Grand Junction Network. Crescendo turned out to be the first of many technology acquisitions to come during the 1990's.

As Cisco moved into switching technology, the firm had to also consider alternative technologies competing for attention in data networking such as ATM (Asynchronous Transfer

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[95] Wertheim Schroder & Co., "Cisco Systems – Company Report," November 8, 1993.
[96] CS First Boston, "Cisco Systems," September 27, 1993. Also Prudential Securities, "Cisco Systems – Company Report," November 12, 1993.
[97] Wertheim Schroder & Co., "Cisco Systems – Company Report," November 8, 1993.

Mode) and ISDN (Integrated Services Digital Network). Cisco had developed a core competence in IP technology. Within a two-year span, Cisco had demonstrated a willingness to interoperate across alternative technologies and to seriously consider acquisitions as a way to continue growing the firm. Demonstrating a type of absorptive capacity (Cohen & Levinthal, 1990), Cisco was beginning to distinguish itself from the historic wisdom of technology strategy primarily built on internal R&D and the not-invented-here syndrome (Katz & Allen, 1982). One analyst remarked, "There is less of a "not invented here" attitude at Cisco."[98] However, Cisco was not unique as other networking industry players were also looking to access external technologies as a growth mechanism. One analyst remarked, "Ventures, alliances, and acquisitions have been crucial tactics for growth for virtually all networking equipment vendors."[99]

Services as complementary capabilities

As Cisco stood at the cusp of the dot-com bubble in 1995, the opportunity in networking seemed very big. However, the technological path was filled with uncertainties. Had Cisco made the right technological bets? Had Cisco stayed in routing too long? Would IBM be able to leverage its large installed base of SNA network customers? With the benefit of hindsight, we know that Cisco faired quite well during the 1990's. Rather than explore Cisco's capability in technological search, this chapter instead explores the role of complementary capabilities in services within a fast-moving industry circa 1995. For example, after-sales support (i.e., technical support) is an important complementary function needed to commercialize an innovation (Teece, 1986). In this chapter, the emphasis is on understanding when, why, and how the innovator activates services and how that emphasis evolves using a focused longitudinal study. However, the beginning assumption as illustrated in Figure 2.1 is that there exists a distinction between technical support and professional services.

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[98] PaineWebber analyst report, "Cisco Systems – Fourth quarter reflects blowout revenues," August 25, 1995.

[99] PNC Bank, "Equity Analysis – Cisco Systems," October 11, 1995.

Technical support

It would be hard to imagine that technical support would not be an important complementary capability for a complex technology product such as internetworking equipment. Prior studies examining technological change and complementary resources strongly suggest the importance of product support service. In the typesetter industry, the sales and support service network was conflated together as one specialized complementary capability, but nevertheless was a valuable asset across periods of technological change (Tripsas, 1997). In a study of technological change in calculators, sales and support services were valuable complementary capabilities during the era of electromechanical calculators. Since electronic calculators were much more reliable and required far less servicing, the complementary support service competences were no longer of value (Majumdar, 1982).

Between 1984 and 1995, the multi-protocol router became firmly established as a new technology category. Unlike the first generation of electronic calculators that were standalone devices, multi-protocol routers were complex devices for which product support was a valuable complementary capability. The default arrangement within any technology product firm is a technical support function that is tightly coupled to the product offering. Cisco was no different and indeed followed that industry norm. The conventional model for technical support within a hardware product firm is primarily a set of post-sales activities that are reactive in nature and comprise a combination of break/fix maintenance, a tiered problem escalation plan, spare parts, a geographic coverage plan, and guaranteed response times. Occasionally, support includes basic installation from a customer support engineer and technical sales assistance from a systems engineer who is able to converse at a more technical level with the customer's IT staff. The cost of systems engineering and basic installation is usually considered to bundled in with the price of the product. In other words, it comes across as a no-charge item to the customer. Professional services are monetized activities above and beyond the standard price of the product such as pre-sales consulting, systems integration, and customized implementations. A professional services business can be inside the product firm (i.e., a "build" option) or it can be offered by an external dedicated services organization. Professional services as complementary is discussed further in the next section.

Not surprisingly, the evidence suggests that product support was a very valuable and important complementary function during the early days of the internetworking industry.

Support was valuable because routers were installed in multi-vendor network product environments where network problems were difficult to diagnose. One trade article described the situation in 1992.

> "According to James Herman, a principal with Northeast Consulting Resources, Inc. in Boston, internetworking technologies are the most troublesome to install and manage today. "Internetwork troubleshooting is notoriously difficult. Almost everything that goes wrong with an internet requires a highly trained technician -- an engineering guru -- to do the diagnosis," Herman said. Users largely rely on vendors for that work; however, with the explosive demand for their products, vendors have had a hard time keeping up with service demands."[100]

With the rapid growth in networking technology, customers were still pushing the major vendors to improve their support offerings in 1995.

> "All four companies [Bay Networks, Cabletron Systems, Cisco Systems, and 3Com] are fine-tuning their support offerings accordingly. They are pledging faster response times and callbacks, lengthening telephone hot line support hours, using on-line services on the Internet and CompuServe, and providing quicker turnaround for replacement parts and equipment. Users and analysts agree that life is confusing right now for even the most technically astute users and network administrators."[101]

Cisco took customer support very seriously. The formal name of the organization was different that what one normally saw in a technology firm – they called it Customer Advocacy. In the first Letter to Shareholders, CEO John Morgridge stated,

> "Cisco has invested heavily in all elements of customer support, including training, documentation, order entry and post-sales support. The philosophy is to fulfill each customer's individual requirements. Though simple in design, this philosophy demands dedicated employees. Customer Advocacy assures customers of true "advocates" within cisco whose principal jobs are to listen and respond to their needs."[102]

Although the router market share leader in 1992, Cisco continued to have challenges with product support simply due to the large number of protocols supported by their multi-protocol routers.

> "Service is certainly the area of greatest challenge for Cisco today," Morgridge said. "A technical specialist needs to know Unix, Apple, Novell, Apollo Domain, Banyan and,

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[100] Network World, "Service a sore point with bridge/router customers," June 1, 1992.
[101] Computerworld, "Support, service are scale-tipping factors; Internetworking vendors fine-tune offerings in response to users wants," June 19, 1995.
[102] Cisco Systems 1990 Annual Report, "Letter to Shareholders," July 29, 1990.

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increasingly, [IBM] SNA. In addition, corporate internets are becoming larger and more geographically dispersed, all of which adds to the complexity.[103]

Because Cisco equipment was installed and integrated alongside products from many other vendors, Cisco customer support was willing to respond to issues even when it wasn't obvious which vendor's product was having problems.

> *"The evolution from single-vendor to multivendor networks has expanded the role of Customer Advocacy. Network customers can no longer simply call one vendor, say IBM or Digital, that once supplied all of their computer and communications equipment. Installations today typically employ devices from ten or fifteen different vendors. When an internetwork problem occurs, it may not be obvious which vendor's equipment is at fault. The cisco Customer Advocacy team will respond, whether or not it is clear that cisco equipment is at fault. Cisco wants its customers' internetworks up and running, even if that means finding and coordinating repair of a problem unrelated to cisco equipment.*[104]

Finally, Cisco relied heavily on making support information available electronically. Initially launched as a text-based service called Cisco Information Online, Cisco upgraded this capability to take advantage of the World Wide Web in June 1994 and called it Cisco Connection Online (CCO). CCO provided customers with quick access to technical support databases, known problem reports, and software updates.[105] As demand continued to grow, CCO was a highly scalable mechanism for customers and partners to access valuable support information and this subsequently reduced the number of costly technical support phone calls. CCO was one example of how Cisco used web technologies to increase productivity of its own business operations. It is believed that "80% of customers address their needs online and support themselves through the tools that we created and made available over the web."[106]

Professional services

The business of professional services represents a different form of service function than technical support outlined above. As a fee-based profit and loss (P&L) business, I found very little evidence of a professional service business within Cisco prior to 1995. Wellfleet Communications, one of Cisco's main competitors in 1992, announced the formation of a

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[103] Network World, "Service a sore point with bridge/router customers," June 1, 1992.

[104] Cisco Systems 1990 Annual Report, July 29, 1990.

[105] Cisco press release, "New version of Cisco online support service offers hypertext access to multimedia information," June 29, 1994.

[106] Interview with Jonathan Ballon.

professional services organization. Coverage of the announcement attempted to distinguish between this new revenue-generating service effort and the conventional customer support model.

> "Most companies bundle a degree of free consulting in their pre- and post-sales support. Wellfleet, however, aims to evolve the ad hoc phone call for help into a more formalized process to assist users in determining their requirements and deciding on network details...".[107]

Wellfleet started its professional services organization as an eight-person team of consultants that cost $2000 per day.[108] Buried in the Computerworld story is a mention about a similar effort at Cisco of a 14-person team that charges between $150 to $250 per hour called Cisco Network Consulting – described as an ad hoc help shop. Given the approximate team size and the scarcity of information about the professional services organization at Cisco (and its competitor Wellfleet), this particular function is of low value from the product vendors at this stage of the internetworking industry. Perhaps the basics of free technical support needed to be ironed out first before the firms could allocate substantial resources towards monetizing professional services. In addition, no evidence of alliances with dedicated professional services organizations is apparent either during this period.

Customer satisfaction culture

Customer satisfaction appears to have been imprinted within the Cisco culture from the early years. Customer satisfaction is linked to the customer advocacy philosophy that fuels technical support.

> "The customer's satisfaction is the ultimate measurement of any internetwork installation's success. At cisco, we judge every part of our operation against that ultimate standard. We believe Customer Advocacy is the ultimate competitive advantage."[109]

In the 1996 Letter to Shareholders, CEO John Chambers stated that management compensation is tied to customer satisfaction. So beyond customer support as a standalone group, the customer satisfaction mentality is intended to permeate through all levels of the firm.

One analyst report about Cisco's commitment to its customers:

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[107] Computerworld, "Wellfleet program to provide network advice," October 26, 1992.
[108] InternetWeek, "Internetworking: In Brief; ... And Consulting, Too," October 19, 1992.
[109] Cisco Systems 1990 Annual Report, July 29, 1990.

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"Learning from past failed and successful corporate dynasties, Cisco culture is focused on the customer. The customer comes first at Cisco. It's ingrained in the culture. This primary element in Cisco's culture gives Cisco the key to overcoming any temporary obstacles or execution problems from a technology perspective. Customers stick with a vendor when they trust them. We have interviewed numerous Cisco customers and they appear extremely loyal."[110]

1995: an inflection point

Although not prominent by 1995, other key developments would prove very instrumental during the dot-com boom period of the late 1990's. First, Cisco achieved a modest level of success from its early set of acquisitions between 1993-1995. These early acquisitions served as a learning mechanism and subsequently became a preferred model for plugging gaps in Cisco's technology portfolio (Levitt & March, 1988; Rosenkopf & Nerkar, 2001; Stuart & Podolny, 1996). Second, Cisco learned that it needed to make some changes to handle the fast growth it experienced up to 1995. It's business model was primarily through direct sales. To enable faster growth, the firm decided to build a channel partner program. An experienced channels executive, Steve Behm, was hired from SynOptics in 1995 to develop an indirect channel presence for Cisco. Sales through channel partners grew from 12% in 1995 to over 70% by 1999.[111]

Third, John Chambers was promoted to CEO and President in 1995. Unlike most other CEOs at large technology companies, Chambers tenure as CEO has extended through the dot-com boom, bust, and recovery. This has provided a source of stability for Cisco across many acquisitions and macro economic swings.

Lastly, complementary capabilities in professional services were not of significant value for Cisco during its initial growth. While technical support – i.e., Customer Advocacy – has persisted as a valuable function throughout the firm's history, the business of professional services does not appear to have been a material part of the Cisco business model in 1995 whether viewed through a build strategy or a partnering strategy. The dominant approach appears to be the conventional model of bundling advice and pre-sales support with the sale of the products. Cisco's approach was primarily a direct approach provided through systems engineers where the business model was to offer consulting advice free of charge as part of the

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[110] Salomon Smith Barney analyst report, August 7, 2000.
[111] CRN, "Cisco channel builder retires at 39," April 16, 1999.

sales process. The firm had a 14-person fee-based consulting team in late 1992 that was most likely used for the most complex deployments.

5.5.2   Speed and scale: 1996-2000

Market opportunity identification

By 1996, the major data networking vendors were each working to create end-to-end product portfolios since the best-of-breed approach combining Cisco routers, 3Com adapters, U.S. Robotics modems, and Cabletron intelligent hubs lacked the technological cohesiveness that customers wanted. So these networking vendors began in earnest to acquire and merge with a mission to create a one-stop-shop portfolio – with Cisco leading the way.[112]

As data networks started to become ubiquitous, the issue of having two networks – one for data and one for voice – began to be debated. Why not have one single network that could handle data, voice, and video. Technological change during this period was fueled by the need to create a single versatile network infrastructure (convergence) capable of handling data, voice (i.e., voice over IP or VoIP), and video traffic – each with their own unique requirements for quality and reliability. For example, a two-minute delay in delivering data packets for an email is more acceptable than a similar delay of voice packets during an emergency phone call.

Technological change and end-to-end solutions

Cisco's identity as an innovative firm is perhaps viewed in two stages. The first stage was its implementation of the multi-protocol router. The second stage took shape as it began slowly acquiring technology firms in 1993. Of note, Cisco expanded its product line to include switches. Cisco continued to fill gaps in its switching portfolio as new technologies emerged. While Cisco achieved market leadership positions in routing and switching technologies, it began to position its portfolio and compete based on a combination of its products – what it referred to as end-to-end networking solutions, which supported the buildup of local (i.e., workgroups and small business) and global (i.e., large firms and service providers) networking infrastructures. Whereas customers had the freedom to choose best-of-breed individual products for their networking infrastructures, Cisco bet on a one-stop shop approach that provided a loose coupling of routers, switches, and remote access products. Although the firm continued to

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[112] Smith Barney, "Cisco Systems: The dominant player in the networking industry," September 2, 1997.

diversify its product line beyond routers and switches through 2000, routers and switches represented approximately 90% of product revenues and 80% of overall revenues. See Table 5.2. From a technological perspective, Cisco's core competence was in routing and switching technologies.

Table 5.2. Revenue contribution from routers and switches

Revenue contribution from routers and switches

Sales ($million)	Routers ($million)	Switches ($million)	R + S / Sales	R + S / Product Sales
8458.8	3856	3613	88%	
12154.0	5196	5167	85%	91%
18928.0	7611	7509	80%	90%
22293.0	8655	10586	86%	88%
18915.0	5607	7560	70%	83%
18878.0	4859	7721	67%	82%
22045.0	5406	8881	65%	84%
24801.0	5498	9950	62%	84%
28484.0	6005	10833	59%	84%
34922.0	6920	12473	56%	84%
39540.0	7909	13319	54%	84%
36117.0	6271	12025	51%	81%
40040.0	6574	13658	51%	81%

Approach to innovation

What has garnered more recent attention is the second stage of innovation at Cisco, which is not about a specific technological breakthrough but rather about Cisco's overall approach to innovation and R&D. Cisco is often held up as an example of open innovation that is contrasted with prior approaches to innovation characteristic of the large internal R&D organizations in the twentieth century such as AT&T/Lucent, IBM, and Dupont (Chesbrough, 2003).

Having acquired nearly 70 technology firms between 1993 and 2000, much of the buzz around innovation at Cisco centered around the firm's methodical approach to acquisitions (Paulson, 2001).[113] Given that most mergers and acquisitions fail or never meet intended expectations (Malmendier & Tate, 2008), some suggest that Cisco on average was able to retain 90% of the key staff across these acquisitions (Bunnell & Brate, 2000).

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[113] The SDC Platinum database shows 71 acquisitions. Cisco's website (GET URL) shows 68 [CHECK AGAIN] acquisitions – accessed on August 1, 2011. The discrepancy is likely a difference between acquisitions of assets versus acquisitions of entire firms. TIGHTEN THIS UP – FIRMS vs. TRANSACTIONS

Professional services as a complementary capability

Cisco Connection Online, a large part of the firm's customer support strategy, remained a big part of Cisco's technical support capabilities. However, the focus of this section is on complementary professional services. Overall, professional services started to emerge as a very valuable complementary capability during the dot-com boom – an era of major growth.

A partner-centric model for professional services

Between 1996 and 2000, the evidence shows an overwhelming emphasis on partnerships for professional services. See Appendix 1 for a listing of events.

While Cisco was forming alliances and partnerships with professional services organizations during the dot-com boom, its activities in 1999 stand out as a clear statement of its intent to rely on partners for professional services.

By early 1999, Cisco had formed a number of non-exclusive partnering agreements with large professional services firms such as EDS, Ernst and Young, KPMG, and Cambridge Technology Partners. To incentivize the services partner, Cisco would often make investments in its services partners. For example, Cisco held a minority interest – valued at $200 million in 1999[114] – in International Network Services (INS), an up and coming internetworking consulting services firm. Cisco made a $7 million investment in systems integrator Total Network Solutions (TNS) to enable TNS to support the firm's geographic expansion.[115]

In 1999, Cisco and Lucent Technologies were fierce competitors. INS, a network consulting firm and partner of Cisco, was the subject of a possible acquisition by either Lucent or Cisco. Cisco had several opportunities to acquire INS, but eventually decided not to. In August 1999, Lucent Technologies completed the acquisition of INS for $3.7 billion. One analyst took this event to summarize Cisco's beliefs about its approach to professional services as follows:

"Cisco was also ready to point out the differences between what it and the Old World networking companies (Lucent and Nortel) are doing. Besides the traditional knocks ... about high prices, slow moving, proprietary solutions, lack of data networking expertise etc., Cisco – this quarter – pointed out the differences in the way they are integrated

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[114] An initial Cisco investment was announced in a January 18, 1995 press release by INS when the firm was a small 132-person privately held firm. By August 1999, INS was a publicly traded, 2000-person firm of which Cisco's ownership stake was estimated to be 6.7% or $200 million.

[115] "Total Network Solutions Announces $7 Million Cisco Systems Investment," TNS PR Newswire, June 3, 1999.

(vertically [Lucent] versus horizontally [Cisco]). This was a direct shot at Lucent and its
acquisition of INS to add to its consulting business. (By the way, Cisco owned a part of
INS, had a representative on its board and had a number of opportunities to buy them but
declined.) Cisco believes in forming partnerships with dozens of companies or partners to
help them provide solutions to companies versus Lucent preferring to own its distribution
and service channels. By forming partnerships, Cisco believes that it can have more
people selling its solutions and will not compete with its partners."[116]

However, Cisco management believed that professional services were an important complementary function for the sale and deployment of Cisco products. But the Cisco philosophy was to remain focused on the technology and depend on partners for complementary capabilities. Having lost an influential partner to Lucent, Cisco put a big stake in the ground in August 1999. Cisco invested $1.05 billion in KPMG Consulting – a 19.9% ownership stake. In return, KPMG Consulting would hire 4,000 employees and build six technology centers that would help customers deploy Cisco technology. To put this in perspective, Cisco spent $1.7 billion on internal R&D in fiscal year 1999. One analyst summarized it as follows:

"One of the challenges that Cisco faces is how to continue to deliver revenue growth,
without adding a low margin consulting and services infrastructure similar to the
infrastructure carried by Lucent and Nortel Networks. Consulting businesses typically
generate lower margins than the 65% gross margin and 27% to 28% operating margin
that we expect of Cisco... The investment in KPMG enables Cisco to scale its business
without adding lower margin business... The company's investment in KPMG will ensure
that it is able to deliver the consulting resources needed to drive growth without adding a
low margin consulting business to its income statement."[117]

On August 30, 1999, Cisco and IBM announced a strategic alliance where Cisco pays up to $300 million for the intellectual property of IBM's networking division. Prior to this alliance, Cisco and IBM had been partners. However, the two firms competed in the networking space and that dampened Cisco's partnership with IBM Global Services – the largest professional services organization in the industry. This alliance effectively took IBM out of the networking business and elevated Cisco to a preferred networking vendor for IBM Global Services customers interested in networking infrastructure related projects.

Lastly, Cisco announced a formal Professional Services Partner program in April 2000. Initial partner organizations qualified under the program were Datatec Systems, Getronics, HP, IBM Global Services, KPMG Consulting, NCR, NetEffect, Netigy, Predictive Systems,

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[116] A.G. Edwards analyst report, August 20, 1999.
[117] A.G. Edwards analyst report, August 9, 1999.

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REALTECH Systems, Rt 1 Solutions, SAIC, Spring Enterprise Network Services, The Signature Group, Total Network Solutions, and Unisys.

At the peak of the dot-com bubble, Cisco was focused on the scale and growth of networking technology. The necessary complementary component of professional services – from consulting to systems integration and implementation – were the domain of Cisco partners that sometimes were sealed through a financial investment without a full-blown acquisition.

Considering its large investments in KPMG Consulting, in IBM, and the Professional Services Partner program, Cisco was acknowledging the value of professional services within its value chain while making a strong statement that its intent was to rely on partners for these complementary capabilities.

Cisco provides very limited professional services

However, Cisco had a small professional services footprint in 2000 that was involved with some of their larger enterprise customers.

Another sign that Cisco had invested in professional services is the acquisition of Worldwide Data Systems (WDS), a consulting and engineering services firm that specialized in the convergence of data and voice networks. The WDS acquisition was completed for $25.5 million in February 2000. With over 60 acquisitions between 1996 and 2000, WDS is the only professional services firm that Cisco acquired. By comparison, the $25.5 million acquisition pales in comparison to the investments Cisco made in KPMG Consulting in 1999. Overall, the Cisco professional services footprint was very minimal in 2000.[118]

A second source of professional services activities although not a P&L (profit and loss) business was a consulting organization known as the Internet Business Solutions Group (IBSG). The group was formed in approximately June 1998 as a free consulting group to influence the thinking of CEOs at Cisco's largest accounts.[119] Cisco was well-known for its own internal use of web technologies and so IBSG became a forum for sharing some of Cisco's best practices, giving strategic customers a Cisco-inspired vision for the Internet, driving Cisco products using an indirect approach, and getting its most influential customers to think about Cisco beyond

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[118] No mention of Cisco professional services (e.g., managers or revenue contribution) can be found in annual reports, 10-K reports, or trade news up through 2000. Very sparse coverage is within a few analyst reports but simply as a mention that it is included within the "Other" category.

[119] "Cisco unit eyes 'Net business users," Network World, September 21, 1998.

routing and switching products – i.e., plumbing for the Internet. In addition to connecting with CEOs, IBSG was designed to help Cisco from becoming a commodity network product supplier.[120] While IBSG shaped vision, Cisco left the implementation of the vision to its professional services partners.

5.6 The Downturn and Restructuring: 2001-2003

5.6.1 Market opportunity identification

The convergence of data, voice, and video continued to be the big opportunity for continued growth across the industry for network equipment moving into 2001. Despite the big upswing in IT spending during the dot com bubble years, the vision of a converged networking infrastructure was more vision than reality as enterprises and telecom service providers deployed converged networks at a slower rate than many had projected. Even for customers seriously contemplating deploying a converged network, a big struggle was whether to add incrementally or to completely rip and replace the old with the new.

The bubble bursts

The biggest change during this period was not about technological change. The story of this period was the big collapse of the IT market in 2001 – the bursting of the dot com bubble. All technology product firms were affected and especially the hardware firms who were some of the primary technology suppliers such as Cisco in networking equipment, Sun Microsystems in compute servers, and EMC in enterprise data storage. As many firms folded during this period, a large secondary market for barely used equipment developed, putting additional pressure on market opportunities for these technology suppliers. [121] Where these leading firms garnered premium prices during the bubble growth years, power began to shift towards buyers as a glut of excess inventory became available across the industry.

At one level, Cisco seemed not to be as hard hit as Sun Microsystems and EMC. Cisco 2001 revenues increased by over $3 billion compared to 2000 revenues. However, the firm lost money for the first time in its history. With its fiscal year ending in July, the brunt of the 2001

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[120] "Sizzling Cisco," InformationWeek, February 28, 2000.
[121] Investor's Business Daily, "Used networking equipment puts squeeze on Cisco sales," May 15, 2001.

market collapse is scattered across 2001, 2002, and 2003 fiscal year reports. Table 5.3 shows the state of the firm by numbers from 2001-2003. Comparing 2001 to 2003 shows the extent of the market collapse on Cisco. Overall revenues were down. Perhaps most significant, the flagship revenues from routing and switching products were down over $6 billion (see Table 5.2). R&D investments were down. Employee staffing levels were down with voluntary and involuntary separations. Based on his prior experience with massive layoffs at Wang Laboratories, Chambers was not a big fan of layoffs. However, the market collapse was so severe that Chambers had to consider all options to keep the firm moving forward.

Table 5.3. Cisco by the numbers

	Cisco					
Year	Sales ($million)	Gross Margin	Net Margin	R&D / Sales	Services / Sales	Employees (thousands)
1990	69.8	67%	20%	9%		0.3
1991	183.2	67%	24%	7%		0.5
1992	339.6	69%	25%	8%		0.9
1993	649.0	70%	26%	7%		1.5
1994	1243.0	69%	25%	7%		2.4
1995	1978.9	70%	21%	13%		4.1
1996	4096.0	69%	22%	10%		8.8
1997	6440.2	68%	16%	19%		11.0
1998	8458.8	69%	16%	19%		15.0
1999	12154.0	69%	17%	17%	9%	21.0
2000	18928.0	67%	14%	22%	10%	34.0
2001	22293.0	55%	-5%	21%	12%	38.0
2002	18915.0	70%	10%	19%	17%	36.0
2003	18878.0	76%	19%	17%	18%	34.0
2004	22045.0	74%	20%	14%	16%	34.0
2005	24801.0	70%	23%	13%	16%	38.4
2006	28484.0	69%	20%	15%	16%	49.9
2007	34922.0	67%	21%	13%	16%	61.5
2008	39540.0	68%	20%	13%	16%	66.1
2009	36117.0	67%	17%	15%	19%	65.6
2010	40040.0	68%	19%	13%	19%	70.7

Managerial beliefs

Having been an icon of growth during the dot com boom years, Cisco was in new territory in 2001. Cisco experienced many *firsts* during 2001: first quarter of negative earnings, first fiscal year of negative earnings, and first workforce reduction plan. Contrasting with the prior period, Chambers and team now had to start thinking about how to manage the firm during

a dramatic downturn in the market. Mohsen Moazami, Vice President of IBSG, described the beliefs that permeated every level of the firm during the bubble years as one of

> *"scaling and speed – doubling and tripling and a run, run, run mentality. No one had much focus on costs and ROI. Our job was just to get things done fast."* (Chatman, O'Reilly, & Chang, 2005)

Three of the key themes during this period were organizational efficiencies, profit contribution, and prepare for the upturn. First, organizational efficiency efforts began to unfold in March 2001 as Chambers and team announced Cisco's first ever workforce reduction program. While it doesn't come through on the annual headcount numbers, Cisco full-time employee headcount had reached 44,000 by early 2001, having doubled in size from mid-1999. By the end of the 2001 fiscal year, the workforce was at 38,000 employees.

Continuing with the organizational efficiency effort, the firm announced a major reorganization from a line of business structure[122] to centralized engineering with 11 technology groups and centralized marketing under one leadership in August 2001.[123] While a few years back the line of business structure served the needs of customer segments with uniquely different needs, over time the shifting customer segment needs revealed overlapping requirements, redundancies, and missed opportunities to create synergies across business silos.

Second, profit contribution rather than revenue growth became a mantra during this period. Chambers often discussed during quarterly analyst conference calls how the firm had embraced a "fanatical focus on profit contribution"[124] and how this new focus permeated "from manufacturing to sales to engineering to finance to service and IT respectively."[125] Given the poor market conditions in 2001, top line revenues were likely to remain flat; therefore, profit contribution was going to come from cost cutting measures. As mentioned above, a reduction in staffing level and spending levels were implemented during this period.

The final theme that Chambers continued to emphasize with analysts was how Cisco was preparing for a market upturn. While the focus on organizational efficiencies and profit

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[122] There were three lines of business organized by customer segments: service providers (large telecommunications providers), enterprise, and commercial (small and medium business).

[123] The 11 technology groups were routing, switching, remote access, aggregation, IOS technologies, Ethernet access, network management, optical, storage, voice, and wireless.

[124] Fair Disclosure Financial Network, "Cisco Systems – Q4 2002 financial release conference call," August 6, 2002.

[125] Fair Disclosure Financial Network, "Cisco Systems – Q1 2003 financial release conference call," November 6, 2002.

contribution was about managing the downturn, Chambers was adamant with analysts about how Cisco was positioning for the "inevitable upturn."[126] Chambers provided insight to the analysts as to how he and his management team thought about future growth.

> *"In the following sections we will attempt to cover four of the most commonly asked questions. The first question is, can you provide an update on your three major areas of focus for future growth outlined in your last conference call? As a reminder, we focus on three major areas, the first being routing and switching, our traditional core products. Second, the service provider marketplace. And third, our nine new growth markets."[127]*

The growth market opportunities beyond routing and switching were described using various names such as tornado markets or emerging markets, but by mid-2003 this area was known as Advanced Technologies.

5.6.2 Innovation management

With a flexible approach to innovation that included internal development and acquisitions, Cisco had created a broad network technology portfolio whose breadth and depth was unmatched by other network equipment vendors. However, routers and switches were the primary revenue drivers. As networks continued to evolve, many technologies were being mixed and matched to cater to wide-ranging customer needs that ranged from the build out of new networks to the migration of existing networks. Switching technologies alone mixed various technology combinations such as Ethernet, Gigabit Ethernet, Token Ring, and Asynchronous Transfer Mode (ATM).

Cisco had recently expanded into wireless networking technologies through the Aironet Wireless Communications acquisition in 2000. Cisco continued to push its approach to the convergence of data, voice, and video through its technology strategy known as AVVID (Architecture for Voice, Video, and Integrated Data). By 2003, Cisco had expanded into optical networking technologies and data storage switches for storage area network (SAN) environments. Across this vast portfolio were multiple layers of technologies, each at various levels of maturity and adoption. Competitors often had better individual or point products, but

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[126] Fair Disclosure Financial Network, "Cisco Systems – Q4 2002 financial release conference call," February 4, 2003.
[127] Fair Disclosure Financial Network, "Cisco Systems – Q4 2002 financial release conference call," February 4, 2003.

Cisco was the one-stop shop for networking equipment. The Cisco portfolio was a barrier to entry. They were the plumber of the Internet.

Cisco wanted to diversify not only in the number of products in its portfolio, but also in the revenue contribution beyond routers and switches. Towards the end of 2003, Chambers announced a more simplified technology strategy – core technologies (routers and switches) and Advanced Technologies. Advanced Technologies were opportunities closely related (i.e., adjacent) to routing and switching, where Cisco management perceived a minimum of a $1 billion business for Cisco within 3-5 years, and where Cisco could maintain the first or second market share position. By the end of 2003, the six primary Advanced Technologies were IP telephony, security, optical networking, storage area networking, wireless technology, and home networking.

The Cisco philosophy towards innovation persisted during the downturn. For example, one analyst commented on Cisco management's comments about pursuing growth market opportunities during the annual analyst conference in 2002:

> "Where Cisco does not have a product line or presence in one of these growth markets, the firm will continue to evaluate acquisitions in addition to partnerships and internal development."[128]

Although innovation is the lifeblood of Cisco, R&D expenses are reduced by $1.3 billion from 2001 to 2002 and then a further $400 million reduction from 2002 to 2003. Having peaked at 23 acquisitions in 2000, Cisco acquired at a much slower rate with seven, four, and three in 2001, 2002, and 2003 respectively. Acquisitions during 2002 and 2003 were the fewest over a two-year period since 1993 and 1994.

As Cisco looked towards a possible upturn in 2004, the innovation philosophy was reinforced again during the 2003 annual analyst conference:

> "Cisco reiterated its position against acquiring large competitors and its strategy to buy smaller companies while it seeks partnerships with larger vendors and integrators [professional services firms]. Cisco uses acquisitions to either move into new markets, such as with the Linksys acquisition, or to buy technology, the model for many of Cisco's smaller acquisitions."[129]

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[128] Deutsche Bank Securities, "Cisco Systems, Inc. – Analyst Meeting: Confirms Solid L/T – No Change to S/T," December 4, 2002.

[129] Prudential Equity Group, "CSCO: provides market outlook; says earnings leverage extremely strong," December 11, 2003.

5.6.3 Professional services as a complementary capability

Professional services remained a valuable part of the value chain of activities needed to successfully deploy network technologies in demanding enterprise and telecom service provider environments. However, such complementary activities were not immune from scrutiny as an industry-wide climate of restructuring took hold. During times of crises, firms are more likely to concentrate on their distinctive core competences (Leonard-Barton, 1992). During periods of disruptive technological change, incumbents are more inclined to prioritize their historic strengths and values (Tushman & Anderson, 1986). This line of research suggests that an established firm will more likely trim back on complementary resources in favor of its core resources during a period of disruptive change. Cisco's restructured technology strategy by 2003 appears to follow this line of thinking, having formally designated routing and switching as its core technologies and then everything else within its vast portfolio of products as advanced technologies. On the one hand, this simplified categorization is convenient for Cisco stakeholders and analysts to better understand what the firm is doing. On the other hand, this categorization sends a message about Cisco priorities – what is negotiable (i.e., advanced technologies) and what is non-negotiable (i.e., core technologies).

One Cisco competitor, Lucent Technologies for example, announced a plan to exit from the enterprise customer segment and instead focus on their traditional strength in the large service provider customer segment. As part of the refocus on their core strengths, Lucent announced a plan to sell off their professional services division, known as Enhanced Services and Sales (ESS), in November 2001 as part of their restructuring efforts. ESS, formerly the INS consulting firm acquired for $3.7 billion in 1999, was focused on engagements with Lucent's enterprise customer base. Although Lucent management decided to sell off the former INS assets, Lucent kept the Lucent Worldwide Services organization – a division that provided professional services to the service provider customer segment. Hence, professional services persisted as a valuable complementary function at Lucent.[130]

Unlike Lucent, Cisco's approach to professional services was partner centric. A majority of the professional services resources needed to complement Cisco innovations were owned by partners. Therefore, the task of restructuring those assets was the responsibility of the asset

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[130] IDC Flash #27635, "Lucent sells enterprise professional services business: INS reenters the marketplace," July 2002.

owners – namely the partners who wrap professional services around Cisco products. From a pure cost-cutting perspective, Cisco's partner centric approach offers relatively no drag on Cisco restructuring programs that had a mandate to drive profit contribution during the downturn.

However, partner centric is not the same as *partner only*. Perhaps somewhat surprising, Cisco began to *increase* its relative investment levels (i.e., costs and resources) in professional services during the downturn as it began to *decrease* its relative investment levels in innovation (i.e., R&D spending, R&D staff, and rate of acquisitions). While Lucent's decision to sell off the former INS assets follows from a bigger decision to get out of the enterprise market, Cisco's counter example is not initially obvious. Was this the beginning of a major shift towards services similar to what IBM experienced in the mid-1990's under the leadership of Lou Gerstner?

Partner centric, but not partner only

The dominant model for professional services in the prior period was partner centric as evidenced by many public domain signals: the Professional Services Provider program, the Professional Services Partner program, and strategic alliances that often included minority ownership stakes with Cisco executives appointed to directorships. Apart from the $25.5 million acquisition of the professional services firm Worldwide Data Systems in 1999, there's little evidence of much of a Cisco professional services business. It simply was not a material part – in revenue or in management discussion – of the Cisco business model. Nevertheless, many large customers demanded a Cisco-only approach:

> "It [Cisco-direct professional services] has been around for some time in different formats because we always had some accounts – top end like a Walmart or JP Morgan – they always insisted, no intermediary. They want Cisco people delivering and managing. We've always had some [professional] services capability because we've always had this group of accounts that were direct."[131]

Although Cisco allocated resources towards revenue-generating professional services even during the dot com bubble era, the evidence suggests that Cisco management had no interest in building a large professional services footprint like IBM Global Services. One informant expressed the common sentiment, "we will not build a large services organization."[132]

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[131] Interview with Surinder Brar.
[132] Interview with Surinder Brar.

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Cisco maintained a small professional services footprint within a dominant partner centric framework during the dot com bubble years. During the downturn period, the Cisco internal approach began to shift as evidenced by an internal restructuring and an increase in professional services investments, revenues, and management discussion.

The restructuring of internal professional services was consistent with the overarching mandate by Chambers to facilitate profit contribution across every organization "from manufacturing to sales to engineering to finance to service and IT respectively." [133] Consistent with the newly consolidated R&D and marketing organizations, five groups were consolidated into one professional services organization later known as Advanced Services. Gary Moore, formerly the CEO of Cisco network-consulting partner Netigy (initially known as Enterprise Networking Services) and formerly an executive at services firm Electronic Data Systems, was hired to run the Advanced Services organization.

While professional services was seldom a topic of discussion during the big growth years, Chambers offered a rare glimpse into Cisco's evolution of internally-sourced professional services during a quarterly earnings call with analysts in 2003.

> "The other area that we have applied a lot of investments, realignments, and focus is the area of Advanced Services [professional services]. Traditionally, we combined professional services with our products and lines-of-business focus, similar to what many of our large competitors have done. While this approach did help sell some basic products, the contribution margin was negative, and we actually at times competed with our partners, who were interested in providing similar services. A little over two years ago, we made the decision to realign five different professional services groups into one under the leadership of Gary Moore, who reports to Wim Elfrink (Senior Vice President of Customer Advocacy groups). We defined the charter to focus on profit contribution, customer satisfaction, revenue growth, and speed of implementation. At the same time, the challenge was to focus on tight coordination, rather than competition with our partners, and focus on return on investment for our customers. The progress is very steady, moving from negative contribution margin, to positive 10% in FY 2002, to approximately 20% in FY 2003. In FY 2003, we grew our revenue by over 20% to $400 million, doubled our contribution margin, and achieved at the same time a 20% productivity improvement from the group."[134]

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[133] Fair Disclosure Financial Network, "Cisco Systems – Q1 2003 financial release conference call," November 6, 2002.

[134] Fair Disclosure Financial Network, "Cisco Systems – Q4 2003 financial release conference call," August 5, 2003.

Chambers comments revealed a few problems. First, the collective business of professional services sourced from Cisco was not a profitable venture. Although a relatively small footprint compared to its partner centric model, the costs exceeded the revenues. During the downturn, no organization was immune from scrutiny relative to profit contribution. Cisco was an icon of dot com growth and as the leader in network equipment, its business model was largely based on selling premium-priced products and high margin support contracts. Poor profit contribution within its minimalist professional services business was tolerated as a cost of doing business with its most influential customers during the big growth years, but now was regarded as unacceptable during the downturn.

The second problem that Chambers alluded to was channel partner conflict. Even a minimalist professional services footprint during the growth years was big enough to stir up issues of conflict with the partner community. The restructuring of Cisco internal professional services was to turn channel partner conflict (i.e., competition within overlapping customer accounts) into coordination and collaboration. Raja Sundaram provides a perspective on the delicate nature of channel conflict:

> "It doesn't matter who the vendor is. Any channel leader will tell you the same thing. All that needs to occur ... in a geographic region is just once, and it's at that point it becomes very, very difficult to discern whether it's an instance or a pattern. Because [to the partner] everything is a pattern. It just spreads through the partner community instantaneously... It doesn't matter whether it happened 100 times or it happened once. So you can statistically go in and say, 'Wait, wait, wait, it only happened once.' Sorry, it's already done. The damage is already done. Statistically you could argue there are 100,000 transactions in Botswana this year and only one [channel conflict] occurred... You can argue that all you want... To a partner, it's a pattern instantaneously."[135]

Cisco's new Advanced Services organization not only provided professional services to the firm's most influential customers, but the new organization provided offerings that partners could access if needed. This was a signal that Cisco wanted to cooperate rather than compete with its services partners.

> "Cisco Advanced Services offer a strong complement to Cisco ecosystem partner offerings such as vendor-neutral ROI analysis, project management, multivendor network support and systems/network integration. Cisco Advanced Services provides several opportunities for partners to take advantage of the Cisco engineering expertise according to each partner's unique business model. Cisco partners can choose to resell Advanced Services to their end customers, as required or deliver their own branded services built on Advanced Services engineering expertise. Cisco plans to actively support both models globally. In the

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[135] Interview with Raja Sundaram.

future, Cisco will work to provide partners both engineering and onsite project mentoring to further enhance deployment and support services partner capabilities. These partners can offer their own brand of services to their customers. Moreover, Advanced Services partner program offerings will soon become available to partners after pilot programs are complete. These services will enhance the partner's ability to access Cisco expertise and tools, such as assessments. The new Cisco Advanced Services program is designed to enhance partner participation and engagement, allowing for maximum customer choice and success. "[136]

The Advanced Services partner program offerings outlined above were part of a pilot program that involved experimentation and learning between Cisco and the partners. As with Cisco's support program offerings (i.e., SmartNet), Cisco was trying to create standardized services offerings beyond break/fix support during this period.

"We were struggling with the knowledge transfer in a structured and scalable fashion. We would either go to very ad hoc or we would go to a very structured engagement. We would sit down with a partner and go through their business model. We had created a whole bunch of templates for ourselves around the star model – strategy, structure, process, rewards, and skills – which is a basic change model. I said if you want to help the partners build up a services business and you've got to change the way they do business now, then you need to look at all five elements because otherwise the chances of that change sticking is pretty low. We then looked at what were our best practices in each of those areas and we started to do engagements with our partners. Every time we did an engagement, we would learn stuff. Our partners had their own best practice and we would add them to the library around this piece. In a 4-6 week engagement, we would sit down with a partner for free and help them improve their business. We did, in that period, about 200+ engagements with the partners. For us, the measure by the end of the day was how much did we improve their return on working capital because that's a pretty objective measure... Most partners that we did that with were eternally thankful because in some cases we saved their company. And it wasn't rocket science; it was just applying the basic principles." [137]

In addition to the Advanced Services division, another professional services group called Advisory Services was created during the downturn. The IBSG team, the pseudo consulting organization within Cisco created in 1998, would connect with high-end customers to create a vision for how network technologies could be used in their businesses. When customers agreed to move forward on a specific implementation project, the Cisco team would create a product parts list and then hand the customer off to a Cisco professional services partner. This felt like a "throw it over the fence" transaction and often dampened the enthusiasm for the project.

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[136] Cisco press release, "Cisco accelerates high-performance networking through new support program," April 8, 2002.

[137] Interview with Karl Meulema.

Advisory Services was to provide a smoother transition between the IBSG vision and the implementation project that eventually included partner involvement. Jonathon Ballon explains:

> "At the time eight years ago [2002], Cisco [engaged] with customers in strategic dialogue about what Internet technology could do for their business...top line [revenues] and productivity. We have a group of people called IBSG ... that would engage with our most strategic customers – customers that are leading their industry and create influence. We would share with them stories and case studies about how we would use our own technology to transform our own business. The idea was that we would create these compelling concepts with these customers and they would say, 'OK great. Let's do it.' They would buy a bunch of stuff, [but] there was this gap. We would have these business-focused conversations about transforming their business with technology and then Cisco would come in with a bill of materials and a bunch of boxes. The customers would scratch their heads and say, 'OK, I don't see how I'm supposed to translate all this product technology into this vision you created.' And so I was brought in with another gentleman to start what is now called Advisory Services within Cisco with the intent to create a business and technology architecture offering that would be a bridge between the vision that IBSG created and the technology... that's predicated upon the ability for us to have SI (systems integration) partners who can do the deployment."[138]

Elaborating further about how IBSG and Advisory Services work together:

> "Highly complementary. Very distinctly different... [IBSG] will bring Cisco examples and industry examples. If they're consulting with Wal-Mart they'll say, 'Based on the engagements we do around the world, here are some best practices that we're seeing from other large retailers that you might want to consider.' Then the advisory team will come in. First of all, IBSG is free. Advisory is fee. But really the goal of the advisory team then is to come in and say, 'OK you want to do this point-of-sale retail deployment with digital signage, smart carts, and self checkout and all these things that [another] company has pioneered. Let's work with your architecture team to design what that looks like and how that would fit within your IT stack and your business process and basically create a plan that bridges the business architecture that we'll collaboratively develop and your technology architecture. Then you have a roadmap and a plan for how you can implement.' Then what follows that is the partner, the advanced services, and the products that will then get integrated and deployed. So it [Advisory Services team] is a bridge."[139]

The restructuring of Advanced Services that enabled positive profit contribution and began to facilitate better coordination with partners combined with the creation of the Advisory Services organization suggest that professional services became a valued internal asset within Cisco during the downturn. With high demand for the product technology during the dot com years, Cisco could afford to form alliances and make equity investments in firms with professional services

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[138] Interview with Jonathon Ballon.
[139] Interview with Jonathon Ballon.

Partner community: from competition to coordination

In early 2001, Cisco's partner centric approach to professional services had a few problems. Cisco had over 5,000 certified channel partners globally comprised of value added resellers (VARs), systems integrators, and distributors (Kalyanam & Brar, 2009). The partner community was entirely based on non-exclusive agreements where partners competed against one another, occasionally collaborated with one another, and often represented other technology vendors as well. The partners were free to provide as few or as many services for end customers as they desired. While Cisco established some high-profile strategic alliances that included financial investments in many of the large professional services partners during the dot com bubble years, the majority of partners had no such arrangements.

One problem in the partner centric model was unintended behavior that resulted from the frenzied growth of the prior period. The channel partner program claimed to reward value-based selling as well as volume-based selling. Partners who sold larger volumes of Cisco products were rewarded with deeper discounts. Therefore, large partners competed based on a price advantage and this behavior had the unintentional effect of squeezing out smaller partners who often provided more value-added professional services with Cisco products. Cisco wanted more of the latter than the former. Cisco rolled out a revamped program by April 2001 that rewarded partners for value added services rather than volume-based product sales (Kalyanam & Brar, 2009). The new channel partner requirements resulted in 50% attrition in the partner community.[140] The large attrition was considered a positive outcome as many believed that Cisco had too many low-quality partners.

A second problem was that customer satisfaction ratings were much lower from partner-led engagements than from Cisco-led engagements. The large partner community provided Cisco with scale, but the lack of a minimum level of product expertise combined with Cisco's vast product portfolio resulted in unintended behavior where Cisco sales people – incentivized to send business to partners – would often pursue direct Cisco fulfillment due to the gap in customer satisfaction ratings. During the downturn, Cisco began to create partner programs that

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[140] Cisco shared these results with analysts during the December 2002 annual analyst conference. Salomon Smith Barney, "Cisco Systems Inc – Cisco's Analyst Meeting...And There You Have It," December 4, 2002. UBS Warburg, "Cisco Systems – Highlights From Analyst Day," December 4, 2002.

provided training and certifications so that customers understood the specific capabilities of the partners.

The partner problems with volume-based selling, lack of training, and low customer satisfaction were all intertwined. If Cisco could not get customer satisfaction ratings from partner-led engagements on par with Cisco-led engagements, the scale benefits of a large partner community would be questionable. Surinder Brar summarized the situation that was unfolding between late 2000 and early 2001.

> *"In July 2000 when I joined, I went out and talked to the sales teams to see what they thought about the partners? What's the value proposition etc.? Generally the feeling among Cisco [sales teams] was that partners were not adding any value. They were just collecting some business. Cisco can do it much better. [The partners] were not qualified or well trained. And Cisco is a big customer satisfaction culture so the sales teams often preferred not to use a partner and wanted to go directly. So after spending about six months trying to understand the lay of the land and the status, I came back with a recommendation that we need a formal program that is global in nature that actually drives behavior of the partners in a way that aligns with what we want to achieve. Even at that time... we had a very broad product portfolio and partners were kind of jack-of-all-trades. They weren't specialized in a particular area. There was this concept that allows partners to focus on particular technology areas. We call it a specialization. What that said was that we're going to have training as a requirement in the specialization. So there's a security specialization, or a wireless specialization, or a routing/switching specialization. Here is a set of requirements. You meet these requirements [and] I'm going to give you a badge. I'm going to say that you're a Cisco security specialized partner. And on the security products, you're going to get a higher discount than others. You get a reward for getting that training. You get recognition."[141]*

By October 2001, Cisco was beginning to roll out their first set of services specializations.[142] A services specialization was tied to a specific Cisco technology and thereby the technology specialization was a prerequisite to the services specialization. For example, the VPN/Security Technology Specialization was a prerequisite for the VPN/Security Services Specialization.

Some evidence suggests that the low customer satisfaction ratings were not just a partner problem. A major point of discussion during the 2002 Cisco Partner Summit was that partners believed they were being brought into the sales process too late. At the time, 8 percent of enterprise sales were direct and resulted in a 4.59 out of 5 customer satisfaction score. Roughly

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[141] Interview with Surinder Brar.

[142] Cisco launched its first set of services specializations in late 2001. Cisco press release, "Cisco announces first services specialization to identify channel partners delivering value-added professional services," October 1, 2001. Cisco press release, "Cisco announces new services specialization to identify channel partners with advanced network security expertise," November 6, 2001.

22 percent were from partner-only engagements with SME (small and medium enterprises) customers that resulted in a score of 4.4 out of 5. The remaining 70 percent were from engagements where Cisco and partners combined efforts and those deals scored 4.15 out of 5. The partners claimed that Cisco was bringing them in at the tail end of the deal once all pricing was set. This essentially handcuffed the partners into competing on price and left little room for the partners to contribute value-added professional services. And this was believed to be correlated with the lower customer satisfaction scores.[143]

Service revenues: technical support vs. professional services

During this period, Cisco began to formally break out its product revenues from its service revenues. In 2001, service revenues were 12% of overall revenues, or $2.7 billion. The majority of this revenue came from maintenance support contract initiations and renewals. There was a very small revenue-generating professional services footprint, but the revenue contribution was immaterial. Whereas a consulting or implementation project is most likely measured in weeks or months, a maintenance support contract is generally measured in years. Service revenue recognition in 2001 was largely based on yearly agreements, which suggests that the revenue came mostly from support contracts.

> *"Service revenue is generally deferred and, in most cases, recognized ratably over the service period obligations, which are typically one to three years."[144]*

In 2003, the management discussion about services was organized into two distinct categories: technical support, which included maintenance contract initiations and renewals, and professional services, better known as advanced services.

> *"Net service revenue in fiscal 2003 increased by $67 million or 2.1% from $3.2 billion in fiscal 2002 to $3.3 billion due to increased technical support service contract initiations and renewals associated with product sales that have resulted in a higher installed base of equipment being serviced and revenue from advanced services, which relates to consulting support services of our technologies for specific networking needs."[145]*

As mentioned earlier, Chambers' comments about the evolution of professional services within Cisco during this period reveals that approximately 12% of service revenues, or $400

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[143] Computer Reseller News, "Cisco's Channel Overtures – CEO John Chambers promises to bring partners into the sales process sooner and personally address pricing issues," May 6, 2002.
[144] Cisco Systems 2001 annual report.
[145] Cisco Systems 2003 annual report.

million, were being generated by the advanced services group by 2003. As a matter of perspective, the *increased* investment in professional services during this period resulted in advanced services as 2% of overall Cisco revenues. So while a professional services business was a valuable value chain activity, the Cisco model was partner centric, but not partner only.

5.7 Upturns, Downturns, and Lifecycles: 2004-2010

After three tough years across the entire industry, there were signs of a recovery heading into 2004. During 2003, there was a great anticipation and expectation of a rebound within the industry. Chambers often referred to a possible "upturn" during meetings with analysts in 2003. His goal was to get Cisco ready for the upturn. One analyst summarized Chambers' message about the 2004 fiscal year at the annual analyst conference in December 2003 as:

> *"In talking about strategy, Chambers said: 'The last three years were about preparation, this year [fiscal year 2004] is about growth.'"*[146]

Cisco began the period with an advantaged position. The firm maintained the leading market share in nearly every market segment it competed in. Unlike many other firms in the industry, Cisco product margins remained priced at a premium. Finally, Cisco had a large installed base of customers. The combination of a customer satisfaction culture and the complexity of building out network infrastructures meant that Cisco offerings were very sticky in customer accounts.

5.7.1 Market opportunity identification

Although IT spending in the prior period was drastically reduced, the demand for networks did not collapse during the dot com bust. At a high level, the opportunities for networking equipment vendors such as Cisco were twofold. First, many believed that customers would need to upgrade their existing equipment within the next two years. As demand grew, Cisco customers would be less inclined to maintain older equipment as the newer technology would include price-performance advantages. One analyst described it as follows:

> *"The serviceable life of networking equipment has historically been 4-5 years. After this period, maintenance costs accelerate and enterprise corporations typically have always chosen to upgrade to newer technology rather than pay the higher maintenance costs.*

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[146] Wachovia Securities, "Cisco Systems, Inc. – Comments from the Analyst Conference," December 11, 2003.

Given the last major upgrade year was 1999 (given Y2K), corporations will likely be considering increasing upgrade activity starting in 2004."[147]

Second, the promise of one network infrastructure supporting a convergence scenario with data, voice, and video persisted. The adoption of this vision was not taking hold all at once. In 2004, the next phase was the roll out of the voice component, which Cisco called IP Telephony but more commonly referred to as voice over IP (VoIP). Cisco began to embrace the video phase by 2006. Nevertheless, convergence remained a major theme throughout this entire period.

Market transitions

Chambers and team frequently evaluate their world as a series of lifecycles. Managers frequently use technology adoption diffusion lifecycles as a guide to make decisions. Although the dominant approach builds on early innovation diffusion research (Rogers, 1962), many managers in technology industries rely on a slightly modified version that puts a chasm between the early adopter phase and the mainstream customer phase (Moore, 1991). The belief is that high technology products do not easily transition from the very technical customers who are only interested in the raw technological development to mainstream customers who need a complementary support infrastructure for a more user-friendly context. Given that all technology products do not cross the chasm into mainstream adoption, managers of innovations will search for signs to indicate that a technology is going to become a big market opportunity.

The crossing the chasm framework is used as a guide by Cisco management to select potential market opportunities that Chambers refers to as market transitions. Market transitions are opportunities that Cisco managers believe will shift from a small early adopter market to a big mainstream market. Five principles are used to identify market transitions. First, the opportunity has to build on pre-existing Cisco competences and expertise. This principle is consistent with prior research in technology management and strategic management. For example, radio manufacturers with transferrable skillsets relevant in television equipment manufacturing were more likely to outperform radio manufacturers without those skillsets (Klepper & Simons, 2000). Prior research in technology innovation management shows that incumbents are more likely to pursue innovations that build upon their existing base of

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[147] UBS Investment Research, "Cisco Systems," December 11, 2003.

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competences (Tushman & Anderson, 1986). A common thread in strategic management research suggests that firms are more likely to diversify into new opportunities closely related to their core competences (Palich, Cardinal, & Miller, 2000).

Second, the market size must be at minimum a $1 billion opportunity for Cisco within approximately five years. The third principle was a timing issue. Chambers believed that Cisco would greatly benefit from an early mover advantage. To ignore an addressable market transition could be fatal. Speaking at a conference, Chambers shared, "we believe you catch market transitions or you get left behind; or if we don't do it, somebody else will do it to us."[148]

Although early entry was necessary, it wasn't sufficient. The fourth element was that Cisco had to possess a leading position in the early opportunity. However, Chambers and team understood that Cisco may not always be in a leading position at the right time. Therefore, the fifth principle was that Cisco would use it's flexible innovation model to correct any defencies if its internal R&D did not leave Cisco in a leading position during the market transition. Chambers explained it as follows:

> "Different than most of our peers, we drive imparity off of market transitions. We do not focus on competition. We listen to our customers, try to identify those market transitions three, five, seven years before they occur. We then got rid of the old world definition of innovation. Innovation used to be about everything doing it yourself. Innovations to me -- you do it yourself. If you're not in the first five to do it, you buy one of the first five or you partner with one of the first five. While that sounds simple, that is our recipe -- market transitions, and innovations."[149]

Cisco management believed that no one factor could stimulate a market transition. Possible sources were technological change, customer buying behavior changes, economic downturns, and industry-level structural changes. For example, the dot com downturn had a profound impact on customer buying behavior – shifting from the technology-driven frenzy to a greater scrutiny that required business-level ROI justifications for IT spending.

The threat of commoditization

Innovative hardware firms constantly face the threat of commoditization and the accompanying erosion of profit margins within their product categories. It's not a matter of if, but when. Cisco faced two types of commoditization threats across this period – direct and

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[148] Fair Disclosure Wire, "Cisco Systems at Deutsche Bank Securities Inc. IT Hardware Conference – Final," March 9, 2005.

[149] Fair Disclosure Wire, "Cisco Systems at INTEROP 2007 – Final," May 22, 2007.

indirect. First, direct threats come from other network equipment vendors. In 2004, Chambers expressed concern about possible low-cost product competition primarily coming from vendors in Asia.

> *"CEO John Chambers highlighted the competitive threat emerging from Asia. Cisco believes the Asian competitors are mainly focused on price and expects that as customer networks evolve and become more complex, that value, not price, will become more important, playing toward Cisco's strengths."[150]*

Although a long-time partner and mostly complementary in capabilities, HP maintained a low-end network product (ProCurve) that eventually grew and started to put pricing pressure on some of the low-end portions of the Cisco portfolio.

Another concern is always the direct threat of a competitor who introduces a similar product with a distinct innovative advantage that enables the competitor to establish a foothold in the market. Juniper Networks often posed a threat in the service provider router space.

> *"Recent industry checks have indicated a greater acceptance for Juniper's routers among carriers given the flexibility offered by the Juniper Network systems."*

The second type of threat was of a more indirect nature, but possibly with a bigger potential to disrupt Cisco's position. Virtualization, a technology that creates multiple virtual machines out of one set of physical machine resources had the potential to blur product distinctions between competitors who provide operating systems software, computer hardware, storage hardware, and network hardware. A net result of such a technology for IT customers is better utilization of excess capacity in physical resources. The major downside for the physical product vendors is that the operating system and the hardware layers become commoditized thereby destroying the distinctive value that enables these vendors to often charge price premiums. Virtualization was not a new technology per se. However, if the latest advances in virtualization technology reached mainstream adoption, it would be a major disruptive change for all hardware vendors. To Cisco management, virtualization represented a commoditization threat that ultimately shaped Cisco's technology strategy during this period. For example, one analyst shared Chambers' thinking on this matter.

> *"CEO John Chambers admitted that Cisco's move into unified computing and virtualization – an effort that began three to five years ago – had nothing to do with*

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[150] A.G. Edwards, "Thoughts from Cisco's analyst meeting," December 8, 2004.

competition and everything to do with Cisco's imperative to avoid commoditization of its networking gear that data center virtualization was likely to drive."[151]

Another indirect threat concerned cloud computing, an ill-defined development that is part technological change and part business model change. The idea is that computing becomes much like a utility model whereby IT customers pay only for the resources that they use. Customers are no longer concerned with purchase, install, and maintenance of a hardware infrastructure. This change in business model has major implications for innovators whose business model is based on IT customers purchasing products. During this period, Cisco began to embrace this as yet another market transition.[152]

> *"It's not just about products. It's also about business models. In some of these emerging countries, they don't want to purchase the hardware. In some cases they don't want to own it. In some cases they don't even want to operate it. And this is for large service providers where in mature markets, the network is your core asset. In some of these emerging markets, they see the network as context. They're more [concerned] about customer acquisition, customer service, sales and marketing type of front end. We need to be able to do that. We need to be able to allow them to lease or purchase technology-as-a-service either through Cisco or a partner. To essentially move it from a CAPEX (capital expenditure) decision to an OPEX (operating expense) decision which gives them a lot more flexibility and predictability in their spend. It also takes the burden of vendor selection and integration and operation off their hands and they can turnkey that to some managed service provider."[153]*

Diversification strategy

With strong demand for networks and the lingering potential for commoditization of product categories, Chambers and team had to decide where the growth would come from during the upturn. The scope of Cisco's product portfolio prior to the market collapse is often reduced to routers and switches. A more complete picture shows several other network product categories such wireless access products, IP telephony, security products, content delivery network products, remote access products, optical transport products, and network administration products.[154] Surinder Brar recalls his impression of the Cisco product portfolio in 2001 saying, "even at that time and it's hard to imagine, we had a very broad product portfolio." Moreover,

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[151] William Blair & Company, "Cisco Systems, Inc. – Analyst event reinforces our positive view on cyclical IT recovery combined with addressable market expansion," December 9, 2009.
[152] Cloud computing is sometimes interchangeable with the "as a service" discussion, but this is different than professional services.
[153] Interview with Jonathon Ballon.
[154] Based on the August 2001 Cisco Products Quick Reference Guide (CPQRG)

the big restructuring in August 2001 created one R&D organization that contained 11 technology groups – i.e., nine technology areas besides routing and switching.

While the portfolio was broadly diversified, the revenues were concentrated in routing and switching. Jonathon Ballon describes his impression of the portfolio in 2002 saying, "When I joined [in 2002], it was primarily a two-product company. It was routing and switching. That was 95% of the revenue or the product revenue at least." One of the goals for the upturn was to truly diversify the revenue contribution beyond routing and switching.

While the strategic management research on diversification shows an advantage for the diversified firm over the single business firm, the question as to whether a firm with related businesses outperforms a firm with unrelated businesses remains an ongoing debate. In either case, the diversified firm can spread its risk and share some level of resources across multiple businesses whereas the single business firm is vulnerable to the internal and external conditions from its one business. Diversification for Cisco during the dot com bubble years was primarily about two product categories – routers and switches.[155] Chambers often spoke about Cisco's diversification strategy in terms of end-to-end solutions during the late 1990's and that was primarily about building out network infrastructure – often referred to as "the plumbing." One analyst summarized Cisco's portfolio approach during that era as follows:

> "Cisco sells a variety of products to businesses and service providers. Because of the complexity of networks and the convergence of voice, data, and video, we believe that customers are placing greater value on a network or portfolio of products from a single vendor. Cisco was the first to see the strategic value of providing a portfolio of networking products. Over the past several years, Cisco has developed the broadest and most tightly aligned portfolio of data networking products, especially for enterprise networks, and has begun to realize the promise of its end-to-end strategy. Cisco's extensive line of products can be sold separately or as part of an end-to-end network solution. Cisco's ultimate goal with its end-to-end strategy is to become a customer's strategic, primary vendor in a long-term relationship."[156]

The diversification strategy before the market collapse leveraged the portfolio by offering end-to-end product solutions for Internet plumbing. After the market collapse, Cisco implemented a complex diversification strategy that at a high level positioned the firm beyond products and plumbing. This new portfolio approach was often described in terms such as systems, solutions, architectures, and platforms.

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[155] Routers and switches represent two categories of products. For example, the router product line consisted of multiple products scattered across low-end, mid-range, and high-end requirements.

[156] William Blair & Company, "Cisco Systems, Inc.," September 8, 1999.

Chambers often referred to the diversification strategy as architectural plays. The management of technological innovation literature describes an architectural innovation as a recombination of existing components that communicate together in new and novel ways within a product (Henderson & Clark, 1990). In that context, architectural innovation is confined to what is going in within a product. The Cisco diversification strategy of architectural play is more concerned about recombinations between products rather than within products. Architectural plays are part technological and part conceptual. This type of portfolio approach is perhaps intentionally more conceptual than technological and creates a barrier to entry from competitors with a narrower market focus. Chambers acknowledges the difficulty by which the Cisco portfolio approach can be replicated.

> "So what we think about, where many of our peers are thinking about one product area, routers, or one industry, service providers, or a couple of key geographies, we're playing out the game in an integrated fashion. So as you think about Cisco, think about how well or not our strategy is doing, how well we [play out our project], but understand -- this is very, very complex and very difficult to duplicate."[157]

The diversification message evolved during this period. At the beginning of this period, Chambers elaborates on Cisco's direction to compete at a product level and as a diversified player where the non-diversified entrants were disadvantaged. Cisco would not abandon direct product competition, but head-to-head product competition leads to commoditization as new entrants are eventually able to replicate or innovate beyond the existing product capabilities. Chambers explains the intent:

> "Our product design focusing on moving from individual products to systems to solutions combined with driving smarter, faster and lasting architectures is also key to our differentiation... And finally, we intend to come at this market not only from a technology architecture approach, but also from a business architectural approach... If you look at what we're going to attempt to do, we're going to compete against our competitors on shall we say individual pinpoint products or an architectural play."[158]

The analyst community picked up on Chambers' message. As the upturn began, one analyst explained very simply the diversification intent and what the implications were on competition.

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[157] Fair Disclosure Wire, "Cisco Systems at Sanford C. Bernstein Strategic Decisions Conference," June 1, 2006.

[158] Thomson StreetEvents, "Preliminary Transcript – Q1 2005 Cisco Systems Earnings Conference Call," November 9, 2004.

"The company believes competition from companies with point products will remain intense and perhaps even increase as Asian competition emerges. It is Cisco's strategy to raise the competitive bar by raising the competition from point products to systems, where competitors will find it difficult to match the breadth of Cisco's product line and technology portfolio."[159]

Looking back at the end of this period that included an upturn and a downturn, Chambers summarized the evolution of Cisco as a diversified firm. The shift was from product plumbing to architectural plays.

"The point that I am making, we have moved from selling routers and switches, which I am proud to sell, plumbing is a very honorable profession, but we are now a technology architectural play and a business architectural play and a trusted advisor with governments, business and the technologists on a global basis. We said we wouldn't miss this opportunity. It feels really good. We did exactly what we told you we would do over this time period."[160]

Cisco CTO, Padmasree Warrior, comments further about the shift for Cisco towards more of a solutions orientation and how architectural plays consist of technological and business components.

"So we are now shifting more towards becoming a solution company, so a solution company meaning in some cases we have to integrate third-party solutions but also apply Cisco capital where it makes sense, bring innovation with respect to design and user experience. And we are slowly shifting towards what we call an architectural play. An architectural play, the way we define it is a combination of a technology architecture as well as a business architecture which helps us help our customers do the business transformation that they need to do, help them do more with less. So some of those things are what we call architectural play."[161]

The shift from products to systems, solutions, architectures, and platforms is all part of how Cisco began to leverage its expanding diversified portfolio after the market collapse. This was a theme articulated throughout Cisco management.

Jonathon Ballon provides another perspective on the architectural play as being another layer of abstraction above products and technologies. Moreover, the crossing the chasm lifecycle framework is also used by Cisco managers to evaluate these higher level abstractions.

"And just as we look at technologies maturing across this adoption lifecycle, now we're doing it with solutions. Solutions being a combination of products, systems, services,

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[159] Oppenheimer, "Cisco Systems – Comments on Analyst Day," December 8, 2004.

[160] Fair Disclosure Wire, "Cisco Systems at Sanford C. Bernstein Strategic Decisions Conference," June 4, 2010.

[161] Fair Disclosure Wire, "Cisco Systems at Bank of America and Merrill Lynch U.S. Technology Conference – Final," June 4, 2009.

software, and third-party components whether it be third-party services, hardware,
software, etc. "[162]

Raja Surandam explains how the diversification strategy after the market collapse has implications at multiple levels whereas the pre-collapse diversification strategy was operating at only the network infrastructure level.

"When you look at that broad a portfolio, you really have now products, systems, solutions, and architectures. You have things playing at different levels. Now the question then is, what is the role of services? "[163]

Before understanding the role of complementary capabilities in professional services, the next section will establish the scope of technological change for Cisco during this period.

5.7.2 Next-generation technologies and market adjacencies

The innovation approach continues

During this period, Cisco continued with its three-pronged approach to innovation, which included internal development, acquisition of small technology firms, and partnering with large technology and services firms. Chambers reiterated this during a call with investment analysts:

"Remember that innovation, in our opinion, has to come from a combination of internal development, partnering and acquisitions. "[164]

Chief Development Officer Charles Giancarlo summarized Cisco's approach to its technology strategy as one that shows Cisco's desire to lead preferably via internal development but acknowledges that it won't always get it right and so acquisitions provide a way to compensate for miscalculating the future:

"We would always much rather be clairvoyant: have a good understanding of the future, make the right internal investments and do the internal development. We firmly believe that we won't always get it right. We won't always be perceptive enough, we won't always make the right choices, and we won't always execute well. We don't want to deny to ourselves or our shareholders a new market. So if we think it's a new market that we should go in and we didn't invest early enough or didn't have the right skills - any number of things - then we will use acquisitions in order to get there. Acquisitions always get the headlines. Internal investment and innovation doesn't. So be it. We invest a lot internally and I think we do innovate. But we're going to continue acquiring. "[165]

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[162] Interview with Jonathon Ballon.
[163] Interview with Raja Surandam.
[164] "CSCO - Q3 2005 Cisco Systems Earnings Conference Call," Thomson StreetEvents Final Transcript, May 10, 2005.
[165] Network World Canada, "Giancarlo helps steer Cisco strategy," April 2007.

Advanced technologies

Technological change within this industry was continuous and occurring at multiple levels during this period. Whereas prior research that examines technological change and the role of complementary resources is able to isolate one or two disruptive technologies, the nature of technological change here is about the story of relentless change coming from within the industry and also from the convergence of multiple industries. As the leader in network technologies, to follow Cisco is to essentially follow the industry.

As Cisco emerged from the market collapse, its vast product portfolio and its search for the most appropriate market transitions shaped its technology strategy heading into the upturn. The growth opportunities were organized into two technology groups: core technologies and advanced technologies. The core technologies were routing and switching. The core technologies symbolized the core competences and revenue drivers of Cisco prior to the market collapse. During the upturn, core technologies were expected to be a modest source of growth. The growth from core technologies would most likely come from upgrades by enterprise customers and a renewed effort to target the service provider customer segment.

Advanced technologies were expected to be the bigger source of revenue growth for Cisco during this period. Advanced technologies represented what Cisco managers considered to be the most favorable market opportunities addressable by the emerging technology program areas within the Cisco portfolio. The advanced technologies were the programs directly tied to market transitions. Chambers announced six advanced technologies at the end of 2003 and those same six continued into mid-2005.

> "John has asked me to address Cisco's strategy for describing new technologies and provide more visibility into how we will do business in this area. Cisco's first six advanced technologies represent examples of exploiting market transitions ahead of competitors and executing against the opportunity to drive growth. As John has said many times, the best time to capture a market transition, whether it's for technology or our business model or a new market, is well before the transition is apparent to the mainstream of the market. As a reminder, we've defined an advanced technology as an opportunity which is adjacent to our other businesses that can generate Cisco revenue of $1 billion or more, where Cisco can secure the number one or number two market share position ... with clear and sustainable differentiation over time, and that fits into our long-term architectural

technology vision. We expect, as you've heard, to announce a new advanced technology every three to four months throughout this fiscal year."[166]

Throughout this period, routing and switching remain the core technological areas for Cisco. Diversifying beyond routing and switching was largely a technological issue from 2004-2007. Advanced technologies were the new expansion technology areas. By 2007, Cisco had evolved from a simple set of six advanced technologies into a tiered set of technology areas. The technology categories were now organized into three waves of potential areas: the first wave of advanced technologies from 2003, a second wave of advanced technologies, and a third wave of emerging technologies that were described as "early-stage internal startups"[167] that had the potential to develop into advanced technologies. During 2007, Cisco had targeted eight advanced technologies and three emerging technologies. Overall, the diversification strategy was a direct mapping of market transitions to advanced/emerging technologies.

> *"The advanced technology revenues are larger in terms of the total contribution to our top line than routing is, and this speaks to our market transitions that we're focused on and moving to market adjacencies. This again speaks to Cisco's balanced product portfolio and our constant evolution of moving into these new market and product adjacencies. At Cisco, we have been very focused on creating the next generation of products or what we call advanced technologies. We have attempted to develop what we refer to as waves of these technologies that will come to market three to five years after their inception if we execute well. At this time, we have the first wave of advanced technologies, which includes security, wireless, storage, network home and unified communications. The second wave includes video systems, hosted small businesses, application, networking systems, etc. The third wave, which we are calling at this time emerging technologies -- and Charlie, we hope they are going to evolve into advanced technologies -- these include digital media systems, telepresence, IPeX, physical security, etc.*"[168]

2007: collaboration technologies, Web 2.0, and market adjacencies

Two movements coalesced within Cisco and resulted in an inflection point in 2007 within the Cisco diversification strategy. First, Cisco management begins to link market transitions to a higher level of abstraction that Chambers refers to as market adjacencies. Chambers says, "We

[166] Thomson StreetEvents Final Transcript, "CSCO – Q1 2006 Cisco Systems Earnings Conference Call," November 9, 2005.

[167] Thomson StreetEvents Preliminary Transcript, "CSCO – Q4 2008 Cisco Systems Earnings Conference Call," August 5, 2008.

[168] Thomson StreetEvents Preliminary Transcript, "CSCO – Q4 2007 Cisco Systems Earnings Conference Call," August 7, 2007.

do not move into market adjacencies unless there's a market transition going on."[169] Market adjacencies have a significant technological component which is inclusive of products within core technologies, advanced technologies, and emerging technologies.[170] However, market adjacencies also map to solutions and geographic expansion opportunities.[171]

Second, Chambers and team believed that collaboration technologies would drive the next big growth wave of the Internet. Cisco formally embraced Web 2.0, a loose collection of web technologies such as blogs, wikis, podcasts, social networks, etc. Cisco's primary connection to Web 2.0 came through its 2006 launch of Telepresence, a video conferencing system, and its 2007 acquisition of web conferencing software vendor WebEx Communications. To Chambers, Web 2.0 was "simply the technologies that enable user collaboration."[172] TelePresence and other video intensive collaboration technologies in the Cisco portfolio (e.g., the 2006 acquisition of video technology provider Scientific-Atlanta) would place a major load on network resources and consequently require upgrades to existing network infrastructures. More network upgrades translates into more routers and switches.

Emanating from a strong belief that collaboration was the next wave for the Internet came three implications. First, Cisco would be a lead user of collaboration technologies similar to the way it was a lead user of web technologies in the 1990's. Chambers believed that this was strategic for Cisco's internal productivity but that this would also gain mindshare and open up new opportunities within its customer base.

> *"In summary, we believe that we're very well positioned in the industry from a vision, differentiated strategy and execution perspective. As I stated earlier, we believe we are entering the next phase of the Internet, as growth and productivity will center on collaboration enabled by Web 2.0 technologies. We will do our best to provide both the product architectures and the expertise to help our customers in the implementation of these collaborative capabilities from both a technology and a business perspective, as well as to share how we have done this internally. In short, we are going to attempt to execute a very similar strategy over the next decade, similar to what we did in the early 1990s. And as we said earlier, it powered our growth in the 1990s through today for literally over a*

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[169] Fair Disclosure Wire, "Cisco Systems to Host Financial Analyst Conference 2008 – Final," September 16, 2008.
[170] Thomson StreetEvents Preliminary Transcript, "CSCO – Q4 2007 Cisco Systems Earnings Conference Call," August 7, 2007.
[171] Fair Disclosure Wire, "Q4 2009 Cisco Systems Earnings Call – Final," August 5, 2009.
[172] Fair Disclosure Wire, "Q3 2007 Cisco Systems Earnings Conference Call – Final," May 8, 2007.

decade, except with the obvious differences this time being that we are a $35 billion company with over 60,000 employees focused on this opportunity. "[173]

Second, as Cisco embraced the strategic benefits of collaboration, Chambers and team rolled out a new organizational structure to enable a more participative and collaborative management style. The new organization structure is composed of cross-functional management teams called councils, boards, and working groups. Sometimes referred to as social networking communities, the new structure began to push decision making down from the 10-person executive level to the senior vice president level and eventually to the vice president and director levels. Councils are assigned to $10 billion opportunities, boards are assigned to $1 billion opportunities, and working groups are communities of interest attached to an idea or special project. Chambers believed that this structure facilitated a more collaborative style of management that would enable a large firm with over 60,000 employees to be as nimble as a startup company with the added bonus of having the resources to enable scale. Chambers often remarked how the new structure enabled "speed, scale, flexibility, and rapid replication."[174] The origins of councils and boards dates back to the reorganization in August 2001. However, the number of councils and boards began to expand around 2007 as the firm began to internalize collaboration technologies.

"We moved from about ten people running the organization top-down in 2001, clearly command and control, I love it. It's easy to do. "Turn right," 67,000 people turn right. But that's not the future. It's all about how do you take these concepts which our kids invented in social networking, but then we add the tremendous process to discipline the common vocabulary, the review process to, and by 2005, we had four major councils working very well, $10 billion opportunities, and today, we're taking this 4 to 30. We changed from 40 people running the organization to, this first quarter, we had 750 people involved heavily in the councils and boards and working groups, and within the next 18 months, we will engage that through 3100.

So, again, without collaboration and Web 2.0 technology behind, how do you pull that off? So, it isn't just the right business models, it's also having the right technology. Then, one of the questions that we got asked earlier by one of the investors in this room, the comment was, "Well, John, how do you even categorize these? How do you know what stages they're in, etc?" So, you've go to say, "How do you review?"

Geoffrey Moore's "Crossing the Chasm" is a great way. We basically will have five phases that we will do the review on. Multiple ways would have worked, but the first is where you get into these idea areas. You try to see what happens, and then, if it looks like it's going to

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[173] "CSCO – Q4 2007 Cisco Systems Earnings Conference Call," Thomson StreetEvents Preliminary Transcript, August 7, 2007.
[174] Fair Disclosure Wire, "Q3 2009 Cisco Systems Earnings Conference Call – Final," May 6, 2009.

have legs and run, then you build a strategy around it, and you see if you can get across the chasm.[175]

Third, Chamber believed that the collaborative organizational structure would enable Cisco to move into new market adjacencies at a much faster rate than it did with their previous organizational structure. In 2007, market adjacencies mapped directly into a combined total of 11 advanced/emerging technologies. In 2008, Chambers began to comment on how the new collaborative structure allowed Cisco to expand into many new opportunities.

> *"Instead of doing one or two priorities a year, as we did very successfully in our traditional command and control approach, we can now focus on 20 priorities with a collaborative structure and replicatable process driven by our Councils and Boards. These smaller teams are moving faster than we could in the command and control structure, and are enabling our ability to move into new market adjacencies with the speed and effectiveness that we would not have been able to do before."*[176]

Chambers continued to move Cisco into more market adjacencies. By 2009, Cisco was in 30 market adjacencies with the intent of moving to 50 market adjacencies. Chambers shared

> *"We have a game plan that focuses on the US first, then on three emerging markets, China, India and, most recently, Mexico, as of two weeks ago. We use these transitions to move into the market adjacencies, 30, on its way to 50, and you know why 50? Because I don't want incrementalism."*[177]

Although technological change within Cisco and its industry is continuous, to understand Cisco's diversification strategy and accompanying technology strategy one must follow the market adjacencies that are triggered by market transitions as guided by lifecycle frameworks. Cisco CTO, Padmasree Warrior, comments on how these concepts fit together within the firm.

> *"And to use a model that is specific to Cisco and we kind of take Geoffrey Moore's chasm model if you think about the lifecycle adoption and we focus on the front end of it. And we take our 30 adjacencies and map them to where they fall within this curve, the maturity curve."*[178]

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[175] Fair Disclosure Wire, "Cisco Systems at J.P. Morgan Global Technology, Media and Telecom Conference – Final," May 18, 2009.
[176] Thomson StreetEvents Final Transcript, "CSCO – Q2 2008 Cisco Systems Earnings Conference Call," February 6, 2008.
[177] Fair Disclosure Wire, "Cisco Systems at J.P. Morgan Global Technology, Media and Telecom Conference – Final," May 18, 2009.
[178] Fair Disclosure Wire, "Cisco Systems at Bank of America and Merrill Lynch U.S. Technology Conference," June 4, 2009.

Virtualization, cloud computing, and the future of the data center

While collaboration technologies became part of the "quadruple play" network convergence story (i.e., data, voice, video, and mobility), Cisco wrestled with other larger technological changes that were looming over the computer industry.

Chambers began to paint a picture for analysts in 2004 of how virtualization technologies could change not only how network resources are used, but also how processing (i.e., compute) and storage resources are used.

> *"Literally, the virtualization -- that if you have a device in your hand, you won't know if the device itself has the application on it, had the processors in it, had the data stored on it or not. You won't know what combination of networks it went over to have it processed and architected, etc. That's where you have to be wired and wireless. That's where you have to have a security architecture across it. That's where you have to make it completely transparent to the user on how this occurs...And if you look at the three pieces where we have got to make decisions on, one is the data center, because the CIO's heart, as you all know, is in the data center. And if that virtualization of resources and processing capability and storage is going to occur, you have to be strong in the data center."[179]*

Cisco entered the virtualization space through partnerships with virtualization software vendor VMware and enterprise storage vendor EMC. Cisco made a $150 million investment in VMware in 2007. EMC held a majority ownership stake in VMware and so effectively an agreement with VMware was an agreement with EMC.

Given that Cisco management believed that virtualization could commoditize network, compute, and storage resources, the arrangement between Cisco, EMC, and VMware lacked a compute partner such as IBM or HP. Cisco had longstanding complementary partnerships with the big compute vendors IBM and HP. On the other hand, the big compute vendors were diversified into the enterprise storage market and hence, fierce competitors of EMC.

However, given the opportunity and threat of virtualization technology, Cisco announced their Unified Computing System product line in March 2009. The announcement included the launch of the B-Series blade servers and the C-Series rack-mounted servers, officially placing Cisco into the computer market – the sweet spot of their long-term complementary partners IBM and HP.

In November 2009, a joint venture known as the Virtual Computing Environment Company (VCE) was announced between Cisco and EMC with Intel and VMware as minority

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[179] Fair Disclosure Wire, "Cisco Systems at Citigroup 2004 Technology Conference – Final," September 8, 2004.

investors. The joint venture announced a product bundle known as a Vblock, which combines Cisco servers, Cisco networking products, VMware virtualization operating system software, and EMC storage products.

VCE also provided Cisco with a position in yet another technological development likely to redefine the industry – cloud computing. Clould computing was perhaps more of a potential business model disruption than a technological disruption.

One analyst shares how Chambers perceived the Cisco expansion into computing and virtualization completely as a response to a potential indirect threat.

> "CEO John Chambers admitted that Cisco's move into unified computing and virtualization – an effort that began three to five years ago – had nothing to do with competition and everything to do with Cisco's imperative to avoid commoditization of its networking gear that data center virtualization was likely to drive."[180]

During the latter part of this period, we see how two technological developments shaped Cisco strategy. First, collaboration technology shaped Cisco internal strategy, their management/governance structure, and how the firm would pursue new external opportunities. Second, virtualization technology shaped Cisco external strategy and their partnership structure (new joint venture and old partnerships with HP and IBM). Wim Elfrink, EVP, Cisco Services and Chief Globalization Officer comments on how Cisco's newest initiatives may redefine who the competitors and partners are.

> "For Cisco, we are at two, I would say, inflection points. And we will get new friends and new enemies as we're stepping up. And as we try to set the network as a platform and we're going from consumer with the Flip [Video camera] to the data center with our unified computer services. Add [to] that [the] scope and landscape of partners over the next coming years is going to dramatically change. We will have new friends. We will have new enemies."[181]

5.7.3   Professional services as a complementary capability

Cisco's product portfolio continued to greatly expand as the firm fought to recover from the dot-com market collapse. Technological search was focused on opportunities that Chambers referred to as Advanced Technologies and market adjacencies. In the context of Cisco's vast

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[180] William Blair & Company, "Cisco Systems, Inc. – Analyst event reinforces our positive view on cyclical IT recovery combined with addressable market expansion," December 9, 2009.

[181] Fair Disclosure Wire, "Cisco Systems at Morgan Stanley TMT Conference – Final," November 18, 2009.

technology portfolio, this section explores the position of services. One informant proposed this issue in the following way:

> "When you look at that broad a portfolio, you really have now products, systems, solutions, and architectures. You have things playing at different levels. Now the question then is, what is the role of services?"[182]

With positive signs of an upturn headed into 2004, Chambers and team execute a complex diversification strategy during this period. Services as a revenue contributor ranged from 16%-19% of total revenues during this period, approximately $3.5 billion in 2004 up to $7.6 billion in 2010. The gross profit margins in services were approximately 65% during this period. However, the technical support services business is a large part of the financials in services.

> "That's a business that is very mature and drives the majority of the profitability of services. Eighty percent of customers address their needs online and support themselves through the tools that we created and made available over the web. It's a very scalable business and it's very successful... It pays for the Advanced Services and Advisory Services which are much lower margin businesses. We've increased the margins in both the support business – 80% of the services revenue – as well as the professional services business, which includes the Advanced and Advisory, as well as some managed services."[183]

By 2010, Cisco was generating approximately $1.5 billion from its own professional services business – a substantial increase over $400 million in 2003. The revenue increase from 2% to 4% of total revenues suggests that professional services grew in value but only as a complementary capability for Cisco during this period. A greater revenue contribution would be evidence of a supplementary or core capability. With a partner centric model, this revenue increase might appear odd. Yet, these figures remain relatively small and suggest that professional services is indeed fulfilling its mission to add value to the core rather than to maximize professional service revenues and opportunities as an independent business.

A greater emphasis on professional services

First of all, the overall Cisco philosophy was partner centric, but not partner only as witnessed by the 2001 restructuring and the 2003 revenues of $400 million in Advanced

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[182] Interview with Raja Surandam.
[183] Interview with Jonathon Ballon.

Services. Even during the market collapse, there remained an organization and a revenue-generating business in professional services.

Second, the Cisco advantage would be to leverage its diversified portfolio in what Chambers described as architectural play, which included a technology architectural approach and a business architectural approach.[184] The technology architecture is about how components communicate within a product, but also about how sophisticated individual products work together within a higher-level system. At the product level, the components are perhaps modular but tightly coupled. However at the systems level, the products are primarily independent but sometimes loosely coupled. Decisions to create a common architecture and shared components are technology issues left to the engineering teams.

On the other hand, a business architectural approach was a direct reference to professional services as a mechanism to bring uncoupled, but related products together to solve a business problem. This was nothing new in a technology-intensive industry. Given that customer buying behavior had changed following the dot com collapse, it was not surprising that technology purchases needed to be linked to specific business goals. The puzzling part was how would Cisco execute this approach within a partner centric model. The following excerpt from an interview with John Chambers in December 2004 captures the value Cisco placed on complementary professional services within its growth strategy. With a greater emphasis on professional services, Cisco's partner centric approach seems to contradict conventional wisdom.

> *"Paula Musich: With the growth strategy focused on both business architecture and technology architecture, you're relying heavily on professional services. But you're also talking about an arm's length approach to professional services through service providers and systems integrators. Can you really achieve 10 to 15 percent growth without the [customer] account control you'd have if you were in the [systems] integrator position?*
>
> *John Chambers: Yes. I never compete with partners I must have to win. We have to have IBM, EDS [Electronic Data Systems Corp.], Cap Gemini Ernst & Young Application Service LLC, BearingPoint [Inc.], and the VAR and our distribution partners. Secondly, our core differentiation is the products and how they tie together and whether we can have a leadership product in both stand-alone decisions and [those that involve] 10 to 12 products. That depends on a dramatically lower cost of ownership and higher investment protection. [It also depends on] design and implementation-network transformational [professional] services and how you help them apply this to really change the business process, which is the primary reason we do it...*

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[184] Thomson StreetEvents, "Preliminary Transcript – Q1 2005 Cisco Systems Earnings Conference Call," November 9, 2004.

Paula Musich: Do you have the alliances with the big players, such as PricewaterhouseCoopers, EDS and even Hewlett-Packard Co.'s services unit?

John Chambers: We're very strategically aligned with IBM [who owns PricewaterhouseCoopers]. We meet with the key leadership within EDS, as well. And we're expanding our relationship with HP. I think that speaks well to the change in terms of the systems integrators' attitude. When you see them standardize, it means they're doing it for the exact same reason that customers did it: It's cost of ownership; it's practicality on investment protection; it's cost of your support because each vendor you support adds more complexity; it's a realization the market will probably evolve into an architectural play-not a pinpoint product play. We've been very surprised that our peers in the industry have not followed this strategy. "[185]

During the annual analyst conference in December 2004, several of the analysts left with the impression that Cisco was putting a greater emphasis on professional services than it had previously done. See Table 5.4 for some excerpts.

Table 5.4. Greater emphasis on services: analyst perspectives, 2004

Chambers declares greater emphasis on services: analyst perspectives, December 2004	
Source	Representative evidence
CIBC World Markets	"Cisco also highlighted a deeper emphasis on adding a stronger services component to the business - but as a way to drive more complex product sales (e.g., security functionality), not as a replacement for slowing equipment sales (as some have implied). We continue to expect services to be a driver of other business rather than a stand-alone business."
Wachovia Securities	"Cisco's 9th analyst day was upbeat. In his keynote address, CEO John Chambers, gave no business update but noted that indicators of business confidence have improved in recent weeks. Chambers also seemed to emphasize acquisitions and services more than in previous years."
Citigroup Smith Barney	"It appears competition from Asian vendors has not yet had a big impact and Cisco's strategy to build deeper consulting like relationships with its customers should offset the potential for this competition to have a significant impact going forward."
Bear Stearns	"As networking technology is implemented for productivity benefits, Cisco explained that companies must consider both: a) their business architecture and b) their technology architecture in order to reap the maximum productivity gains. This places Cisco in the role of a solutions integrator for global and strategic accounts. ... Cisco was careful to mention that their role as a solutions integrator is expected to be limited to global and strategic accounts... Nevertheless, the increased importance of Cisco's integration and business process capabilities to the company's overall strategy is notable."
Morgan Stanley	"Similar to commentary on its earnings call, CEO John Chambers highlighted the competitive threat emerging from Asia. Cisco believes the Asian competitors are mainly focused on price and expects that as customer networks evolve and become more complex, that value, not price, will become more important, playing toward Cisco's strengths. By focusing more on its services and network architecture evolution strategies, Cisco believes it can insulate itself from competitors that are focused solely on cost."

[185] eWeek, "Cisco's Future: Smarter Nets," December 13, 2004.

Altogether, the value of professional services increased during this period as Cisco sought to execute their diversification strategy. Cisco needed professional services more engaged in the value chain of activities as it sought to implement its story of architectural play. This would require greater investment from both Cisco and its partners. Parvesh Sethi comments that the ultimate goal was to create a bigger market opportunity for both Cisco and its partners.

> *"The other piece was that by continuing to put more focus around a tiered go-to-market strategy where the top global service providers or the top-tier enterprise accounts ... [where we are] building more of that direct touch relationship and still with the partner community doing engagements with us but being on the front end and being able to grow the pie in size. It's not about taking something away from the partner community. It's more about together how do we increase the size of the pie? It creates a win-win scenario and as a result you have a more satisfied customer where you're being much more proactive in areas that you weren't engaged before."[186]*

Cisco viewed a stronger professional services footprint as a way to create a larger opportunity for its products and technologies during this market upturn materializing in 2004.

Cisco-led, but not Cisco only

With the increased emphasis on professional services, Cisco has to carefully navigate around sending the wrong signal to channel partners while simultaneously being responsive to customers. During this period, Cisco persists with a sophisticated, three-tiered structure of professional services organizations – IBSG, Advisory Services, and Advanced Services. Although operating within the larger partner centric model, the Cisco tiered professional services offerings were a way for the firm to interact directly with their most strategic customer accounts. These accounts were leaders in their respective industries, usually with a global footprint and requiring the most challenging network deployments. These influential customers used their buying power to demand more investment in Cisco-owned professional services. In early 2004, Chambers shared his perspective on customer demand for Cisco-led professional services.

> *"I'm in the services which my customers told me I have to be in. We generate US$400 million in advanced services today. We will probably, if we execute well, and if the market evolves the way we think, that has a very good chance of becoming US$1 billion. But I'm*

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[186] Interview with Parvesh Sethi.

not in it for revenue generation as much as I am to...help our customers take the ideas, and instead of taking 36 months to implement, make it 18."[187]

On the one hand, tangible customer demand is a positive sign of where the firm can build a business. In a study of high technology entrepreneurs, the more successful start-up firms were those who made decisions based on information gathered from potential customers (i.e., market orientation) as opposed to firms with a technology-driven "better mousetrap" orientation (Roberts, 1991). In the field of high technology software, firms with a strong sales and marketing orientation – a proxy for understanding customer demand – are more likely to build more successful software businesses(Cusumano, 2004).

On the other hand, we also know that customer input may not accurately reflect the most lucrative market opportunities. In the disk drive industry, incumbents who relied too heavily on customer input missed the growing opportunities emerging from the low-end markets (Christensen & Bower, 1996).

An increased investment in complementary competences such as professional services resources put Cisco in an awkward position in three areas: partners, customers, and Cisco profits. As Cisco adds more resources, the firm must manage not to send the wrong signal to the partner community who has been continually told that professional services is the work domain for channel partners. Karl Meulema comments on the tension of balancing customer demand with channel conflict.

> *"There is a group of customers that really want more Cisco skin in the game. They say, 'Listen, you're telling me that I need to transform my business. That I need to completely revamp how I'm looking at my business architecture and my technology architecture and really put everything on its head in order to be ready for the next wave of competition and be ahead of that. And Cisco I here you and I can see how it's benefited you as a company and I can see a lot of the technologies. But if you then tell me that if I believe in that vision, I need to go to partner ABC and they'll help me get it done. I need your expertise. I need your knowledge, and not just from your executives because in those customers you have John [Chambers] talking to their CEO. You have Frank [Calderoni] talking to their CFO. You have engagements at multiple levels of the ladder and in those engagements they also want our professional services to be more directly engaged. Now you have a dilemma because that sort of gets you into a fight with your partners... You have to have some reasonable planning and containment around it."*[188]

Customer demand for a complementary business can often put the product vendor in a quandary where the customer wants the complementary offering but does not want to pay for it

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[187] Network World Canada, "Chambers: smart gear will benefit IT workers," February 13, 2004.
[188] Interview with Karl Meulema.

given the amount being spent on the core product offering. This places constraints on the firm's ability to earn a profit from the complementary business when viewed in isolation. Stuart Doyle comments on this dilemma.

"We do [professional services] for fee. We're not free [and that] brings another sales and business challenge. A lot of customers will say, 'Look, I'm about to spend $100 million on product. Can't you give me this [professional services] work?' Sometimes... we don't do it... This segment is not here for some big rich profit maker. That's not what it's designed for."[189]

Finally, the firm has to determine how not to over invest in the complementary resources such that overall profitability is negatively affected. Karl Meulema comments on the challenge of balancing customer demand within the overall Cisco business model.

"The customers hold you hostage. They say, 'If you want me to buy this product, you'd better lower your price on the implementation [services] cost.' So what you see is that for us to [greatly] expand in professional services would dramatically put pressure on our [overall profit] margins. And we're not about to let that happen."[190]

The next sections outline how Cisco navigates the challenges of Cisco-led complementary professional services where the firm must balance customer demand and partner concerns of encroachment on their business model.

The scope: incomplete by design

Given the significant professional services footprint of comparable diversified technology product vendors in the industry, Cisco has to build its services practice in a way that doesn't compete with the channel partners yet exudes Cisco competence for the direct customers being served. While Cisco has allocated resources and developed a capability in professional services, Karl Meulema shares that the scope of the Cisco professional services portfolio is "incomplete by design." The intent is to prime the opportunities within its strategic customer accounts, but leave plenty of room for partners to provide value.

"If you look at our portfolio of services that we at Cisco deliver, then we are incomplete by design – meaning that if you would look at a total deployment of any of our top architectures or collaboration architecture or a data center architecture or even a borderless network architecture, then of the total services content that is necessary of those three, we cover about 19%-20%. There's a whole bunch of services that need to be done around application migration, around third-party integration, about a whole bunch of stuff that we don't do. We have decided not to invest in [some services] skills because we don't

[189] Interview with Stuart Doyle.
[190] Interview with Karl Meulema.

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believe that the value we can add there is crucial for the success of it. And we believe that others can add that value just as good as we do without it jeopardizing our relationship with the customer."[191]

By comparison, the technical support services portfolio is complete. Raja Sundaram separates a capable services practice into two components: the content and the delivery. For support services, Cisco provides the complete content yet needs its partner community to provide complete delivery coverage on a global basis. In contrast, Cisco does not provide a complete portfolio of professional services nor does it provide complete geographic coverage.

"If you look at the IT area or any standard against ours and unmap our services, you'll find that we don't deliver all the service. We do not create all the services that the customer needs. Karl would say... our portfolio is incomplete by design... If you look at it as service stacks and all the services that you need in along the lifecycle, we don't deliver all of them. We don't even build a capability [in a support sense] ... So we're very targeted on certain things. On support service, you could say that our portfolio is complete... What you'll find is that although our [technical support] portfolio is complete, our capability to deliver around the world is not complete and the partner capabilities as well. In professional services, we have an incomplete portfolio by design and we have incomplete delivery capability by design."[192]

The size: big enough, but not too big

Cisco's partner centric model for professional services has persisted across the dot com boom, bust, and recovery periods. However, Cisco's relative investment level has increased since the dot com bust and the partners are often concerned that Cisco – an exemplar of acquisition strategy – will acquire a large services firm as other large diversified technology firms have done such as IBM, HP, Dell, and Xerox. Karl Meulema shares:

"So [the partners] have been saying that [Cisco will acquire a large services firm] for the last ten years. I've been responsible for channels for the last nine years so I've been hearing that story just about once a month at least. And I keep saying, give me any evidence that we're going there. Give me any evidence that we've been doing that. And with the latest firming up on the go-to-market [implementation], I think we've put another nail in that coffin by saying that's not our plan. That's not our strategy. Our strategy is to work with partners, to go through partners."[193]

Cisco's revenue contribution from professional services was approximately $1.5 billion in 2010 or nearly 4% of overall revenues, up from $400 million in 2003. Approximately 5,000

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[191] Interview with Karl Meulema.
[192] Interview with Raja Sundaram.
[193] Interview with Karl Meulema.

employees, or 8% of overall employees, are in Cisco professional services organizations as of 2010.[194] While $1.5 billion in revenues is big enough to be an Advanced Technologies size, the Cisco philosophy is not to build a large professional services footprint. Surinder Brar explains:

"Basically our strategy is, and we've declared it multiple times, that we do not want to build a large services organization. We want to have a large enough services organization to do the [pre-chasm] learnings ourselves and to support our direct accounts. But [for] the rest of the customers, we're completely dependent on the partner community."[195]

As a rough comparison, IBM generated $49.2 billion in revenues from its professional services divisions in 2010 – approximately 49% of total reveneus. [196] Approximately 40%-50% of its 426,751 employee workforce are employed in professional services related positions. Although Cisco has increased its investments and revenues in professional services since 2001, it has nowhere near the same level of investment as IBM does.

Jonathon Ballon explains that the market is growing faster than Cisco's investment in professional services. A large professional services footprint is not consistent with the Cisco business model that relies on the profit margins from its technology product portfolio.

"[The Advanced Services business] is [growing], but the pie is growing. Advanced Services is growing at a rate that is less than the overall market opportunity. While the business is growing, we're actually creating greater opportunity for our partners at the same time. [It is] not our intent to become IBM Global Services or HP Services. This is a business model that works really well for us. We are a technology company and want to continue being a technology company."[197]

The effect of Cisco-led professional services

Cisco management believes that the greater emphasis on Cisco-led professional services has had a direct positive effect on customer satisfaction and product sales. Chambers shares the sense that overall services activities complement the product businesses and facilitate customer satisfaction.

"As we have discussed in prior conference calls, our services are not stand-alone product areas, but rather they are a delivery vehicle through which we earn our customers' trust and satisfaction by enabling their technology and business goals... Also, our services-led approach to sales continues to gain traction with our customers. There is usually a direct

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[194] Fair Disclosure Wire, "Cisco Systems at Jefferies & Co Global Technology Conference – Final," March 9, 2010.

[195] Interview with Surinder Brar.

[196] This figure does not include the $7.25 billion in revenues from maintenance services. Source: IBM 2010 Annual Report.

[197] Interview with Jonathon Ballon.

correlation between the amount of services our customers buy from Cisco and the growth rates of our core products. In other words, the more services customers purchase, usually the higher the customer satisfaction and the higher the growth rates in our product orders."[198]

More specific to professional services, Cisco managers believe that higher-order services such as consulting or architectural services ultimately lead to more business for Cisco and its partners. Cisco managers comment on the one-four-seven effect. Nick Earle, Senior Vice President of Cisco Services Europe, says:

> *"And we never used to do this. Our services followed the product. Sell product, maintain it. Now, we're architecting networks... Now, when we started to see this effect, that if you sell architecture services you get more product than you would have done if you didn't sell architecture services, so 2.5 times more than just bidding on RFP, we started to measure it. And what we found that -- when we first started off, we thought, "Well, there's a one-four-seven effect." Every dollar of architecture that we do leads to $4 of implementation for us and our partners and $7 of pull-through product. And if you don't do the dollar of architecture, maybe you'll get two or three. So, we thought that, if we beefed up our Services business, we'd double the product growth... The reason I showed the one-four-seven effect is that growing a Services business has an even bigger effect on the product business."[199]*

Gary Moore, co-lead of Cisco Services globally, also shares about the one-four-seven effect.

> *"What we found is, our advisory services which is consulting services that we do both from the services organization, my advisory services team or the Internet business solutions group -- which is a group of about 200 consultants that are pretty much free to customers; they go out and they evangelize some of the things going on in the industry and how technology can be brought to business issues -- what we see is on the front end where for every $1 of advisory type work we do, that leads to about $4 of advanced and technical services down the road, which leads to $7 of product. So we are seeing a very nice 1-4-7 formula evolve. And in a lot of cases it's actually more than $7 for every $1 of advisory work."[200]*

Setting boundaries and coordination policies

As Cisco continued to invest in its own professional services, Chambers and team also worked to implement clear policies on how Cisco would coordinate its own efforts with those of its partners. The policies on coordination with partners have not always been clear and have

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[198] Fair Disclosure Wire, "Q2 2008 Cisco Systems Earnings Conference Call – Final," February 6, 2008.
[199] Fair Disclosure Wire, "Cisco Systems at Barclays Capital Global Technology Conference – Final," December 11, 2008.
[200] Fair Disclosure Wire, "Cisco Systems at Jefferies & Co Global Technology Conference – Final," March 9, 2010.

taken several years to evolve towards a more formalized model. Cisco is telling its partner community that Cisco will lead professional services engagements with their transformational customers and in pre-chasm technologies.

The process to create standard policies has been an evolutionary process over this entire period. Earlier ad hoc routines were often not very clear across the entire partner community. Surinder Brar comments:

> "The philosophy and the idea has been in place for 6-7 years, but we finally started to formalize this because it's unclear. Partners need to know which accounts [are Cisco led]. There's the top of the pyramid – 500 accounts. Cisco will be there. That's a Cisco-led model. The next tier is co-led. Some deals you guys lead. Some we lead. At the bottom of the pyramid, it's all partner led... We are formalizing... We've always sold the standard maintenance and support services (SmartNet) through partners. That model is very mature. But formalizing what happens on professional services and advanced services has been going on since we introduced voice and other technologies. But we're only now formalizing."[201]

The 500 transformational customers are not necessarily the largest Cisco customers. Rather, they are a group of customers who most likely have a very complex project that they only trust Cisco to lead them through. Karl Meulema explains:

> "We've agreed that we would have 500 customers in that top. And the reason that I'm not putting a hard line is that not every large customer is automatically a transformational customer. It's 500 what we call 'transformational customers' – customers that look at Cisco and see in Cisco somebody that can help them transform their business... that allows Cisco to have that dialog with them. Because you may have customers that say, 'Just sell me the box and get out of here.' Those are not transformational customers no matter how big they are... We're putting in a governance process around who's in there and how people get in and out."[202]

In addition to the transformational customers, Cisco will also lead professional services activities in pre-chasm technologies. Building on the "crossing the chasm" technology adoption lifecycle framework, Cisco has decided that it needs to be directly involved in helping its early-stage technologies reach mainstream adoption. This ties directly back with catching market transitions and selecting advanced technologies.

Services are most often viewed as a bellwether of market maturity. In a study of software firms, maintenance services emerge as the primary source of revenue after the product business has reached maturity and has saturated its target market (Cusumano, 2008). The evolution of

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[201] Interview with Surinder Brar.
[202] Interview with Karl Meulema.

IBM is usually held up as a reference that links a services orientation – maintenance and professional services – to market maturity and technology vendor maturity. These examples are not viewed as positive signs for innovation.

In contrast, Cisco has embraced a more services orientation within for early stage technologies. With its growth strategy linked to its ability to diversify beyond routers and switches, Cisco has decided not to leave the important professional services value chain activity to its partner community for technologies that are potentially large growth opportunities. This is also a model that began to formalize towards the end of this period. The intent is that Cisco leads the professional services engagements for pre-chasm technologies (i.e., Advanced Technologies), learns what works and what doesn't, and then transfers that services knowledge to the channel partner community where it scales for the larger market with mainstream customer adoption. Karl Meulema explains what has become Cisco's phased lifecycle model towards coordinating professional services with its partners.

> "I'm sure you've heard the 'crossing the chasm' principle. We use that as an easy way to have a debate about how we work with our partners and what we need to do in the various stages of that chasm model. When you talk about a very early technology, Phase 1 of the chasm model, clearly we don't even know ourselves how to make the thing work and keep it running. So there's a lot of experimentation and early learning going on and we need to be extremely hands on. So the role for the partner there is to sell the thing, but for the rest, stay out of our way.

Now you go to Phase 2 where you start to prepare to scale. So now you take the learnings from Phase 1 where we figured out how to make it work and you now start to package that in an early phase so you can transfer to a partner. We bring in Advanced Technology Partners (ATP) ... by invitation [only]. It's not an open program... We carefully select based on both skills and capacity needed. Usually a relatively small set of partners enter the ATP. And you take the partners through a process where they start from being incompetent and you try and bring them up to fully competent. At the end of that phase, we treat them as fully competent partners that can handle this technology as if this technology had already crossed the chasm. But in reality it hasn't and that's why it's not an open program. Now you get to a point where you believe the volume in the marketplace is such where you need to move this to the next phase, which is it now becomes an open program. The technology crosses the chasm. You now create a specialization (Cisco partner training certification) for it. You now have an open program. Partners can apply, certify for it, and by their own choice join. Now you have far less control

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over it other than through your specialization over what the partners do. And the only control you have there is based on the info that you provide to your partners. So an important component for us is the whole structure of how we have structured our services model..."[203]

Gary Moore summarized the role of Advanced Services as a pre-chasm enabler:

"So we look at things – the Geoffrey Moore model of crossing the chasm, if you will. Services is really about the pre-chasm space where we are trying to accelerate the adoption of that new technology and giving that return to our customers more quickly. And then we get that nailed down and get back home then scaling back into our channel partners."[204]

Karl Meulema provides the perspective on Advanced Services for the 500 transformational customers and pre-chasm learnings.

"So the scope of services is very directly tied to our technology, very directly tied around the [adoption] lifecycle. The lifecycle stays the key point, but [services are] very directly tied around our technology. What we've said is that in those customers, those 500, we will take an active role with the customer to position our Advanced Services. Outside [of] those 500 [transformational] customers, we go back to the pre-chasm and post-chasm [model]."[205]

The evolution of partner enablement

While Cisco internalized "growing the size of the pie" as an opportunity to diversify beyond routers and switches, leverage its broad portfolio of products, and enable stronger customer satisfaction with more front-end services, Cisco wanted to align partner interests with Cisco strategic goals. Although Cisco maintained a three-tiered model for Cisco-led professional services across this period, the dominant approach to complementary professional services remained partner centric.

Partners must evolve as the industry evolves

The philosophy over the partner model is that Cisco provides the products and the partners provide the services. All partners have access to the same product portfolio from Cisco and hence the partners must differentiate themselves based on their level of expertise in the

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[203] Interview with Karl Meulema.
[204] Fair Disclosure Wire, "Cisco Systems at Jefferies & Co Global Technology Conference – Final," March 9, 2010.
[205] Interview with Karl Meulema.

products and their level of services. The need for complementary professional services is evolving as the technologies and the industry are evolving.

> *"If a partner talks to me, my basic model is the product margins are going to come down. You have no differentiation [in products]. You make margin when you have a differentiated value proposition. We don't give exclusive territories or anything. The biggest competition for our partners is other Cisco partners... Both of you have the same box. If you want to differentiate yourself, you've got to differentiate in services."*[206]

Cisco maintained a large and diverse set of channel partners ranging from small value added resellers to large technology organizations. Cisco has to maintain constructive ties with its partner community. Cisco felt a responsibility to help the partner community understand how the industry was changing.

> *"If you want to have a service business, if you want [profit] margin, you've got to move up the food chain to higher value services. That's been our messaging. It's been the same messaging for 10 years because you can't stand still. If you are selling the same services you were doing 10 years ago..., you're only going to get half the margin today that you used to get 10 years ago. I think that [it] is our responsibility to help them [our partners] understand how the industry is evolving."*[207]

As Cisco was adapting its position in professional services moving into the upturn, so it expected the partner community to also adapt by investing in more services capabilities. This was building on the channel partner program shift from volume to value based incentives that launched in 2001. Cisco needed the partner community at large to increase their relative level of investment in professional services capabilities aligned with the Advanced Technologies and the other emerging opportunities. Raja Sundaram comments on the challenge of guiding partners towards more investments in their services capabilities while acknowledging that Cisco can't make the partners do anything they don't want to do.

> *"The 'volume-sells-more-I'm-going-to-give-you-more' is not what we pursue. Now that makes it more tricky because a value-based program will now mean that you the partner [have] to invest in capabilities. [But we] can't make them invest in capability."*[208]

Surinder Brar also comments on the difficulty of getting the partners to invest in Cisco technologies and services in a timely fashion.

> *"When you deal with the channel, you can't dictate what they do. They make their own decisions. If you get the program right... over time you will align the behavior but it will not be [on] your time schedule. It will be their time schedule. They're independent*

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[206] Interview with Surinder Brar.
[207] Interview with Surinder Brar.
[208] Interview with Raja Sundaram.

businesses. These are run by people who have their own ideas on where the opportunity is etc. [209]

Alliances: collaboration, competition, or co-opetition

Cisco used four mechanisms during this period to strengthen its partner program for professional services: alliances, programs, specializations, and the lifecycle services model.

Cisco continued to expand existing and form new strategic alliances with large services organizations, most of whom were dedicated professional services firms such as Wipro, Tata Consulting, Dimension Data, and Accenture while some were technology vendors with a large services capability such as Ericsson, Boeing, IBM, and HP.

In addition to strategic alliances with the large services firms, Cisco also formed a special alliance program known as the Global Services Alliance program in 2004. Through this alliance program, co-branded technical support services were provided through a collaboration between Cisco and the alliance partners. By 2007, this program consisted of four vendors – HP, IBM, Dimension Data, and Orange Business Services.

However, alliances between so-called complementary technology vendors are often not perfectly complementary as large diversified portfolios have areas of overlap. For example, Cisco and HP had a longstanding partnership that was complementary except for a very small overlap with HP's ProCurve networking product line. While Carly Fiorina served as HP CEO and a member of the Cisco board of directors, the ProCurve division remained a small operation. When Mark Hurd took over as HP CEO, he invested more heavily in the ProCurve division, growing it to a $1 billion business by 2008.[210]

In March 2009, Cisco announced its Unified Computing System (UCS) plan and entered the enterprise computer market with a line of blade servers and rack-mounted servers. UCS became part of the larger push into virtualization that became more formalized in November 2009 through the VCE joint venture with EMC. In November 2009, HP announced the acquisition of 3Com, a long-time Cisco routing and switching rival. In February 2010, Cisco

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[209] Interview with Surinder Brar.
[210] The New York Times, "H.P. unit sheds stepchild status to take on Cisco," November 25, 2008.

formally announced that HP would not be renewed as a Cisco Certified Channel Partner or a Cisco Global Services Alliance partner.[211]

The UCS strategy and the joint venture with EMC is also believed to have prompted IBM to form closer ties with Cisco rivals Juniper Networks and Brocade Communications.[212]

The strategic alliances with HP and IBM for complementary capabilities have been severed and strained, respectively. In what seems to be a response to the threat of commoditization from virtualization technology, Cisco's technology strategy has landed the firm in a much more competitive posture with two of its biggest professional services alliance partners. This is an example of how the diversified innovator prioritizes its strategy for innovation. The highest priority is how to remain a viable technology innovator in the context of direct and indirect competitive threats such as other networking equipment vendors and virtualization technology, respectively. Surinder Brar explains the risk of relying solely on the strategic alliance partners.

> *"Despite the fact that we don't have a volume-based program, a lot of our business is concentrated around the top partners... among a few partners. I don't want to be that dependent on a few partners. I want to be spread over a lot of partners."[213]*

Incentives: get with the programs

While only a small number of partners are eligible for a strategic alliance, the governance model for the partner community is maintained through formal contractual agreements and channel partner programs. The formal agreement provides a basic set of terms and conditions to be a Cisco partner. In order to adapt to changing market conditions, Cisco creates a number of short-term programs on top of the formal agreement to drive certain behaviors. A program may be tried for six months and then retracted if the desired goals are not accomplished. Otherwise, a program can last indefinitely. Surinder Brar explains:

> *"A program is a channel management concept. How are you going to [formally] manage these independent entities? You can have a legal agreement with a partner saying, 'OK, you'll do this much business for us and we'll give you so much discount." But that alone is not enough. On top of that you need to layer because things change every few months. You want to have a promotion. You want to drive some new behavior. You're introducing a new technology. You can't always go back to the legal agreement and negotiate for six*

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[211] Network World, "Cisco-HP split may not be too painful for customers," February 19, 2010.
[212] MarketWatch, "Cisco, EMC, VMware unveil data-center alliance," November 3, 2009.
[213] Interview with Surinder Brar.

months... By the time you do that, the world changes again. So what you do is you have a legal agreement saying you represent me. And you basically say on top of that, you put a program in place. If you sell our services and you have a certain attach rate, you're going to get a higher discount on services you resell. If your attach rate goes up, we'll increase your discount. It's better to contain those kinds of initiatives or objectives in a program that's separate from the legal agreement."[214]

In 2003, Cisco launched the Value Incentive Program (VIP) that was designed to encourage partners to invest towards becoming capable in the Advanced Technologies – i.e., the emerging opportunities beyond routing and switching. Deep reseller discounts translated into higher profits for the partners willing to expand beyond routing and switching.

By 2005, Cisco launched the Solution Incentive Program (SIP) that was designed to reward partners who combined Cisco technologies with professional services. The idea was to incentivize the partners to further differentiate amongst themselves and adapt their business models to include more services beyond the traditional maintenance services they were accustomed to selling.[215]

In 2010, Cisco launched the Teaming Incentive Program (TIP) that was a program specifically designed to reward partners who invested in higher-end professional services such as consulting. TIP-certified partners were also qualifed to provide professional services in the Cisco-led 500 transformational customer accounts.

Specializations: turning partner resources into Cisco capabilities

In conjunction with the programs, Cisco created specializations which were tiered levels of training that indicated how capable a partner was within a given Cisco technology.[216] In order to maintain the specialization, the partner would need to maintain a minimum customer satisfaction rating. Surinder Brar explains:

"There was this concept that allow partners to focus on particular technology areas. We call it a specialization. What that said was that we're going to have training as a requirement in the specialization. So there's a security specialization, or a wireless specialization, or a routing/switching specialization. Here [is] a set of requirements. You meet these requirements [and] I'm going to give you a badge. I'm going to say that you're a Cisco security specialized partner. And on the security products, you're going to get a higher discount than others. You get a reward for getting that training. You get recognition. We decided that we would start badging partners with these technologies and

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[214] Interview with Surinder Brar.
[215] Computer Dealer News, "Cisco adds another incentive," April 15, 2005.
[216] The primary tiers during this period in progressive order were Express, Advanced, and Master.

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put that information in a database. So if you're in Germany and you're a customer and you're looking for a partner with a security specialization within 50 miles, it will give you the results. Not only that, to maintain your specialization or whatever certification we're going to give you, we're going to use an independent party to do customer satisfaction surveys of the customers you have sold to. If you don't meet the minimum threshold, you cannot carry a Cisco badge. Because we are saying that a Cisco gold partner is an extension of our brand. And regardless if you've done all the training, we want to make sure that [the] customer is satisfied."[217]

Specializations were not only a way for partners to signal their proficiency in the Advanced Technologies, but specializations were also used to signal proficiency in professional services that matched with an Advanced Technology. For example, a partner could invest in the IP Telephony Services Specialization as well as the IP Telephony Technology Specialization. A services specialization helped to facilitate a way for partners to build a practice around a particular Cisco technology.

Despite having far more partner resources in the field operating on Cisco's behalf, getting partners to become capable as fast as the market is moving is a challenge. Enough resources are available, but not enough resources are trained and capable to meet the fast-changing market demand.

"Cisco might have 17,000 people out in the field... The aggregate number of people in our partners dedicated to Cisco is 280,000...massive scale. But the fact is, that's at an aggregate level. If we want to win the data center business and ... many of these new areas we're getting into, I don't think we have enough trained people. In aggregate, we [have] enough people but I don't think we [have] enough trained and enabled partners. Whether we can enable them fast enough...get them trained fast enough to be able to meet the customers need and the market need... because the growth is tremendous. It's a huge effort. Because life has become more complex and technology has become more complex, more services are needed particularly high-end services. And we just need to figure out a way to wrap it and scale it faster through the partner community because it will be much slower for us to try and develop that services capability ourselves."[218]

As Cisco seeks to time and catch the key market transitions, Cisco needs partners to invest in the new technology opportunities and to build a services practice around the new opportunities. There becomes a lag between the timing on the market transition, the creation of a program and specializations, and partner movement to invest. Since these are early-stage

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[217] Interview with Surinder Brar.
[218] Interview with Surinder Brar.

technologies, partners are often hesitant to jump in until they perceive a very large market. Jonathon Ballon explains:

"So this chicken and egg problem has been an issue for as long as I've been here. If you look at this chasm model, you go to a large partner like an IBM or an Accenture, and you say, 'We have this new technology and we want you to build capabilities and coverage to deploy it in your customer base.' And they say, 'I don't have the ability to afford to make those investments until the market is mature because I'm a highly leveraged model and I need to know that there's a critical mass of opportunity before I do that.' We invest a lot in partner enablement, but largely it's an organic process where we feed business to the partners and over time, they start to build a critical mass. And the next thing you know they've got a self running and growing business."[219]

Perhaps further straining the issue of partners investing in the emerging opportunities was the rapid acceleration of market adjacencies after 2007. In 2004, there were six Advanced Technologies to consider. In 2007, there were approximately 11. By 2009, Chambers was talking about being in 30 market adjacencies and expanding into 50. Although not all market adjacencies were technology opportunities, this large and growing number of early-stage opportunities perhaps created a greater chicken and egg problem. This issue was raised during an interview with Chambers:

"CRN: Solution providers and the industry as a whole hear often about your 30 adjacencies, or the 30 to 50 adjacencies. One thing we consistently hear from channel partners is that they are overwhelmed by the level of opportunity, from smart grid, to video and health care and the rest. How do you want them to prioritize? What do you want partners to go after?

Chambers: They're the same issues we have. First of all, be realistic given the market. Which areas do you have differentiation and which areas do you want to invest in? The good news is it's a portfolio play. And the portfolio will come together every time, so you can reconnect at a future time."[220]

As Cisco continued to diversify into new technologies, new geographies, and new combinations, the rapid expansion was pushing the limits of the partner centric model where resided a surplus of resources but a deficit of capabilities.

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[219] Interview with Jonathon Ballon.
[220] Computer Reseller News, "Q & A: John Chambers," February 1, 2011.

Another lifecycle: the services model

Much of the work in partner enablement during this period has been in moving from ad hoc to more formalized programs. As the technology adoption lifecycle model has been a reliable guide for Cisco managers, Cisco began to attach a lifecycle model to services within a customer engagement. This lifecycle services model began to gain formal traction around 2005. The model consists of six phases: prepare, plan, design, implement, operate, and optimize. A similar model was used by Cisco partner INS back in the mid 1990's.[221] The key point here is that Cisco formalized this as a way to create consistency across a large partner community and as a way for partners to build up their professional services practices.[222]

5.8   Discussion

Challenges of tapered professional services

By 2010, Cisco's dominant model for complementary professional services remained partner centric. However, the Cisco model is somewhat of a tapered integration approach for professional services. Compared to the growth era that concluded with the market collapse of 2001, Cisco had increased their resource levels, revenue contribution, and management discussion relative to Cisco professional services resources. While such a statement could infuriate channel partners, one must put this in perspective relative to Cisco overall capabilities and to the professional services capabilities of other large IT product vendors.

Growth in Cisco professional services

Although Cisco has not spoken much about its professional services, they have begun to be a bit more vocal. In 2003, professional services revenues were $400 million. By 2010, revenues had grown to approximately $1.5 billion. Professional services is a very labor-intensive business. To grow revenue, a professional services organization has to add employees. Even if Cisco has found a way to codify professional services activities, the firm had 5,000

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[221] International Network Services press release, "International Network Services announces industry's only nationwide internetworking consulting and technical services company," January 18, 1995.

[222] Computer Dealer News, "Cisco introduces Lifecycle Solutions," January 13, 2006.

employees in 2010. While not an army the size of IBM Global Services, Cisco's relative investment increased although it maintained a partner centric model.

By 2010, Cisco's dominant model for complementary professional services remained very partner centric. However, the Cisco model is more of a tapered integration approach for professional services. Compared to the growth era that concluded with the market collapse of 2001, Cisco had increased their resource levels, revenue contribution, and management discussion relative to Cisco professional services resources. While such a statement could infuriate channel partners, one must put this in perspective relative to Cisco overall capabilities and to the professional services capabilities of other large IT product vendors.

Tapered integration for innovation versus professional services

By 2010, Cisco's dominant model for complementary professional services remained very partner centric. However, the Cisco model is more of a tapered integration approach for professional services. Compared to the growth era that concluded with the market collapse of 2001, Cisco had increased their resource levels, revenue contribution, and management discussion relative to Cisco professional services resources. While such a statement could infuriate channel partners, one must put this in perspective relative to Cisco overall capabilities and to the professional services capabilities of other large IT product vendors.

Cisco's tapered approach to innovation has utilized internal development, partnerships, and acquisitions to maintain a leadership position for over two decades. Cisco's approach to professional services is also tapered but not quite at the same level as towards innovation. It's partner centric approach to professional services has provided the firm with scale and reach without needed to build a large services organization. Cisco has received extensive coverage about their approach to acquisitions. The Cisco model is to acquire small technology firms in early markets. Although Cisco has acquired over 130 technology firms since 1993, Cisco has only acquired one firm that can be remotely characterized as a dedicated professional services firm. The Worldwide Data Systems acquisition in 1999 for $25.5 million was miniscule compared to other technology and services financial outlays at the time such as the $1 billion investment in KPMG Consulting and the $2 billion networking intellectual property portfolio and professional services arrangement with IBM.

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Professional services at Cisco versus other large technology product companies

Cisco's partner centric model for professional services has persisted across the dot com bubble, bust, and recovery periods. However, Cisco's relative investment level has increased since the dot com bust and anecdotal evidence suggests that some partners are concerned Cisco is encroaching on their territory. Cisco's revenue contribution from professional services is 20% of overall services revenue, or approximately $1.5 billion, and nearly 4% of overall revenues in 2010. Approximately 5,000 employees, or 8% of overall employees, are in Cisco professional services organizations.[223] On the other hand, IBM generates over 50% of total revenues from professional services, or approximately $50 billion, and employees nearly 150,000 employees, nearly half of all employees, in professional services work. Although Cisco has increased its investments and revenues in professional services since 2001, it has nowhere near the exposure that IBM does. Moreover, as a firm who has made the process of acquisitions into a science, it has intentionally chosen not to acquire a large dedicated professional services firm as IBM, HP, Dell, and Xerox have done.

Technical support services versus professional services

Technical support and professional services are two categories with no hard boundaries between them. Both are considered complementary to the product innovations generated by the R&D organization. Cisco has often mentioned to investors that the two require different types of skills which result in different levels of compensation.

> *"Cisco indicated that it has made increased hiring for its advanced services group, requiring up-front investment in specialized employees at higher salary levels than traditional technical support personnel."[224]*

Professional services at Cisco post 2003 versus pre 2003

PS was important during the dot com bubble years, but not so much within Cisco. The model was intentionally skewed towards alliance partners providing professional services. From 2004 onward, Cisco's commercialization model became increasingly more dependent on

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[223] Fair Disclosure Wire, "Cisco Systems at Jefferies & Co Global Technology Conference – Final," March 9, 2010.

[224] CIBC World Markets, "Cisco Systems – In-line F2Q, Outlook for 2H05 Good; Market Likely To Hit "Snooze" Until July," February 9, 2005.

services during the pre-sales phase. Within emerging technology areas, partners were not investing as quickly as Cisco desired. Cisco evolves towards a model where they decide to perform the services during pre-chasm stages – not as a big source revenue – but rather to learn so that it could transfer the practices onto the partner community to achieve the benefits of scale.

Cisco created more formal structures to foster clarity and consistency so that partners could build their businesses within the Cisco ecosystem with confidence. Cisco became clearer as to which accounts they were going to go direct in – service providers and the top 500 "transformational" enterprise accounts. In other words, the combined groups of IBSG, Advisory Services, and Advanced Services provided direct services to service provider accounts and the 500 transformational accounts. More specifically, these accounts were Cisco-led but not Cisco only. Cisco's professional services portfolio "was incomplete by design"[225] and so partners were also involved even in these Cisco-led accounts. The formalized program became known as Advanced Technology Partners (ATP) where a subset of partners were selected to work alongside Cisco during the pre-chasm phase. The firm began to create a new services specialization where partners could get qualified to participate in the ATP program.

Limitations of tapered integration

This case study illustrates the dynamics and the limitations of a tapered integration approach to complementary capabilities – namely professional services – within a fast-moving environment. Using an inductive study, the paper follows Cisco Systems Inc. and their approach to sourcing for complementary services. Recent research argues that a tapered integration reflects more accurately what firms implement today in the real world – a combination of both internal sourcing (make) and external sourcing (buy or partner) (Harrigan, 1984; Parmigiani, 2007; Parmigiani & Mitchell, 2009; Rothaermel, Hitt, & Jobe, 2006). This is indeed the case with Cisco and its approach to complementary professional services.

This study provides a dynamic view into a tapered integration approach and illuminates some of its boundary conditions. When the external source possesses particular competences and resources that the focal firm does not possess, a partnering approach gives the focal firm quick access to those much needed resources and competences. Cisco has built and nurtured a large partner community through who approximately 90% of Cisco's business passes through.

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[225] Interview with Karl Meulema.

This has been a recognized Cisco capability since the late 1990's. During periods of growth, the partner community has provided Cisco with the scale to reach a range of small to large customer accounts with Cisco products and technologies. For its largest global customer accounts, Cisco prefers a direct engagement model that provides the opportunity to evolve from a box provider to a strategic partner and also a chance to learn how its most demanding customers are using its technology. Although predominantly a partnering model, this tapered integration approach to labor-intensive complementary professional services has enabled Cisco to maintain a relatively high R&D intensity of 14% for a large technology firm (over 50,000 employees) compared to 6% for IBM, 4% for HP, and 1% for Dell.

The findings show that when the gap widens between the focal firm's technology portfolio and the partnering community's competence levels – where a specialization/certification is a sign of basic partner competence in a specific product technology – the focal firm is left with a precarious services dilemma. Whereas a single exclusive and dedicated professional services partner could hold up Cisco, a network of thousands of non-exclusive partners is not likely to coordinate such opportunistic behavior. The need for investment in professional services for the new advanced technologies and market adjacencies is not likely to lead Cisco to hire thousands of new professional service employees due to the same concerns expressed when it considered purchasing the INS network consulting firm in 1999. This is not the type of business that Cisco wants to be heavily invested in like IBM, HP, and Dell. So a build strategy is out of the question.

Cisco is not likely to acquire a large professional services firm for many of those same reasons above, but also because that move would likely destroy its large partnering community. It would be viewed as the ultimate channel conflict and push many partners to form closer partnerships with Cisco competitors. Cisco's most viable option has been to create formal channel partner programs that incentivize the many partners who have traditionally only provided break/fix services to increase their investment in professional services that can be wrapped around Cisco technologies, solutions, and market adjacencies. This is a slow process and it highlights a limitation of a tapered professional services integration even where the resources are available amongst the partnering community. The problem is that the partner resources require training in the new competences that Cisco is pushing within its expanding

product and technology portfolio. With Cisco positioning 30-50 market adjacencies, solution partners are struggling to navigate through a daunting array of opportunities.[226]

Further challenging Cisco's position is that although Cisco has thousands of partners, business is concentrated among a few of the large partners. As Cisco expanded its product portfolio into computers (Unified Computing System) in March 2009 – specifically blade servers and rack-mounted servers – Cisco's partnership with HP and IBM is seen by many to be transforming from complementor to competitor. Cisco's entry into computer servers is believed to have led to IBM forming closer ties with Cisco competitor Brocade Communications and to HP acquiring Cisco competitor 3Com in November 2009.[227] The large professional services organizations within IBM and HP may channel networking business away from Cisco, further pressuring Cisco's dominant model of external sourcing for professional services.

5.9 Conclusions

The goal of this chapter was to explore the relationship between complementary capabilities and the core technology strategy through an evolutionary lens. While prior research has shown that incumbent firms greatly struggle when facing disruptive technological change, the focus of disruption is usually a new product or technology. In other words, prior work puts the spotlight on the technological change – i.e., on the R&D-intensive change agent – and then explores the organizational dynamics. In this dissertation, I explore the difficulty of facing *incremental change* that involves a service-intensive domain. In this chapter, my research follows Cisco's tapered sourcing approach (i.e., make and partner) to complementary professional services. Like EMC during the 1990's, Cisco had a very focused technology strategy. Unlike EMC in 2000, Cisco was a strong partnering firm. Especially for professional services, Cisco's dominant preference was to partner with capable services organizations given that Cisco management viewed professional services – although necessary for deploying Cisco products – as a business with much lower profit margins and unattractive scale economies. However as a strategic option, Cisco allocated a small set of resources to provide professional services to its largest and most strategic customer accounts. Up to 2000, Cisco has chosen a buy/partner approach for professional services.

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[226] "Q & A: John Chambers," Computer Reseller News, February 1, 2011.
[227] "HP takes gloves off in fight with Cisco with plan to acquire 3Com," CRN, November 11, 2009.

In this chapter, we learn how Cisco's strategy for complementary capabilities fits with its efforts to maintain its market power and avoid the commoditization of its product portfolio. While Cisco aims to remain sticky in customer accounts, its evolving market positioning has implications where it must balance demand from its large, strategic customers with its prior messages to service-oriented channel partners.

5.9.1 Stickiness vs. commoditization

From the perspective of diversification and technology management, Cisco expanded into related market opportunities after weathering a tough economic period, 2001-2003. Chambers called these opportunities market adjacencies. From a technology perspective, Cisco continued to build its core know-how in networking infrastructure products – namely routers and switches. The new technologies that Cisco pursued – Advanced Technologies – were all considered to be complementary to routing and switching. As a data point, Cisco 10-K reports began to reinforce that their approach to core and advanced/emerging technologies built upon existing Cisco competences.[228] This is not surprising as some of the classic work in innovation management predicts that incumbent firms will favor innovation in a sustaining, competence-enhancing direction (Abernathy & Utterback, 1978; Christensen, 1997; Tushman & Anderson, 1986; Utterback, 1994).

The corporate diversification literature also predicts that firms with excess resources are very likely to expand into related opportunities where synergies with existing businesses can be leveraged (Palich, Cardinal, & Miller, 2000; Rumelt, 1974; Tanriverdi & Venkatraman, 2005). While the debate on the superior performance of related versus unrelated diversification remains open ended, Cisco's expansion into related technology market opportunities is not surprising especially on the heels of an industry-wide collapse. While not wanting to lose its position in routing and switching, Cisco continued to expand its portfolio under the umbrella of Advanced Technologies. Consistent with classic work on diversification, Cisco sought to leverage the synergies of an expanded product portfolio as a way to maintain an advantage over existing competitors and any potential resource-constrained startup firm with a novel product (Penrose, 1959; Rumelt, 1982).

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[228] Cisco 10-K reports, 2004-2010.

5.9.2   From products to architectures

In technology-intensive industries, it's common knowledge that hardware products commoditize over time as new competitors enter the market and either match or exceed the functionality of existing products. In Christensen's research on the rigid disk drive industry, the incumbent firms ignored the less-capable newer technologies not due to commoditization but rather due to lower profit margins and lack of installed base customer interest (Christensen & Bower, 1996). In most cases, the less-capable technologies were good enough for new market opportunities, which eventually disrupted the incumbent's position in the older market.

However, a more common dilemma faced by innovative hardware firms is that of fighting off the forces of commoditization. Between 2000 and 2010, one way that Cisco fought off commoditization was by shifting their emphasis from products to solutions and architectural plays. In essence, Cisco sought to leverage its expanding product portfolio into tightly coupled combinations of products. This enhanced the value of the underlying networking technologies that Cisco was dominant in – routers and switches. Following the dot-com crash, Cisco sought to move quickly into complementary market opportunities that built on their existing competences – what they came to call market adjacencies.

Beginning in fiscal Q1 2005, Chambers kept hammering Cisco's intent to compete on products or via "architectural plays." Architectural plays became more of the rhetoric from that point well into 2010. Financial analysts also began to pick up on this theme and understanding it to be Cisco's strategy to avoid commoditization:

> "Cisco is placing less emphasis on point products and more emphasis on the architecture as a whole, and specifically administrator and end-user simplicity (ease of use). This architectural play manifests itself in being able to pull through more business across the company's multiple product lines and become a strategic partner with its customers and channel partners. This strategy should prevent commoditization of Cisco's core products and preserve customer stickiness. It is no longer just about plumbing for Cisco, but about leveraging the power of network to drive collaboration, video, and virtualization opportunities through the network. This tenet underpins Cisco's strategic moves into unified computing as well as the acquisitions of Tandberg and Starent (in video and mobility markets). CEO John Chambers admitted that Cisco's move into unified computing and virtualization—an effort that began three to five years ago—had nothing to do with competition and everything to do with Cisco's imperative to avoid commoditization of its networking gear that data center virtualization was likely to drive."[229]

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[229] "Cisco Systems, Inc.," William Blair & Company, December 9, 2009.

Back in 1996, Cisco had an initiative to push beyond routers and switches ("products") to end-to-end networking solutions. This initiative may have reduced the contribution from routers and switches, but by 2000 the contribution was approximately 80% from routers and switches. More complementary products filled in the end-to-end gaps, but routers and switches remained the primary contributors. Those solutions allowed Cisco to remain product focused while partners contributed the professional services. For example, a global alliance between IBM and Cisco signed in August 1999 is a signal of Cisco's approach. In the agreement, Cisco acquired IBM's networking intellectual property and became a preferred networking product vendor recommended by IBM Global Services. The announcement was clear in how this strengthened Cisco's networking product capabilities while relying on the professional services expertise of IBM Global Services.[230]

The push towards architectural plays and solutions that Chambers began to publicly communicate to analysts in late 2004 eventually had more of a professional services component. And this led to a services dilemma for Cisco that is discussed below.

5.9.3 Professional services as an architectural enabler

In the most recent product guides, you see Cisco being more explicit about solutions being a combination of services – I believe of a professional services variety – and products. The emphasis is shifting from products to solutions and architectural plays.

"Today, the network is a strategic platform in a world that demands better integration between people, information, and ideas. The network works better when services, together with products, create solutions aligned with business needs and opportunities."

5.9.4 A services dilemma

As a firm seeks to avoid or slow down the inevitable process of commoditization of hardware products, one avenue that a firm may pursue is to create combinations of products into solutions or architectures. Solutions and architectural plays have a higher level of complexity that requires more careful planning and implementation. For the firm who has depended on its channel partners to provide most of the professional services in a high-velocity industry, a fast-expanding technology portfolio may

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[230] IBM and Cisco alliance – August, 1999. See ...

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Cisco's dilemma is the following: they want to catch early staged technologies (risk and uncertainty); they don't want to invest in the PS, but rather have partners do it; partners struggle with the chicken-and-egg problem – they don't want to invest until they see a market but a market may not develop until someone invests; Cisco can't make partners invest (no control); Cisco can invest but that means adding bodies (costly); to scale this requires partner involvement; to properly scale, Cisco wants to create packaged PS knowledge that defies the conventional wisdom of scale-through-headcount (that's tough); as Cisco moves into new opportunities where some big partners live, this creates tension with those partners (IBM and HP); also, customers are used to big vendors with their own PS – but to deeply invest in PS means contradicting your philosophy about partner centric (conflict).

Build vs. partner events for Cisco complementary professional services

Date	Build	Partner	Other	Comments on Cisco actions	Source
Oct 1992	Cisco Network Consulting			Mention of a 14-person fee-based worldwide consulting team	Computerworld article covering Wellfleet's new 8-person PS team
Aug 1993		Xerox Networking and Professional Services		Alliance where Xerox will resell Cisco routers and provide services	Xerox press release
Jan 1995		International Network Services (INS)		Alliance, minority interest investment, and Cisco exec on board of directors	INS press release; board participation mentioned in 1999 news
Apr 1996			*Electronic Data Systems (EDS)*	*Appoints Steven West, president of EDS' Infotainment business units, to Cisco board of directors*	*Cisco press release*
May 1996		Bell Atlantic		Alliance where Bell Atlantic sells end-to-end networking products and provides professional services	Bell Atlantic press release
Jan 1997		Hewlett Packard (HP)		Alliance to collaborate on technology development, product integration, professional services, and customer support	HP/Cisco press releases
Jun 1997		Wang Laboratories		Global network integration and sales alliance	Computer Dealer News
Aug 1997		KPMG and Microsoft		Alliance to expand KPMG's network integration practice; 10% equity stake from both Cisco and Microsoft	KPMG press release; New York Times article
Oct 1997		EDS		Alliance to provide mainframe-to-web integration	EDS press release; New York Times article
Oct 1997		Cisco Professional Services Providers program		New program creates a formal process to validate providers of professional services; current members include ENS, Cohesive Systems, Forsythe Solutions Group, HP, INS, NCR, NetOps, RPM Consulting, and Unisys	Cisco press release
Jun 1998	Internet Business Solutions Group (IBSG)			New unit provides free consulting that leverages Cisco's internal web usage expertise	Network World; Cisco press release
Oct 1998		Hitachi Data Systems (HDS)		Alliance designates HDS as a Cisco global systems integrator; targeted for Internet-to-mainframe connectivity	HDS/Cisco press release
Nov 1998		EDS and HP		Alliance with EDS (consulting and systems integration) and HP (servers and software)	EDS press release

Date	Company/Program		Description	Source
Dec 1998	IBSG Knowledge Transfer program		Early participants include Cambridge Technology Partners, Ernst & Young, and KPMG	Cisco press release
May 1999	Enterprise Networking Systems (ENS)		$13.8 million investment from Cisco, Benchmark Capital, and Trinity Ventures	ENS press release
Jun 1999	Total Network Solutions (TNS)		$7 million investment to help TNS expand their systems integration business	TNS press release
Aug 1999		*Lucent acquires INS for $3.7 billion*	*INS was a key Cisco network consulting partner*	*InfoWorld Daily News; analyst reports*
Aug 1999	KPMG Consulting		$1.05 billion investment; KPMG to hire 4000 consultants and build six technology centers	Cisco/KPMG press release; New York Times article; Computer Reseller News; InformationWeek
Aug 1999	IBM		$2 billion agreement for IBM network technology IP and strategic partnership with IBM Global Services	San Jose Mercury News; Cisco/IBM press release; CBS MarketWatch
Sep 1999	Predictive Systems		Alliance, equity investment, and Cisco executive appointed to board of directors	Predictive Systems press release (1/20/2000)
Oct 1999	Science Applications International Corp (SAIC)		Becomes a systems integration partner and subcontractor	SAIC press release
Dec 1999	Worldwide Data Systems (WDS)		Announces $25.5 million acquisition; will be part of Professional Services Business Unit within Customer Advocacy	InfoWorld Daily News; Cisco press release
Dec 1999	Enterprise Networking Systems (ENS); later known as Netigy		Announces strategic alliance; $90 million second round funding from a group of Cisco-led investors	ENS press release; InfoWorld Daily News; InformationWeek
Mar 2000	Cap Gemini; later known as Cap Gemini Ernst & Young		$835 million investment; Cap Gemini will form a new subsidiary to offer network consulting and design	Investor's Business Daily; InfoWorld Daily News; Wall Street Journal
Apr 2000	Cisco Professional Services Partner Program		Revamp of former PS Provider Program; qualified US firms include Datatec Systems, Getronics, HP, IBM Global Services, KPMG Consulting, NCR, NetEffect, Netigy, Predictive Systems, REALTECH Systems, Rt 1 Solutions, SAIC, Spring Enterprise Network Services, The Signature Group, TNS, and Unisys	Cisco press release; Computer Reseller News
May 2000	Lockheed Martin		Systems integration alliance focused on U.S. government market	Lockheed Martin press release; Aerospace Daily+G46
Jul 2000	Callisma		Alliance, $25 million investment, and joins Cisco PS Partner program	Callisma press release
Sep 2000	NEC		Global alliance; NEC to provide VoIP systems integration solutions	NEC/Cisco press release

Date		Partner Program	Event	Description	Source
Mar 2001		*Revamp of channel partner program*		*Incentives program shifts from rewarding volume to value*	
Jun 2001		NCR		Alliance for high-speed broadband solutions in multi-unit buildings	NCR press release
Aug 2001			*Major reorganization*	*Response to dot com collapse*	*Cisco press release; analyst reports*
Oct 2001	Hires Gary Moore to run Professional Services division			Former CEO of alliance partner ENS/Netigy; division later named Advanced Services	
Oct 2001		Launches first PS specializations for partners		Formal program to qualify partners capable of providing value-added professional services	Cisco press releases (Oct 2001 and Nov 2001); Computer Reseller News
Nov 2001			*Lucent to sell INS assets*		*IDC Opinion report (sold off in July 2002)*
Apr 2002	Advanced Services	Advanced Services program for partners		Offerings include build and partner components; targeted for enterprise and service provider customers	Cisco press release; Computer Dealer News (Apr 2003)
Apr 2002			*Wants to pull partners in early*	That's the nature of the value driven channel program changes	Computer Reseller News (5/6/02)
Jun 2002	Advisory Services			Beginnings of new PS group that bridges between IBSG vision and customer implementation projects	Interview with Jonathon Ballon
		New partner programs to incentivize adv tech and svcs/solns			
Mar 2003		*Value Incentive Program*		*Six-month programs to incentivize partners to sell Advanced Technologies; specifically IP Telephony and VPN/Security; minimum 4.16/5 customer satisfaction ratings required for rebate; connects tech and PS specializations and investments to incentivize partners to expand into ATs*	*Computer Reseller News (9/15/03)*
Apr 2003		*Partner Consultative Support program*		*A formalized Cisco-to-partner mentoring and knowledge transfer program available through Advanced Services organization*	*Cisco press release*
Aug 2003	CEO perspective on Advanced Services investments			Chambers comments on why Cisco has increased its PS investments during the downturn	FY2003 Q4 analyst call transcript; analyst reports

Date	Program		Description	Source
Feb 2004	Opportunity Incentive Program		Enable partners to compete on value rather than price; yet another step that enables volume to value shift	Cisco press release
Feb 2004	Solution Technology Integrator Program		For partners that target vertical market solutions	Cisco press release
Feb 2004	Lifecycle services for Advanced Technologies		To get partners focused more on PS rather than only maintenance; formalized as blueprints and lifecycle services model	CMPnetAsia.com
Feb 2004	Guide partners upstream into PS and solutions		Partner Summit 2004 in Honolulu	CMPnetAsia.com
Feb 2004	VIP (last year), OIP, and SIP		New programs to help partners become more profitable and solutions focused; hunting, growing, and adapting	Computer Reseller News (Feb and Mar 2004)
Apr 2004	Ericsson		Alliance builds on Ericsson's strengths in multi-service networks and systems integration and Cisco expertise in IP routing and Ethernet	Ericsson/Cisco press release;
Jun 2004	Launches Global Services Alliance program		Cisco and key partners provide co-branded technical support services; HP, IBM, Dimension Data, and Orange Business Services by 2007	Cisco press release, Computer Reseller News
Nov 2004	Lifecycle services model		Provide blueprints to enable consistent services across partners; linked to Advanced Technologies portfolio	Computer Dealer News; Computer Reseller News (2/27/2006)
Nov 2004		*architectural plays*	*Tells analysts about competing architectural play = tech + biz archs*	*Q1 2005 earnings call*
Dec 2004		*Analyst conference*	*Unlike prior years, analysts perceive more emphasis on services and solutions ahead*	*Analyst reports following 12/5/2006 annual analyst conference*
Feb 2005	*Advanced Services is an area of investment*			*Q2 2005 earnings call*
Mar 2005	New channel programs: SIP, OIP, and VIP		New programs to incentivize partners to invest in Cisco-related solutions and services	Analyst reports
Jun 2005	Boeing		10-year non-exclusive strategic alliance to create joint solutions for defense markets	Wireless News; Defense Daily; Aviation Week & Space Technology
Jan 2006	Lifecycle solutions		Introduced to help partners build up their professional services offerings; outlines six phases	Computer Dealer News

Date		Partner		Description	Source
Mar 2007		IBM		Formally added to the Cisco Global Services Alliance program	vunet.com; Market News Publishing; Market Wire
May 2007	Expanding Advanced Services model			Going to get aggressive here while simultaneously communicating with partners	Q3 2007 earnings call
Oct 2007		Wipro Limited		Strategic alliance	Indo-Asian News Service; Business Line; Associated Press (2/10/2009)
Oct 2007		Satyam Computer Services		Investment in joint venture to focus on integrated health solutions	Satyam/Cisco press release
Feb 2008					
Jul 2008	Customer Advocacy renamed Cisco Services				2008 annual report; interview with Jonathon Ballon
Dec 2008			*Mentions 1-4-7 effect*	*$1 arch = $4 svcs = $7 products*	*Nick Earle at Barclays Capital Global Tech Conference*
Feb 2009		Tata Consulting Services		Strategic alliance; Tata to build a new tech practice focused on Cisco tech; undisclosed joint investments	RTT News, Hindustan Times, Market News Publishing, Associated Press
Feb 2009		Accenture		Expanded strategic alliance; formed the Accenture & Cisco Business Group to deliver solutions	Corporate IT Update; Market News Publishing; Telecomworldwire
Mar 2009			*Cisco enters blade server market*	*Announces Unified Computing System strategy; tightly integrates compute and networking in a virtualization environment*	*Network World Middle East; analyst reports*
May 2009	*Being much more aggressive on Advanced Services*			*Discusses reason for lower services margins*	*Q3 2009 earnings call*
Nov 2009		*EMC and VMware*		*Technology partnership puts Cisco further into compute space*	
Nov 2009			*HP to acquire Cisco competitor 3Com*	*HP move viewed as response to Cisco's blade server entry*	*Businessweek; analyst reports*
Feb 2010		HP		Severing longstanding partnership tie; was one of four Global Services Alliance partners; collaboration has become competition	Network World Middle East; TendersInfo article; analyst reports
Mar 2010			*Mentions 1-4-7 effect*	*$1 advisory = $4 advanced + tech svcs = $7 products*	*Transcript of Gary Moore Q&A at Jefferies & Co Global Tech Conf*
Apr 2010		Teaming Incentive Program (TIP)		Encourage sales engagement and reward their investment in consulting and professional services capabilities; the fourth pillar alongside VIP, OIP, and SIP; TIP qualified partners are able to bid alongside Cisco for services across the 500 transformational customers	Market News Publishing; Computer Reseller News UK
Apr 2010		Architecture-oriented specializations			Tendersinfo News (May 2010)
Sep 2010		Orange Business Services, EMC, and VMware		Global business alliance for cloud computing solutions	Business Wire

5.10.2 Internetworking Basics

The following definitions provide some of the basics of internetworking.[231]

END-STATION. A computer connected to a network. Network end-stations include PCs, UNIX workstations, minicomputers, and mainframe computers.

LAN (Local Area Network). A system of network software and hardware components used to connect a group of end-stations by means of a wire cable or fiber optic link. A single LAN segment connects to anywhere from one to several hundred end-stations, usually in the same building. A large organization may have up to one thousand or more LAN segments and tens of thousands of end-stations.

WAN (Wide Area Network). A collection of long-distance telecommunications links and networks used to connect LANs and end-stations across regional, national, or international distances. Commercially available WAN links include: TI, EI, T3, SONET, 64bps leased lines, switched 56; X.25; network services include ISDN, SMDS, ATM, and frame relay.

INTERNETWORK. An organized collection of LAN and WAN links throughout an enterprise. The internetwork provides an information "spinal cord" for the transmission of data between all types of corporate computers and their software applications--data-base, finance, word-processing, engineering, order processing, electronic mail, and so on.

BRIDGE: A simple, limited-function device for connecting a series of two or more LAN segments together. A bridge has a physical interface or "port" for each LAN to which it is connected. Bridges are a relatively inefficient means of interconnecting LANs, but are necessary for certain unroutable protocols.

ROUTER. The primary internetworking device. An intelligent, high-performance means for connecting LANs and/or WANs together. Unlike bridges, routers maintain an internal

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[231] Obtained from Wellfleet Communications 1993 Annual Report.

representation or "topology" of the physical links in a network. With their knowledge of the internetwork topology, routers can efficiently, quickly, and reliably forward data traffic among end-stations throughout a large enterprise.

BACKBONE NETWORK. A number of multi-port routers connected to each other by LAN or WAN connections. A router backbone serves as the main information conduit for major sites in an enterprise and usually has a very high-speed with high volumes of traffic.

ACCESS NETWORK. The connection of a small remote site to the backbone so that remote users can participate fully in corporate computing.

PROTOCOL. Computer end-stations each have their own set of conventions of "protocols" that they use to format data and establish connections across a network. UNIX devices employ TCP/IP (Transmission Control Protocol/Internet Protocol); DEC computers use the DECnet protocol; IBM mainframes traditionally communicate with SNA (Systems Network Architecture); Novell servers use the Netware IPX protocol. A high-end multi-protocol router can accommodate all major commercial LAN/WAN protocols on the same physical internetwork.

MULTIPLEXOR (MUX). The traditional device for dividing a long-distance, high-speed telecommunications line so that it can be shared by many users. Used extensively in wide area networks. High-end routers can interface directly with wide area communications services, reducing the need for MUXs.

CENTRALIZED COMPUTING. Traditional corporate computing architecture that centralizes an organization's data and computing through the use of IBM mainframes and IBM SNA or similar technologies.

DISTRIBUTED COMPUTING. Modern computing architecture that distributes data and processing chores to PCs, workstations, minicomputers, and mainframes throughout an enterprise.

CLIENT-SERVER COMPUTING. A popular form of distributed computing that allows a number of LAN-based PCs or workstations--clients--to share access to a more powerful server computer. Very cost effective for office automation workgroups, database access, and a wide range of information-sharing applications.

6 Concluding remarks

This chapter examines the emergence and evolution of new complementary capabilities across large changes in the industry and continuous technological change. I compare the actions of two firms from different sectors of the IT industry – EMC from storage and Cisco from networking – as they grow, adapt, and survive. Although the firms pursue polar opposite implementation preferences, both firms exhibit similar patterns towards initial activation and subsequent modification of their complementary professional services strategy within a very dynamic environment. Over a period covering 1995-2010, each firm continues to reinforce its core identity as an innovator while its approach to professional services as complementary persists despite increased investments in the latter. During the dot-com crash, each firm begins to utilize approaches to professional services that seem to contradict with their prior dominant preferences. These findings suggest that the firm may have more flexibility to adapt its portfolio of complementary capabilities than its does with its core capabilities. While the complementary is more constrained for resources, the firm has more flexibility to adapt in changing conditions. On the other hand, while the core is less constrained for resources, perhaps they are more constrained to adapt to changing conditions since change has deeper implications on the firm's identity.

This concluding chapter is divided into three sections. First, I highlight the common patterns between EMC and Cisco in managing professional services. Second, I examine how the findings are generalizable for other complementary capabilities in other industry contexts. Finally, I suggest some managerial implications and areas for future research.

6.1 Patterns of complementary capabilities

Chapters 4 and 5 were process studies examining when, why, and how EMC and Cisco activated professional services within their respective value chains. The emphasis was on the business and organization of professional services, a new complementary organizational practice within the value chain of activities. Although EMC became a leader in enterprise storage and Cisco in internetworking, both firms shared many similarities at the beginning of the dot-com boom in the mid-1990's.

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6.1.1 EMC and Cisco: different yet similar

Young, focused, and established technology innovators

The two case studies focus on the mid-1990's through 2010. By the mid 1990's, neither EMC nor Cisco could be considered start-up firms. Yet, neither were they long-established incumbents like IBM or DEC. EMC and Cisco were still relatively young firms, but they were newly established leaders in their sectors.

By 1995, EMC had just emerged as the leader in plug-compatible storage devices for the IBM mainframe market. The Symmetrix storage array enjoyed approximately a three-year first-mover advantage over other competitive storage array products. By 1997, EMC had established a unique interoperability position for the Symmetrix across the mainframe and open systems (i.e., UNIX and Microsoft Windows NT) markets. Unlike the platform competitors who competed in the storage sector such as IBM, Amdahl, and Sun Microsystems, EMC used a common product architecture across mainframe and open systems markets, and as an independent vendor was less constrained than the computer systems vendors who tended to limit their support to their own platforms.

Also by 1995, Cisco was established as the leader in internetworking devices – primarily routers. The firm had recently expanded into switches through a number of acquisitions. However, its core competence and identity were chiefly tied to routers for enterprise customers. While EMC eventually established a competence in interoperability across mainframe and open systems markets, Cisco's initial innovation was its interoperability within its internetworking routers. As open systems computing and local area networks (LANs) grew in the late 1980's, many networking protocols existed and this made the transfer of data between different networks extremely difficult. With its flexible Internetworking Operating System (IOS), Cisco's advantage was in its ability to develop routers that could tie networks together that utilized different protocols. Similar to EMC as an independent vendor, Cisco was not hindered by the constraints that the platform vendors faced. For example, IBM focused its attention on its own networking protocol that worked across the various IBM computer platforms, but rarely

supported any other protocols. Cisco routers could simultaneously support upwards of 16 different protocols.[232]

Commoditization: not a matter of if but when

As with all technology innovators, the threat of commoditization and the erosion of profit margins is a constant concern. EMC faced this risk even though the Symmetrix had a three-year lead on the competition in the mid-1990's. One interview participant paraphrases a conversation he had with CEO Mike Ruettgers in 1996.

"I know there's more value we can bring to our customers. With hardware becoming more and more commoditized, we need to differentiate ourselves more and not just with the brand of EMC but with what we actually offer to and deliver to our customers."[233]

Cisco managers have a similar mindset. One interview participant captured the thinking.

"When you're selling product, it's no different whether you're selling a DVD player or you're selling another product. In the network business, whether you're competing against our known competitors or not, if you don't do something different it becomes through its lifecycle... it begins to become commoditized."[234]

Growth through related diversification

One way that EMC and Cisco addressed the threat of commoditization was by expanding their product portfolios into areas closely related to their core product line. By 1995, both EMC and Cisco had established themselves with a laser focus on one product category, high-end storage systems (Symmetrix) and internetworking routers, respectively. Each firm had other products within their portfolio that supplemented the core product line, but the one primary product category was the main source of profits and market identity.

By 1995, EMC was experimenting with carving out a software business – starting with the Symmetrix Remote Data Facility (SRDF) – and launching new storage arrays for the price-sensitive open systems market. In 1995, Cisco had reorganized into business units: the Core Business Unit (BU) for router products and four other business units it had recently expanded into within the last few years.[235]

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[232] Cisco 1994 10-K report.
[233] Interview with Jeff Sands, formerly with EMC.
[234] Interview with Stuart Doyle, Cisco.
[235] Cisco Annual Report, 1995.

While each firm had expanded into multiple related opportunities from its core business, the majority of revenues and profits came from the core and one secondary business by 2000. EMC and Cisco had successfully created a strong secondary source of income in Symmetrix-related software and switches by 2000, respectively.

Following a period of restructuring after the dot-com crash, EMC and Cisco embarked on an aggressive campaign of diversification growth via acquisitions. EMC began to greately expand its product portfolio into storage related areas with over 40 acquisitions – mostly software firms – between 2003 and 2010. The firm began to position itself beyond storage and more as a leader of data management, what became referred to as information lifecycle management (ILM). While acquisitions became a central part of EMC's growth following the dot-com crash, Cisco had already demonstrated a unique ability to acquire and integrate small technology firms even during the dot-com boom years. Following the restructuring, Cisco began to more seriously expand beyond routing and switching through what it called Advanced Technologies and market adjacencies as it also continued to use acquisitions as a way to expand its innovation portfolio.

Professional services as a complementary capability

In the IT industry, IBM is a well-known example of a technology innovator with a strong professional services organization who many trace to the creation of IBM Global Services after the arrival of Lou Gerstner in 1993 (Gerstner, 2002). IBM was no stranger to professional services in 1993. IBM established a "Systems Integration and Professional Services organization" in 1987.[236] Prior to Gerstner's arrival, IBM had created a separate services subsidiary known as "Integrated Systems Solutions Corporation (ISSC)" in 1991.[237] By the time Gerstner arrived, IBM had demonstrated its skill in professional services as a strong complementary component and through its structure as a subsidiary had demonstrated its skill as a supplementary component. The prior organizations all operated under a product-led model where the hardware products were the core. As IBM shifted to a services-led sales model by the mid-1990's, Global Services marked a shift in the strategic intent of professional services from

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[236] IBM Annual Report, 1987.
[237] IBM Annual Report, 1991.

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complementary/supplementary to core capability. The subsequent hiring of 84,000 new employees into the Global Services division (see Table 4.13) is further evidence of the shift.

However, professional services for EMC and Cisco were activated and still remain as complementary. This point was reinforced by interview participants from both firms.

"Now I think we all get it because we see that a good business consulting engagement met today will yield customer loyalty, customer commitment, and more EMC hardware sales two years down the line. You have to understand something, you've got commitment from all levels of EMC Global Services that we will not sell services for services sake. We sell services to enable us to sell more product. So our job is not to go out there and sell business consulting into [a customer account] and never sell product there."[238]

"Our strategy is to work with partners, to go through partners. Never say never. I mean the company may decide tomorrow to no longer do business with partners. It would be a stupid decision but they may. Until that happens, services in and by itself is not going to make that decision because we are in service of the rest of the company. We're not an independent P&L that can make their own decisions on these things and just say, screw the rest of the company. That's not how we work... You've got to look at the business model. When did HP decide to go big into services? When did IBM decide to go big into services? It was when their product margins were going single digits. And all of a sudden the service margin of 17% looked very attractive. Do you know what our product margins are? [60%...] We have a business model that is based on innovation. We have a business model that is based on being able to command premium pricing because we are innovative and we offer a better portfolio that the customers are willing to pay the money [for]. The moment we stop innovating, that's the moment our margins will go down and that may be the moment we change. But as long as John [Chambers] is here, it ain't going to happen. I mean because that's our DNA. Of course people can decide to change business models and when that happens, we'll have a different discussion. But until the company – not the services organization – until the company decides to do a fundamental different business model, nothing is going to change."[239]

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[238] Interview with Ed Berndt, EMC.
[239] Interview with Karl Meulema, Cisco.

Financial trajectories during dynamic times

Although EMC and Cisco focus on different IT sectors and were founded five years apart, their financials have followed very similar trajectories. On the edge of the dot-com boom in 1995, each firm had approximately 4100 employees and $2 billion in revenues. Cisco has grown at a much faster rate than EMC and this is perhaps due to the differences in their respective IT sectors. Cisco created and has remained the dominant player in what began as the internetworking sector. EMC was the disruptive entrant within an existing market previously dominated by IBM. Unlike the classic story of the disruptive entrant and the failed incumbent (Christensen, 1997), IBM stumbled but not enough to fail. Table 6.1 compares EMC and Cisco sales revenues, gross profit margins, net profit margins, R&D over sales, and total services revenues over sales. Services revenues are primarily maintenance revenues. A rough rule of thumb is 80% maintenance and 20% professional services where applicable. Figure 6.1 shows that the stock prices for EMC and Cisco have followed similar trajectories across the dot-com boom, dot-com crash, and subsequent restructuring and expansion periods.

Table 6.1. EMC and Cisco financials, 1990-2010

| | EMC | | | | | | Cisco | | | | |
Year	Sales ($million)	Gross Margin	Net Margin	R&D / Sales	Services / Sales		Sales ($million)	Gross Margin	Net Margin	R&D / Sales	Services / Sales
1990	171.2	46%	5%	9%	7%		69.8	67%	20%	9%	
1991	232.4	49%	6%	8%	5%		183.2	67%	24%	7%	
1992	349.1	50%	8%	8%	4%		339.6	69%	25%	8%	
1993	782.6	54%	16%	8%	3%		649.0	70%	26%	7%	
1994	1377.5	54%	18%	9%	2%		1243.0	69%	25%	7%	
1995	1921.3	51%	17%	8%	2%		1978.9	70%	21%	13%	
1996	2273.7	49%	17%	7%	2%		4096.0	69%	22%	10%	
1997	2937.9	50%	18%	8%	3%		6440.2	68%	16%	19%	
1998	3973.7	56%	20%	8%	5%		8458.8	69%	16%	19%	
1999	6715.6	57%	15%	9%	11%		12154.0	69%	17%	17%	9%
2000	8872.8	63%	20%	9%	10%		18928.0	67%	14%	22%	10%
2001	7090.6	52%	-7%	13%	17%		22293.0	55%	-5%	21%	12%
2002	5438.4	47%	-2%	14%	22%		18915.0	70%	10%	19%	17%
2003	6236.8	52%	8%	12%	24%		18878.0	76%	19%	17%	18%
2004	8229.5	56%	11%	11%	26%		22045.0	74%	20%	14%	16%
2005	9664.0	60%	12%	11%	27%		24801.0	70%	23%	13%	16%
2006	11155.1	60%	11%	12%	28%		28484.0	69%	20%	15%	16%
2007	13230.2	62%	13%	12%	29%		34922.0	67%	21%	13%	16%
2008	14876.2	62%	9%	12%	32%		39540.0	68%	20%	13%	16%
2009	14025.9	63%	8%	12%	37%		36117.0	67%	17%	15%	19%
2010	17015.1	66%	11%	11%	36%		40040.0	68%	19%	13%	19%

• Based on data obtained from COMPUSTAT and company annual reports

Figure 6.1. EMC and Cisco historical stock charts, 1990-2010

6.1.2 *Patterns of change in complementary capabilities*

Activate new complementary capabilities, but preserve the core business model

The evidence from Chapters 4 and 5 suggests that the business of professional services had no strategic value during the early 1990's as each firm established a leading position in its primary product category. However, after the mid-1990's, each firm began to signal an intent to add professional services as a set of complementary activities within its value chain. Although EMC preferred a "make" position and Cisco preferred a "partner" position, both firms demonstrated that professional services had value but were not central to their existing business model.

EMC decided to build an internal organization with an experimental posture. The evidence suggests that EMC's decision to "make" aligned well its preference for direct customer account control. This seems to be a very rational choice given that most EMC customers were still IBM customers. Resources were mobilized primarily through an organic hiring process – much slower than adding resources through an acquisition or reallocating existing internal resources. These services were not needed for every Symmetrix sales transaction. As the EMC

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software business and storage for open systems markets began to emerge, EMC managers sensed an opportunity for a professional services business for these distributed environments. But since these services were not needed for every sales transaction, the organizational fit was a source of debate and friction especially with the sales organization who was aggressively committed to the current business model.

Cisco signaled its position through a number of new alliance partnerships during the late 1990's – see Appendix 5.9.1. The firm was willing to make sizable financial investments in its professional services alliance partners. The overall theme was that these services were valuable for the Cisco value chain, but just not within the Cisco business model. Unlike direct account control that EMC preferred, Cisco was optimizing for scale. Cisco would focus on product innovation and its partners would be responsible for sales and value-added services.

Progression of value

EMC and Cisco have developed strong customer satisfaction cultures and policies going back to their founding. Customer service (inclusive of technical product support and break/fix maintenance) is a central part of how these firms demonstrate their commitment to customer satisfaction. Unlike customer service, professional services show no evidence of significance within the value chain at the time of founding. The value of customer service has been high and has persisted over the life of both firms and across a very dynamic environment. On the other hand, the value of professional services has varied across time, starting from nothing and increasing in value yet in different ways for both firms.

Table 6.1 below compares the value of customer service and professional services for EMC and Cisco across four time eras: founding to the mid-1990's, dot-com boom, dot-com crash, and post dot-com.

Table 6.2. The value of services: EMC and Cisco

Era	EMC Customer Service	EMC Professional Services	Cisco Technical Support	Cisco Professional Services
Firm founding to mid-1990's	High value	No value	High value	Marginal value; for very complex projects
Dot-com boom	High value	Marginal short-term value as organizational fit is debated; more long-term potential for distributed environments	High value	More value as large investments made in external partners
Market collapse	High value	More value as the firm restructures internally, pursues a joint venture, and formalizes partner program	High value	More value as Cisco invests in more internal PS while simultaneously working on better partner coordination
Recovery & recession	High value	More value as consulting business builds through several acquisitions and creates formal brand	High value	More value to facilitate architectural plays and adoption of emerging technologies

During the dot-com boom era, the evidence shows that professional services became a value chain activity with some level of importance. This importance manifested itself differently for EMC and Cisco. Both firms seemed to take a position that appreciated the potential future value of these services. EMC's investment level signaled to analysts that it was looking at the long-term value of professional services. One analyst commented,

"One of the company's longer-term objectives is to build a complementary IT and professional service business."[240]

Cisco's investments in alliance partners was to ensure that future professional services would be available in support of Cisco sales. For example, the $1.05 billion investment in KPMG Consulting in 1999 was so that KPMG Consulting would hire 4,000 employees and build six technology centers that would help customers deploy Cisco technology.

Compared to customer services that had a history back to firm founding, professional services were an emergent complementary component whose value evolved from nothing to highly valuable for EMC and Cisco. However, its value persisted as complementary and does not seem to have transitioned into a core capability. Perhaps by 2010, some signs of a supplementary capability are beginning to show as both firms generate over $1 billion from their internal professional services activities.

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[240] Pershing Investment Research, "EMC Corporation," December 8, 1998

Greater flexibility: make, buy, and partner

While each firm began to activate professional services activities with a dominant preference, each firm demonstrated a level of flexibility that perhaps is not possible with its core capabilities (Leonard-Barton, 1992). As EMC and Cisco restructured following the dot-com crash, both firms adapted their approach in professional services using an approach completely opposite of their pre-existing dominant model. For example, EMC preferred "make" to optimize for account control. But the firm established a joint venture in 2002 with Accenture in order to develop a consulting capability. Cisco preferred to "partner" to optimize for scaling, but after its dot-com restructuring launched its Advisory Services consulting organization and increased its investment in professional services with its new Advanced Services organization and hiring of Gary Moore, an experienced professional services executive.

On the one hand, all technology firms were operating in crisis mode in 2001 and 2002. Anything was possible as EMC made a deliberate decision to become more partner friendly in many areas. On the other hand, this perhaps demonstrates that firms have more room to pursue flexible options for their complementary capabilities. EMC and Cisco did not demonstrate the same level of flexibility towards their core competence in Symmetrix and routers, respectively. This does not mean that their technology strategy didn't adapt at that time. I would describe their strategy more as investigating supplementary businesses. For example, EMC got serious about its mid-range Clariion storage array and this expansion plugged a hole in its overall storage hardware portfolio while simultaneously preserving its high-end Symmetrix business. For example, Cisco put more effort into its emerging supplementary businesses – Advanced Technologies – while preserving its position in its core businesses of routing and switching. If core competences are tied to the firm founding and formation, once a start-up firm gets established, the firm's strategy is most likely going to be tied to decisions about when, where, and how to expand into supplementary and complementary opportunities. These expansion opportunities may eventually develop into a core competence for the firm.

Architectural enablement as the portfolio expands

The increase of value in professional services tracks very closely with the continual expansion of each firm's technology product portfolio. During the dot-com boom, EMC and Cisco leaned very heavily on their core business in high-end storage and routers, respectively.

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Secondary businesses in Symmetrix-related software and switches became very strong contributors during the period. Professional services mattered, but seemed more about their future potential. As EMC and Cisco greatly expanded their portfolios, we begin to see that the value of professional services increased. The evidence from Chapters 4 and 5 suggest that professional services provided a way to combine products into a solution for customers – what I earlier called architectural enablement. When EMC launched its professional services organization in the late 1990's, professional services included architectural assessments of customer environments. CEO John Chambers at Cisco often referred to professional services as business architecture, something different than technology architecture within a product.

From resources to capabilities

As EMC and Cisco accessed complementary resources through a combination of make, buy, and partner, organizational capability was often elusive. While intent and resource mobilization began during the 1990's, neither EMC nor Cisco were content with the level of capability prior to the dot-com crash. For example, EMC's joint venture with Accenture for a consulting capability was an admission that its organic "make" approach had not achieved its original intent. Two interview participants explain.

"EMC tried a couple of times to organically build a consulting team. That's hard to do, very hard to do which is one of the reasons that they partnered with Accenture to go really try and do something creative around how do we build this now."[241]

"But we didn't have that consultative bend. We had implementers. You can't just go out and hire people like that... We didn't know how to sell it because we were product salesmen so we made an agreement with Accenture."[242]

Even after bringing the resources for the joint venture with Accenture in-house, it still took a while before EMC had achieved the original consulting capability intent – what formally became called EMC Consulting in 2008.

Cisco established a large network of professional service partners, with several high-profile ones that included equity investments. However, Cisco learned that its partner community on average was not as capable as its own internal resources when evaluated through

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[241] Interview with Sandy Hamilton, EMC.
[242] Interview with Ed Berndt, EMC.

customer satisfaction survey results. During the frenzy of the dot-com boom, many partners were simply reselling Cisco products and offering only break/fix customer support. Partners were not delivering the value-added professional services that Cisco expected. This eventually led to the shift in partner incentives from volume to value (Kalyanam & Brar, 2009). Cisco learned that although enough partner resources were in place, the intended organizational capability was not being implemented.

The link between resources and capabilities became an issue again for Cisco as it began expanding into dozens of Advanced Technologies and market adjacencies as the IT industry rebounded following the dot-com crash. The expansion opportunities were in emerging areas whose market uncertainty resulted in partners being hesitant towards investing in professional services training and certifications.

These two illustrations highlight the distinction between resources as organizational assets and capabilities as how an organization deploys its resources (Kogut & Zander, 1992).

6.2 How it matters in general

While the dissertation has explored professional services as a complementary organizational capability at EMC and Cisco, other research suggests that this is a much broader phenomenon in the IT industry and in other manufacturing sectors. Chapter 3 makes the case for a broader IT industry phenomenon for established hardware firms that are diversified into supplementary revenue areas such as software. The findings from EMC and Cisco reveal similar evolutionary patterns that are very likely to apply to other IT product firms in dynamic environments no matter which dominant posture a firm pursues. One recent study suggests that IT software product vendors increase their reliance on service revenues as a result of a maturing product line and perhaps a changing business environment (Suarez, Cusumano, & Kahl, forthcoming). Another recent study shows that manufacturing firms across various industries are able to generate shareholder value as they increase their emphasis on services (Fang, Palmatier, & Steenkamp, 2008). While these large sample studies uncover the broad patterns within industries, they are limited in showing how individual firms learn and make sense of a transition towards more services. This dissertation specifically takes a close up look at how young, established innovators cope in fast-changing industries as they fight to keep their innovation edge. EMC and Cisco are well aware of how several more established innovators are certainly

generating shareholder value, but their identity as aggressive innovators is a subject of great debate. As Bill Gates questioned the innovators decision to increase services income, he acknowledged shareholder value from such a services strategy where "producers retreat from the front lines, exhausted from battling the latest Silicon Valley startup and its kamikaze products, shareholders will cheer."[243] But as we see with EMC and Cisco, even the young aggressive innovators must wrestle with a services strategy whether it be continuing existing customer support programs or creating new value-added services.

The dissertation findings can also inform managers in other manufacturing sectors. A young research area known as the servitization of manufacturing has also been examining a shift towards more services by manufacturing firms (Gebauer, Fleisch, & Friedli, 2005; Neely, 2008; Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988). The dissertation adds to that general conversation by specifically emphasizing one type of service expansion whose business model is somewhat different than what exists in the core business of the firm. The findings here also highlight the patterns and challenges in a fast-moving dynamic manufacturing environment.

More generally, the dissertation findings can inform managers and researchers interested in how complementary capabilities evolve in innovation-intensive environments. For example, manufacturing is often cited as an important complementary capability for innovators (Milgrom & Roberts, 1995; Teece, 1986), but many innovators are outsourcing that capability to partners such as contract manufacturers. Firms often develop an initial affinity for manufacturing but later outsource to partners who demonstrate a comparable ability to what is performed internally. This dissertation shows how new complementary capabilities emerge and evolve in dynamic settings. Given that core competence is very persistent, the dissertation informs researchers how different types of capabilities perhaps face unique challenges within dynamic environments.

6.3   Managerial implications

The dissertation findings inform managers on what types of dilemmas are faced if and when they decide to activate new complementary capabilities such as professional services – whether by "make" or by "partner." In Figure 6.2, I put forth a flowchart that can help managers navigate through a series of decisions based on their long-term objectives. The flowchart works together with the organizational capability states presented in Table 2.1. As a brief recap, core

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[243] "The road to ruin – services," Forbes, Vol. 162, Issue 8, Oct 12, 1998.

capabilities are central to the firm's identity and largely shaped during the founding of the firm. The core is owned and persistent. Supplementary capabilities are linked to diversification events as the firm expands into new businesses to provide additional revenue contribution. Supplementary may be loosely coupled to the core, but tends to be a business that can stand on its own. Complementary capabilities are attached to the core either through a tight or loose coupling. Complementary may provide some revenue contribution, but that is now how it will be evaluated for success. The flowchart walks through two key decisions: firm scope and type of capability.

The first decision is whether the manager wants to own (i.e., integrate) the capability within the firm. The capability is most likely complementary if the manager wants to access through partners. The number of partners and various contractual terms will need to be worked out. How to manage fast-changing conditions, the level of exclusivity, and joint incentive programs will be key issues to be considered. The access path is called the "scale & skill" scenario. The manager can benefit quickly from partners who have prior experience and expertise. However, this scenario presents some classic transaction cost economics dilemmas that are discussed more in depth in other articles (Langlois, 1992; Macher & Richman, 2008; Williamson, 1979).

When the manager wants to build a new organizational capability, the second decision is to determine what type of capability is intended. The manager who intends to build a new professional services organization as a core capability will face a very challenging task. If the firm currently has such an organization in a complementary or supplementary state, they have a chance with active executive-level support. IBM's transition to a services-led model with Global Services did not start from scratch. They had been running the ISSC organization as a wholly owned subsidiary for a few years, which means they had learned how to operate as an independent business although they primarily worked on IBM projects. This suggests that professional services was in a supplementary state having already established credibility and a reasonable level of scale to deliver consistently. Even with that prior experience and CEO backing, the transition to Global Services was painful. The product firm who has no prior experience running a professional services business and who wants to immediately establish it as a core capability should stop and reconsider starting at a different capability state.

If the objective is to own and run professional services as a supplementary business with significant expectations for revenue and profit contribution, the manager must again assess where the firm is starting from. If starting from scratch, the manager has a classic diversification decision to make: organic development (hire one employee at a time) or acquisition. An acquisition has its own unique set of integration challenges to consider. Organic can work if the management team sets expectations accordingly and communicates them with existing organizations that will be affected. If a professional services organization currently exists within the firm, the manager's easiest task will be to add more resources. The biggest problem will come from how to reset expectations relative to the core, which has shaped the dominant business model.

Finally if the objective is to own and establish as a new complementary capability, the manager has to decide at what rate it wants to build this business. If the manager needs the capability activated in the short term, an acquisition should be carefully considered. Acquiring a firm where the business of professional services is the core capability could be a big problem for the acquirer. Once acquired, the services business would become a support function to the core rather than the core itself. That presents a major adjustment issue for all employees within the target firm.
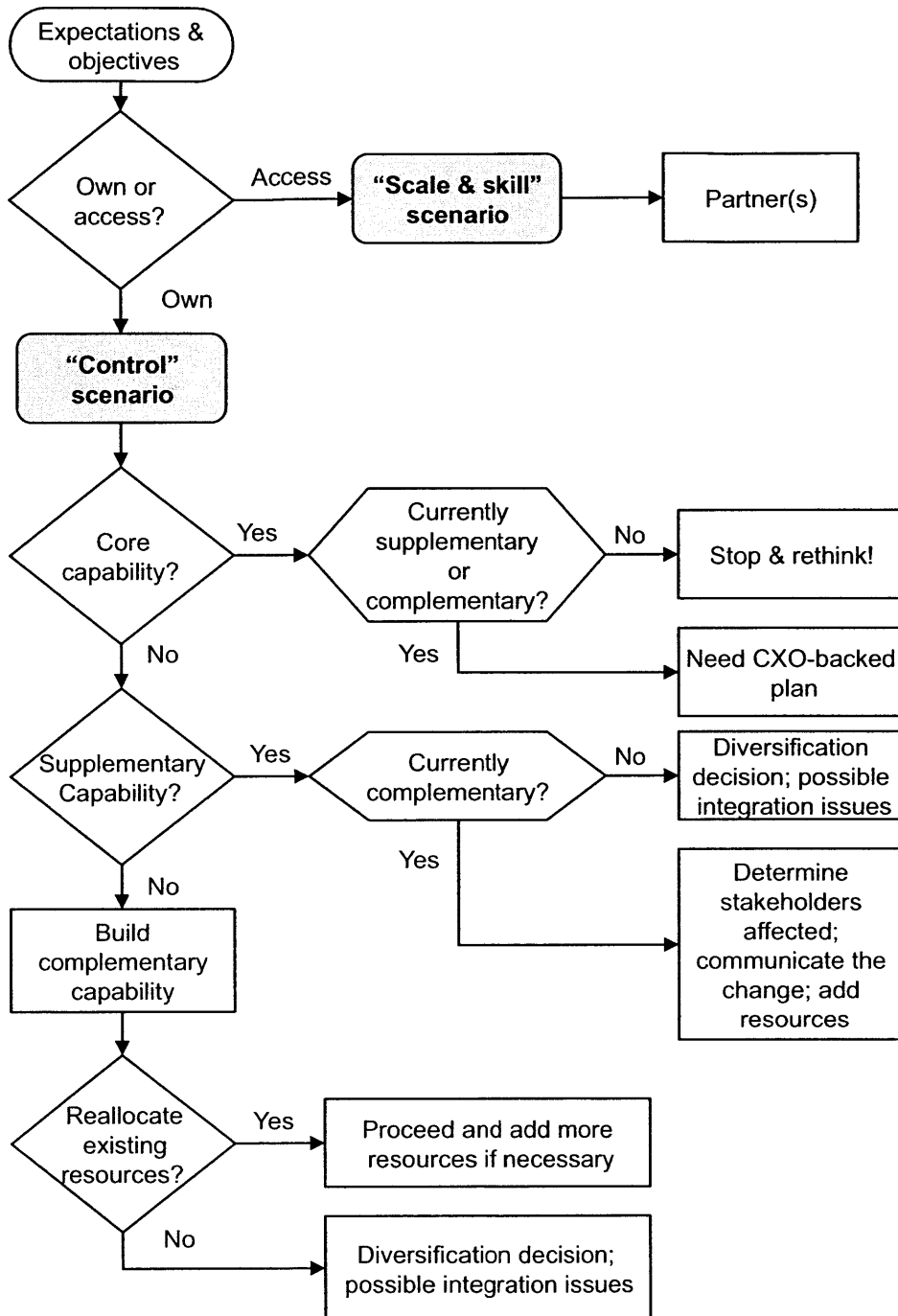
Expectations & objectives

Own or access? —Access→ **"Scale & skill" scenario** → Partner(s)

Own

"Control" scenario

Core capability? —Yes→ Currently supplementary or complementary? —No→ Stop & rethink!

Yes → Need CXO-backed plan

No

Supplementary Capability? —Yes→ Currently complementary? —No→ Diversification decision; possible integration issues

Yes → Determine stakeholders affected; communicate the change; add resources

No

Build complementary capability

Reallocate existing resources? —Yes→ Proceed and add more resources if necessary

No → Diversification decision; possible integration issues

Figure 6.2. Flow chart for adding new organizational capability

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