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ABSTRACT

The data communications industry is being restructured through strategic alliances. The industry's eccentricities create special operating problems for using such inter-firm linkages. Because in data communications the product is a service that depends for its success on access to a communications network, partner relationships will be asymmetrical in their stability. Because labor is the critical source of competitive advantage for some parts of the data communications service offering (and the proprietary features of firms' offerings are especially susceptible to appropriation by competitors), alliances tend to be fragile and short-lived. Suggestions are offered concerning how strategic alliances might be structured and operated to mitigate the structural problems created by bringing together diverse partners with dissimilar (often contradictory) needs.

Strategic alliances are agreements among firms to work together to attain some strategic objective. They have become one of the most significant changes in firms' business strategies in the last quarter of the twentieth century. The use of strategic alliances to accomplish managerial objectives will become commonplace by the twenty-first century, for no other organizational arrangement makes firms as well-suited to cope with the diverse pressures of international competition that many industries will face as do strategic alliances.

Prior to 1989, the desire to attain the economic benefits of vertical integration -- the idea that firms could do a variety of their vendors' and/or distributors' tasks in-house -- had the greatest influence on how firms defined their missions, managed organizational complexity, and assessed the profitability potential of formerly-nonintegrated industries. Under the vertical integration framework for thinking about corporate strategy, firms acquired other firms engaged in the business activities that they could not nurture in-house. By the year 2000, however, strategic alliances will become the most important influence on how managers conceptualize their firms' strategies (for reasons explained herein) and the most important managerial innovations will be the management systems they put in place to harness the power of strategic alliances.

STRATEGIC ALLIANCES IN DATA COMMUNICATIONS

Strategic alliances have become especially-popular within industries where competition has become more challenging -- industries like the data communications industry where firms face shorter product lives, deregulation,

import competition, and blurring boundaries between industries that were once technologically distinct. As the data communications industry is restructured by the use of strategic alliances, more and more firms become candidates for such partnerships; Briefly, in the face of arduous competitive behavior, it is becoming increasingly difficult for firms to go it alone in the data communications arena.

This change -- the increased need for strategic alliances in the data communications industry -- will pose significant competitive challenges for firms that have not yet learned to use them effectively. Through these alliances, firms that once developed vertically-integrated structures must evolve into critical nodes within networks of regular "dancing partners" that look to each other -- as well as to their long-term suppliers and customers -- to accomplish their strategic purposes. Their younger competitors (who never acquired the mental baggage associated with vertically-integrated strategies) must stretch through strategic alliances to access the critical networks of partners that will allow them to keep up with the pack. Savvy firms in data communications are not likely to be "wallflowers" as this industry restructuring occurs. Their managers are testing the waters now to find the ways of cooperating, partners and managerial styles that suit them best.

Examples of Cooperation in Data Communications

The "data communications" industry is defined herein as comprising those activities which are tracked under the following industry groupings: communications services, communications equipment, computers and peripheral equipment, and software and databases. (See the Technical Appendix for infor-

mation concerning data sources.) Strategic alliances are now being used in ways that have the effect of changing the structure (and hence the profitability potential of) this data communications industry. Firms are propelled into strategic alliances for several reasons.

Changes in the telecommunications industry's regulatory environment account, in part, for the recent flurry of strategic alliances depicted in Table 1, but they do not explain all of the interest among data communications firms in taking partners. During the 1980s, many electronics, information processing, software and telecommunications firms were forming strategic alliances to develop new technologies and products because no firm could invest enough research money to develop in-house every product needed to compete effectively. Collaboration had become so important to the interface between communications and data processing that some companies were investing in their partners to cement their relationships and alleviate their fears. During this era, Northern Telecom formed cooperative agreements for equipment standards with over thirty firms. IBM ventured with Mitel, initially, then cooperated with (and later acquired, then divested) Rolm. As early as 1985, a joint venture between AT&T and Philips NV won a contract from British Telecom for specialized switching equipment.

The difficulty of mastering telecommunications technology motivated several other firms to cooperate. To ensure survival in the competitive environment of office automation/computerization, computer manufacturers entered joint ventures and other alliances to beef up their product lines. Rolm and Northern Telecom Inc. each formed technical pacts with Digital Equipment, Hewlett-Packard Co. and Data General, for example. Datapoint, Xerox, and Wang formed consortia to promote the idea of using higher speed local-area-networks

to link different brands of equipment. NCR bought a 19 percent interest in Ztel Inc., a start-up PBX firm. Western Union purchased 25 percent of Vitalink's shares. Control Data invested in a 35 percent share of Centronics' equity and between 30 and 40 percent interest in Source Telecomputing. LM Ericsson formed a joint venture with Honeywell, Inc. (Table 2 presents 1989 announcements of data communications alliances.)

The first local-area-networking (LAN) approach that was embraced as an industry standard, Ethernet, was jointly promulgated by Xerox, Digital Equipment Corp and Intel Corp. The partners published technical papers describing their use of Xerox's Ethernet in their LAN approach and invited vendors to wire up accordingly. (Over 16,000 LAN networks were in operation linking computers within offices in 1985, but often hardware had to be compatible. Vendors like IBM, Ungermann-Bass, and many others formed joint ventures to overcome this hurdle. They cooperated in creating hardware, software, compatibility-ensuring connecting devices, or all of these components of LAN systems.)

In 1985, General Motors created a standard for its factory-automation vendors by requiring all factory equipment it purchased to conform to a set of rules by which robots, machine tools, computers and other factory-floor equipment communicated. The integrated circuitry, software, and connecting devices for this standard was supplied by Industrial Networking (the strategic alliance of GE and Ungermann-Bass). Had its vision of integrated and automated factories been realized, General Motors facilities throughout the globe could .pa have been linked through data communications systems which several firms were striving to create.

Restructuring the Data Communications Industry

Because strategic alliances have the potential to change an industry's structure where they are pursued effectively, they can have the same far-reaching impact as firms' decisions to enter a marketplace, exit from a business, expand (or contract) productive capacity, or change relationships with their sister business units (e.g., vertical integration). They bring about structural changes in an industry's competitive environment like these other strategic decisions, and they can become a source of competitive advantage over firms that operate without the benefit of strategic alliances.

Effects of Industry Structure

When I say that strategic alliances can induce changes in competitive environments I mean that joint ventures can affect the profitability potential of an industry by changing its structural traits. Strategic alliances can be used effectively to promulgate standards or develop other infrastructure in young industries; they can be used effectively to consolidate excess capacity in mature industries. But as competitive conditions change, so too does the nature of relationships between the strategic alliance and its competitive environment. Changes in these relationships, in turn, precipitate further changes in the profitability potential of the venture's industry. The ineffective use of strategic alliances can actually harm industry profitability by eroding favorable structures and amplifying the harmful effects of competitive behaviors.

It is necessary to anticipate these changes in the strategic planning effort because no one strategic alliance strategy is appropriate for all situations. Strategic alliances that were once sufficient for industries' success

requirements have grown out-of-synch with those requirements over time as infrastructures evolve. Briefly, the "best" cooperative strategies for a particular competitive environment cannot necessarily be used in the same way as competitive conditions change and the use of strategic alliances accelerates the pace of change in an industry's structure.

Key Structural Changes in Data Communications

Two key structural changes in the data communications industry are accelerated by the use of strategic alliances: changes in firms' value-adding systems and changes in capacity expansions. Briefly, ownership of key resources needed to provide data communications products is being shared or is being supplanted by agreements giving firms the right to use resources that they cannot afford to own. These resource-sharing arrangements are changing the content of traditional buyer-supplier roles among vendor firms (and their respective suppliers) into one of closer coordination and longer-range resource commitments. Finally, resource-sharing arrangements are reducing the number of facilities that need to be constructed to provide would-be vendors with market access. Hence, competition for data communications customers will be waged in service -- by offering a greater variety of product capabilities and configurations, increasing value-added content in products, and devising new vendor-user roles in customer industries.

The behavioral results of these structural changes offer several potential benefits and costs to data communications firms. Investments in fewer capital-intensive facilities will reduce the likelihood of the kind of excess capacity that plagues many other mature industries when competitive shakeouts

occur. Greater reliance upon fewer communications networks (and other capital-intensive resources) will accelerate competition on the basis of quality in that portion of the industry's value-adding system (because other product differences among network companies will quickly be neutralized). Competition on the basis of value-adding customization -- through componentry and software -- will become a major battlefront.

Reasons for Cooperation in Data Communications

Firms may pursue strategic alliances for internal benefits, such as risk-sharing, lack of outside markets, scale economies, access to better information and practices, and the reduction of personnel turnover. Managers may believe that strategic alliances give their firms competitive advantages, such as influence over an industry's evolution, timing advantages, and the opportunity to build more effective systems for serving desirable customers throughout the globe. Finally, strategic alliances may facilitate operating synergies among firms' business units, transfer of technology, or other benefits of diversification that result in skills sharing if the management systems created to utilize them are effective.

Strategic alliances will be used with increasing frequency in the data communications industry because of changes in the skills needed to survive -- due to the accelerating pace of technological change and the broader range of technological capabilities firms must possess. As more firms are discouraged from undertaking further risky ventures (because they could not recover their seed capital from earlier investments that faced shortened product lives), even bitter competitors will be sharing technical standards in order to commer-

cialize cutting-edge technologies before they become obsolete. Where proficiencies in data-processing and telecommunications are demanded by customers but possessed by no single vendor, strategic alliances are the logical short- term solution. Given the large minimum efficient scale associated with manufacturing communications equipment, it is scarcely surprising that firms will wish to pool their productive capacities to utilize plants efficiently (while concentrating individually on activities with greater value-adding potential). Moreover, as deregulation and trade agreements open formerly-closed markets to new competitors, strategic alliances are even more likely to be formed where firms fear being left behind.

Strategic alliances have long been used by entrepreneurial firms to expand into new businesses and to tap into new markets, particularly within newly-industrializing nations where taking a local partner is the price of admission. Now taking partners has become the ticket of admission for many firms to participate in the potential profitability of the data communications industry -- not only as a condition for selling products in certain markets where governments sponsor local champions and legislate locally-manufactured content levels in products sold in their domains. Many firms participating in the data communications industry "have a tiger by the tail." Customers' "wants" frequently exceed vendors' abilities to supply desired products in the configurations that best suit customers. Vendors cannot keep abreast of demand changes without assistance from other firms.

Introducing New Products

Technological progress is a two-edged sword. Improved communications and computational power allows firms to exploit the advantages of a global organization that can track lower materials costs, labor productivities and other sources of comparative advantage and exploit these opportunities in a program of world-wide sourcing. With this information, firms can erect manufacturing plants in many geographic sites and coordinate their efforts through their improved control systems. Potential cost advantages accruing from supply networks that span their many factory locations, assembly plants, warehouses and distribution systems within several countries motivate customers to press their vendors for improved products.

Strategic alliances allow firms to accelerate the introduction of pioneering products, like the fiber-optics venture between Siemens AG and Corning Glass Works, or the robotics ventures between Fujitsu Fanuc and General Motors and General Electric, respectively. Combinations like the NEC-Honeywell-Bull joint venture give customers broader product choices at lower risk to their developers.

Although strategic alliances may bring products to customers faster, their use raises a warning flag for inexperienced firms. Because cooperation to sell products into the rich markets of Japan, Western Europe, and the United States will continue to be a primary motive for taking partners, firms must control effective distribution systems and command strong customer loyalties in their home markets if they hope to exploit the advantages of strategic alliances without giving away their competitive birthrights.

Keeping Abreast of Technology

Technological prowess is one of the keys to attaining competitive advantage in industries where technologies change frequently, are highly risky and require extremely high creativity in design and precision in manufacturing. It may also be a way to change an industry's structure to a firm's advantage. But many technologies that firms invest in are very expensive failures. Strategic alliances permit firms to share those risks by hedging their bets concerning which products, processes or configurations will become industry standards. Moreover, they permit firms to keep abreast of technological innovations by providing a means of sharing development costs on many alternative technological routes to solving a specific problem.

A desire to "keep up with the pack" motivates many firms to undertake strategic alliances that are similar in spirit to those underwritten by Japan's Ministry of International Trade and Industry (MITI) -- arrangements in which competitors cooperate initially by pooling their efforts to develop cutting-edge technologies, but compete head-to-head later in the worldwide arena to exploit their jointly-developed technologies. In the European Economic Community, consortia of firms cooperate to create data communications products with technological half-lives too short for recovering developmental investments by working alone. In the United States also, consortia of firms pool their R&D capabilities to pioneer data communications technologies. Even teams of firms which each have a variety alliances with other firms as well as with each other use strategic alliances as a way to keep up with their powerful rivals.

The data communications industry exemplifies an environment where technology changes rapidly and strategic alliances must become commonplace.

OEM arrangements must be very transient in such industries in order for firms to obtain components and products that fit their needs for features or low costs. Strategic alliances can rarely endure beyond one technological life in such settings unless special management systems and operating policies are set in place.

Sharing Technological Standards

Cooperation to establish technological standards will accelerate the development of complex systems, like the communications networks which are the backbone of the data communications industry. Strategic alliances are inevitable where technologies require the interconnection of devices made by a variety of vendors because, although expanded computing power and enhanced telecommunications capabilities promise that global coordination of a firm's factories will be possible, as yet, no one firm possesses all of the capabilities needed to deliver the promise of such factory-automation systems. Cooperation must become routine to maintain worldwide compatibility and enhance communication among data-processing, factory-automation, and other "intelligent" devices needed to deliver products with higher value-added.

SPECIAL PROBLEMS IN DATA COMMUNICATIONS ALLIANCES

The data communications industry's eccentricities create special operating problems for using strategic alliances. Briefly, because the data communications product is a service that depends for its success on access to a communications network, partner relationships will be asymmetrical in their

stability. Because labor is the critical source of competitive advantage for some parts of the data communications service offering (and the proprietary features of firms' offerings are especially susceptible to appropriation by competitors), alliances tend to be fragile and short-lived.

Product Differentiability

Customers are rarely satisfied. The more service -- value-added in product features, customization, and ancilliary activities -- that vendors provide customers, the more improvements customers demand. The market for data communications products is so diverse that there are many ways for vendors to differentiate their product offerings (and a great many vendors will try to satisfy the heterogeneous market for data communications products). Unfortunately, the economics of providing highly-customized products are not always conducive to survival unless the volumes demanded are large enough to realize some scale economies in doing so. It is necessary to develop a "critical mass" of customers quickly if products requiring heavy capital investments (like fiber-optic communications networks) are to survive. Given this need to develop large markets for new products quickly, a window of opportunity exists for using strategic alliances to bring many potential customers into the data communications market quickly. That opportunity window may be slammed shut, however, by the next wave of innovation.

Rapid Technological Obsolescence

The rapid technological change which characterizes the data communications industry is propelled by the ever-greater numbers of participants which strive to offer valued products to a customer base that is not growing as rapidly as the number of would-be vendors is growing. Many new entrants survive because they are allied with strong partners. Draconian survival laws driven by cost-benefit analyses are frequently suspended for these strategic alliances because of the "experimental" nature of such organizational arrangements. Darwinian laws of survival are similarly suspended and too much capacity for serving customers (often at uneconomic prices) results.

The time of mutual attraction between partners to a data communications strategic alliance is likely to be especially short-lived because products grow obsolete quickly. Partners' needs become more quickly at odds with each other where product capabilities and configurations change rapidly, especially where powerful and demanding customers can accelerate the pace of obsolescence. Firms that provide capital-intensive resources face pressures and needs different from their partners who provide labor-intensive, value-adding resources to an alliance.

Expropriation of Proprietary Knowledge Embedded in Intellectual Resources

The pace of technological obsolescence in data communications products is further accelerated by the difficulty of keeping some aspects of the total "system" proprietary. This difficulty is compounded by the need for many firms to create competitive advantage through investments in labor resources instead

of capital assets. Intellectual property rights are difficult to defend; intellectual resources are often closer to target customers and mobile. There is some risk that the close coordination that is sometimes required to operate strategic alliances involving products that are systems involving networks and add-on features will alienate creative personnel resources (Harrigan, 1985; 1986).

STRUCTURAL CHANGES ANTICIPATED IN THE DATA COMMUNICATIONS INDUSTRY

Results (reported elsewhere, Harrigan, 1987) in testing models of industry change suggest that cooperation among vertically-related sponsors (the most commonplace alliance in the data communications industry) will accelerate demand growth (by creating viable products faster than if each partner entered alone), encourage industries' infrastructures to develop faster, increase concentration, and accelerate the pace of technological obsolescence. These structural changes create special operating pitfalls that data communications firms must overcome in order to use strategic alliances effectively.

Demand Uncertainty

High demand uncertainty increases firms' propensities to form shared-equity joint ventures (and other stabilizing forms of strategic alliance). Because high demand uncertainty raises exit barriers (by holding out the possibility that sluggish demand would revitalize) and increases the importance of talented personnel to the task of value-creation (by affording firms greater

flexibility to customize products to shifting customer tastes) sponsors that do not grant their strategic alliances enough operating autonomy risk destroying their industry's profitability potential by exacerbating destructive competitive behaviors.

Results suggest that big increases in the rate of demand growth encourage the use of shorter-lived forms of strategic alliance -- such as short-term sourcing arrangements, temporary cross-marketing arrangements, and other highly flexible forms of cooperation -- perhaps as stopgap measures until swings in demand stabilize. Results suggest that shared-equity joint ventures slow recent industrywide demand growth -- perhaps by accelerating saturation of primary demand. Increasing concentration encourages demand growth, as does earlier technological innovation. Substantial changes in demand growth increase competitive volatility. Industry infrastructure formality -- in vertical integration arrangements, product standards, and entry barriers -- will not be stable while demand is still growing. Rapidly-growing demand triggers increased concentration -- as wealthy firms seeking to invest in promising industries acquired several firms in a growing industry. Positive swings in demand growth slow the pace of technological change, reflecting the higher risks associated with introducing new products and processes before demand for them is well established. Negative swings in demand growth instigated a flurry of innovation among firms that hoped to revitalize flagging demand. Positive changes in demand growth raise exit barrier heights, as firms that forecast industry attractiveness by using historical extrapolations valued a continued industry presence more highly than the value realized through cutting their loses early.

Capital Intensity

Capital-intensive technologies increase the attractiveness of forming equity joint ventures (and other less flexible forms of strategic alliances). Because managers consider ventures based on the sharing of tangible, physical assets to be less risky than ventures based on the sharing of intangible and easily-appropriated sources of competitive advantage, more shared-equity ventures are found in those industries comprising the total system of data communications products where massive investments in capital assets were part of the ticket of admission.

Changes in the Pace of Technological Obsolescence

It is possible to over-engineer a strategic alliance. No where is this risk greater than in industries where technological obsolescence is accelerating. Results suggest that the recent globalization of the data communications industry has contributed to the accelerating pace of technological obsolescence.

Data communications is one of the industries experiencing a spiralling effect whereby the product and/or process improvements that made earlier technologies obsolete compound their effects by driving these industries into further generations of technological obsolescence. The pace of technological innovation increased in it geometrically where many strategic alliances were in use. Because of this, I conclude that shared-equity joint ventures are best used in environments with slower paces of technological obsolescence. This result is scarcely surprising because firms lose too much strategic flexibility

by committing to shared equity arrangements in strategic alliances with very short half-lives. Only seventeen percent of all shared-equity joint ventures in my total sample were formed in environments experiencing rapid rates of technological obsolescence in recent years.

Flexible strategic alliances enhance demand growth, encourage changes in industry infrastructure, reduce the number of surviving vendors, accelerate the pace of technological obsolescence, ease firm's movements from less attractive market segments to more attractive ones, and increase the importance of sustaining a competitive advantage by recruiting well and retaining critically-skilled personnel resources. Substantial changes in the rate of technological obsolescence encourage demand growth, lower exit barriers, and exacerbate infrastructural turmoil -- because product and/or process standards are constantly changing.

Customer Sophistication

The presence of highly sophisticated customers increases the need for close coordination between sponsors and strategic alliances. The strategic inflexibility created by strong customers is particularly intense where strategic alliances and sponsoring firms both served the same powerful customers.

Service Content of Products

Products with high proportions of services (rather than manufactured outputs) are associated with (1) relatively young and growing industries and (2) with industry structures that are developing clear product standards, (3) stable buyer-vendor relationships, and (4) higher entry barriers like the data communications industry. The high coordination needs associated with delivering services of high quality increase the need to form equity joint ventures (and other less flexible forms of strategic alliance). Given their high dependence on flexible assets, products with high proportions of services as part of their product offerings do not have high exit barriers. Since the effective delivery of services requires careful coordination between sponsoring firms and their strategic alliances in all activities of a value-adding enterprise, strategic alliances in these industries cannot enjoy the same high operating autonomy of ventures with capital-intensive technologies. This condition creates greater tensions with the creative, intellectual resources who are critical the the success of such strategic alliances.

Global Markets

Global markets -- those diverse geographic markets that accept standardized product solutions -- reduce the attractiveness of shared equity and shared decision-making arrangements. Because of the difficulties of coordinating actively-involved partners' value-creating activities across several geographic boundaries (as would be necessary to customize products for diverse end users) partners are rapidly likely to become frustrated with each other if they try to coordinate their strategic alliance's activities too tightly. Because greater strategic flexibility is needed to manage the

downstream aspects of global strategies effectively, more vertical quasi-integration and highly- flexible forms of strategic alliance are needed to enter overseas markets in global industries.

Changes in the Importance of Personnel Resources

Substantial increases in the importance of talented personnel to value-creation in strategic alliances -- especially in the (1) training and skill levels required of personnel who deal with customers, the (2) importance of product and/or process protection to competitive success, and (3) whether an individual's specific talents added significantly to a product's differentiation -- result in a more fragmented industry structure of less concentration of assets in the hands of few competitors and a more rapid rate of technological change. Results reflect a commonplace confusion about the nature of global strategies: value that is added in marketing activities that are unique to each regional market increase the relative importance of personnel resources while activities that can be standardized across the globe are less sensitive to the value-adding contributions of personnel resources.

Changes in Industry Infrastructure

Substantial structural changes (as an industry evolves from an embryonic one to an established one) in (a) the extent of upstream or downstream vertical integration relationships, (b) extent to which product standards were well-established, and (c) the height of entry barriers leading to a better-established industry structure slow the pace of demand growth and technological

change while also lowering exit barrier heights. As was explained above, demand growth precipitates changes in the formality of an industry's infrastructure. After investments have been made in appropriate infrastructures -- in larger minimum efficient scale plants and appropriate distribution channels -- supply and demand are temporarily in balance, until the next revolutionary technological investment precipitate another wave of demand growth, technological change, and infrastructure change. Each infrastructure adjustment lowers previous exit barriers by changing the critical success factors firms must control to continue to compete in that particular industry. Personnel resources increase in importance as the industry's infrastructure evolved into greater formality -- as scale economies gave way to scope economies and firms outsourced those value-adding tasks which they could no longer perform as well in-house.

Changes in Concentration

Substantial increases in industry concentration reduce the likelihood that competition will be volatile. Earlier increasing concentration creates the necessary credibility among customers that spurred subsequent demand growth. Subsequent infrastructure changes precipitated by earlier increasing concentration include entry by non-traditional (often technologically-innovative) competitors and greater use of quasi-integration arrangements to supplant past vertical integration. In data communications, these quasi- integrated arrangements are frequently strategic alliances. Stagnant earlier industry conditions -- such as increasing concentration -- form the necessary pre-condi-

tions for subsequent revolutionary technological change. New entry is also accomplished through strategic alliances in data communications.

Changes in Exit Barrier Heights

Substantial increases in exit barriers -- in the (a) the durability and specificity of physical assets, and (b) the significance of goodwill created by promotional and advertising investments, for example -- increase firms' propensities to use price-cutting forms of competition and to reduce firms' strategic flexibility.

Results from the full sample suggest that there is a window of opportunity in forming strategic alliances. Those formed late in an industry's evolution are less likely to be successful. Results also suggest that strategic alliances with "patient" sponsors are more likely to be regarded as mutually successful; strategic alliances which were given ample time to attain their objectives were more likely to be considered successful, especially if they were shared-equity joint ventures.

DESIGNING BETTER STRATEGIC ALLIANCES

Although strategic alliances offer more participants a window on new technologies, they offer the individual firm little advantage unless it possesses the means of exploiting the products and processes the venture develops. For many firms, effective use of strategic alliances will require new internal management systems and external attitudes regarding the value of technological

cross-fertilization. The way must be cleared for cooperation through massive campaigns of education and persuasion at the business unit, corporate, regional, and national organizational levels.

Too often managers from disparate partners within venture cannot work together due to conflicting management styles or personal conflicts. Partners' priorities, values, and trade-offs may be too diverse, especially if they are of unequal sizes (or organizational complexity), experience levels, or value systems.

To avoid problems associated with using strategic alliances, managers should better prepare their internal organizations for the idea of strategic alliances. Although it is important to choose the "right" partner for strategic alliances, it is also important to know when to exit. Managers must devise tests to verify their alliance's performance, lest they procrastinate unduly in exiting from losing operations. Partners must explicitly accommodate the dynamics of their alliance relationship when writing agreement because success requirements in the data communications industry are certain to evolve.

The challenge of remaining competitive in the data communications industry will likely be met through greater use of cross-national strategic alliances among firms that are headquartered in mature economies. Thus managers must be more careful about designing management systems that harmonize differences in sponsoring firms' cultural values. Strategic alliances are an important change in the way that firms do business. They require a different approach to management by virtue of their complexity. If managed skillfully, joint ventures can offer sponsoring firms a wider range of strategic flexibility than they can hope to develop by going it alone in the global arena.

Let's Dance

What do these changes imply for effective managers? Savvy managers have already started their search for "Prince Charming." Because it is sometimes difficult to predict which frogs will metamorphosize to princes later, many firms are testing the strategic alliance waters early by working with potential partners now. Recognizing that championship dancing teams need ample practice, managers are learning about the candidates who may become their firms' regular "dancing partners" later by working with them in low-risk relationships like joint development, sub-contracting arrangements, and other projects.

Savvy managers are also getting their own organizations in shape for the rigors of venturing effectively. Recognizing that effective use of strategic alliances requires managers to develop special liaisoning skills for coping with the mixed loyalties and conflicting goals of shared ownership and shared decision-making, they are instilling their firms' with team-building values and a greater receptivity to outsiders' ideas. They recognize that good marriages are not created with a handshake and stroke of the pen. Rather, they know that strategic alliances are, in fact, as difficult to sustain and nurture as marriages are. Joint ventures need as much attention and support from their parents as babies do. Instead of rushing headlong into a flurry of strategic partnering, savvy managers are now moving into long-term relationships with their cross-national counterparts slowly and purposefully -- hoping to avoid many of the mistakes created by the kneejerk venturing behaviors of the early 1980s.

In summary, the future will bring more -- not fewer -- strategic alliances in data communications because managers realize that the benefits provided by

joint ventures and other cooperative strategies make them well worth the extra effort of learning how to manage them effectively. But savvy managers are more choosy about who they take as their partners, lest they give away their birthrights in their eagerness to please while courting.

GLOSSARY

"Joint ventures," are strategic alliances which create entities owned by two or more sponsoring firms which share risks, returns, and decision-making (unless one partner takes a passive role) while combining partners' resources and skills in the venture's operations. Examples include Prodigy Systems (IBM and Sears), Gemco (Merrill Lynch and McGraw-Hill), and Industrial Networking (General Electric and Ungermann-Bass), among others. Firms share equity ownership in joint ventures, and may share decision-making responsibility for their day-to-day operations as well.

Firms are also cooperating through non-equity forms of strategic alliance and these include co-marketing, co-promotion, cross-distribution, cross-licensing agreements, cross-production, joint bidding activities, minority investments, and research and development partnerships. Although firms' personnel work together in these arrangements, they do not necessarily create a separate entity as in a joint venture. In these forms of strategic alliance, tasks are performed by cooperating firms within their respective facilities, as in the example of agreements to act as second-source vendor for well-specified products like electronic components.

"Co-marketing agreements" permit one firm to market and sell the products of another under its own brand name in a specified geographic region. Such agreements are used to fill out firms' respective lines to offer customers a wider array of products. If each firm to the agreement receives products to market and sell from the firm, the arrangement is often called a "cross-distribution" agreement.

"Co-promotion agreements" permit one firm to market and sell the products of another under the originating firm's brand name in a specified geographic region. Unlike the co-marketing agreement, goodwill for a rival brand name is not created when firms fill out their product lines in this manner.

"Cross-licensing agreements" cover technology developed independently by separate firms for the same (or similar) products or processes. Firms trade licenses to gain knowledge.

"Cross-manufacturing agreements" enable partners to attain scale economies by using their facilities efficiently. Each firm specializes in making one of the inputs required for all partners. Cross-manufacturing agreements are a way of reducing excess capacity when industry-wide demand plateaus or declines.

"Joint bidding consortia" members often subdivide tasks associated with a contract after their bid is accepted (so that each firm has a separate contract with the customer for a portion of the work). Once the consortium's bid is accepted and each member completes its task, alliances dissolve. Sometimes partners for one bidding consortium compete against each other simultaneously in bidding for other contracts.

"Minority investments" do not create a new entity; instead the investing firm purchases some equity in an ongoing firm as in the example of IBM's investment in MCI Communications. These investments may be made to fortify a

fledgling firm against stronger competitors or to improve a pioneering firm's staying power until its products have been accepted by customers.

"Research and development partnerships" are agreements to fund research in order to accelerate their respective pace of innovation. Under the terms of many R&D partnerships, a general partner contracts with the user group (the sponsoring consortium) to take or pay for a specified volume of product (such as megabyte semiconductor chips, for example), contingent on the manufacturer meeting predetermined cost and performance specifications. The general partner contracts with appropriate laboratories to do the development work, and the technology is licensed back to the consortium when the product is developed. The consortium may even choose one of its members to manufacture the product for the others until sales justify the construction of more than one plant.

A "spider's web" of strategic alliances link many firms to one pivotal partner. Depending upon the needs of each partner and the sensitivity of information and resources to be exchanged, a firm (like A.T. & T. or IBM) could forge strategic alliances with several firms who may be competitors of each other, and thereby form a network of alliances. A spider's web of alliances is one way to hedge a firm's bets concerning which of its partners will eventually attain dominance in a developing industry.

TECHNICAL APPENDIX

Announcements of strategic alliances were collected by industry for the the years prior to 1975, for 1975 to 1978, for 1979 to 1981, for 1982 to 1984, and for the years 1985, 1986, and 1987 individually from listings of joint ventures (and other forms of strategic alliance) in Mergers & Acquisitions and the Funk & Scott Index of Corporate Change. (These sums are displayed in Table 1.) These announcements did not include those strategic alliances which affect commerce only outside of the United States.

The United States has seen a virtual explosion in the 1980s in the use of shared-equity joint ventures and other forms of strategic alliance. The number of strategic alliances announced in Predicasts' F & S Index of Corporate Change increased by 6 percent from 1984 to 1985, by 21 percent from 1985 to 1986, and by another 21 percent from 1986 to 1987. In a pre-1975 sample of 26 U.S. industries, strategic alliances represented no more than 2 percent of all the U.S. firms or divisions of firms listed (by 4-digit SIC code in the Dun & Bradstreet Million Dollar Directory) before 1975. By 1985, almost 8 percent of all U.S. firms or divisions of firms in those industries were strategic alliances.

Table 1
STRATEGIC ALLIANCES BY INDUSTRY OVER TIME

	Pre-1975	1975-1978	1979-1981	1982-1984	1985	1986	1987
Communications Equipment	2	8	3	38	10	34	38
Communications Services	5	4	13	30	92	45	64
Computer & Peripherals	9	4	12	32	13	13	15
Software & Databases	2	3	7	10	24	21	13

Table 2

TYPICAL STRATEGIC ALLIANCES IN DATA COMMUNICATIONS

Licensing and Technology Transfer Agreements

Geostar	Telecoam Australia	Radio determination satellite systems
Pacific Bell	General DataComm Industries	Develop products compatible with PacBell's Advanced Data Network
Racal-Milgo	Milscan Systems	Advanced facsimile products for teleconferencing, training, and security applications
SynOptics Communications	Adaptec	Develop access to Ethernet networks

Minority Interests

Amoco Technology	MERET Inc.	Analog fiber-optic markets
Geostar	Telefonica (Spain)	Satellite positioning and communications systems
International Telecharge	Peoples Telephone	Pay telephones and operator networks

Non-Equity Joint Activities

Bell Atlantic	Telenet Communications (US Sprint)	Electronic mail service
BellSouth Services	TC Telemanagement	Develop management report generation software using Automatic Call Distribution package
Digilog	Frontier Software Development	LAN testing and management products
Motorola	Timex	Wristwatch pager
Newbridge Networks	Wellfleet Communications	Sell, install and maintain internetworking software
Nynex Information Resources	Advanced Graphic Applications	On-line telephone directory services
Pacific Bell Services	Quantum Computer	Develop intelligent user interface for videotex gateway service
Pacific Bell	Vicorp Interactive Systems	Information storage facility for videotex gateway service

Prime Computer	Dialcom (British Telecom)	Value-added network services
U.S. West	United Cable Television plc (UK)	Build and develop cable systems in the U.K.
U.S. West Network Systems	3Com	Software for managing local-area networks and interconnected Systems Network Architecture networks
	Joint Ventures	
A.T. & T.	American Express Information Services	Interactive voice services for mass home audience participation
GE Information Services	STET (IRI)	Value-added network services in Italy
M/A-COM	Filtronic Components	Microwave subsystem components

Source: Corporate Venturing News, Venture Economics, November 22, 1988 through August 28, 1989.

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