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How can an organization's capabilities exceed the sum of its parts?

MANAGING PROFESSIONAL INTELLECT:

Making the Most of the Best

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In the postindustrial era, the success of a corporation lies more in its intellectual and systems capabilities than in its physical assets. The capacity to manage human intellect – and to convert it into useful products and services – is fast becoming the critical executive skill of the age. As a result, there has been a flurry of interest in intellectual capital, creativity, innovation, and the learning organization, but surprisingly little attention has been given to managing professional intellect.

This oversight is especially surprising because professional intellect creates most of the value in the new economy. Its benefits are immediately visible in the large service industries, such as software, health care, financial services, communications, and consulting. But in manufacturing industries as well, professionals generate the preponderance of value – through activities like research and develop-

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DRAWING BY NARDA LEBO

ment, process design, product design, logistics, marketing, or systems management. Despite the growing importance of professional intellect, few managers have systematic answers to even these basic questions: What is professional intellect? How can we develop it? How can we leverage it?

What Is Professional Intellect?

The true professional commands a body of knowledge – a discipline that must be updated constantly. The professional intellect of an organization operates on four levels, presented here in order of increasing importance:

Cognitive knowledge (or know-what) is the basic mastery of a discipline that professionals achieve through extensive training and certification. This knowledge is essential, but usually far from sufficient, for commercial success.

Advanced skills (know-how) translate "book learning" into effective execution. The ability to apply the rules of a discipline to complex real-world problems is the most widespread value-creating professional skill level.

Systems understanding (know-why) is deep knowledge of the web of cause-and-effect relationships underlying a discipline. It permits professionals to move beyond the execution of tasks to solve larger and more complex problems – and to create extraordinary value. Professionals with know-why can anticipate subtle interactions and unintended consequences. The ultimate expression of systems understanding is highly trained intuition – for example, the insight of a seasoned research director who knows instinctively which projects to fund and exactly when to do so.

Self-motivated creativity (care-why) consists of will, motivation, and adaptability for success. Highly motivated and creative groups often outperform groups with greater physical or financial resources. Without self-motivated creativity, intellectual leaders can lose their knowledge advantage through complacency. They may fail to adapt aggressively to changing external conditions and particularly to innovations that obsolesce their earlier skills – just as the techniques of molecular design are superseding chemical screening in pharmaceuticals today. That is why the highest level of intellect is now so vital. Organizations that nurture care-why in their people can simultaneously thrive in the face of today's rapid changes and renew their cognitive knowledge, advanced skills, and systems understanding in order to compete in the next wave of advances.

Intellect clearly resides in the brains of professionals. The first three levels can also exist in the organization's systems, databases, or operating technologies, whereas the fourth is often found in its culture. The value of intellect increases markedly as one moves up the intellectual scale from cognitive knowledge to self-motivated creativity. Yet most enterprises focus virtually all their training attention on developing basic (rather than advanced) skills and little or none on systems or creative skills.

Most of a typical professional's activity is directed at perfection, not creativity. Customers primarily want professional knowledge delivered reliably and with the most advanced skill available. Although there is an occasional call for creativity, most of the work done by accounting units, hospitals, software companies, or financial service providers requires the repeated use of highly developed skills on relatively similar, though complex, problems. People rarely want surgeons, accountants, pilots, maintenance personnel, or nuclear plant operators to be very creative. Managers clearly must prepare their professionals for the few emergencies or other special circumstances that require creativity, but they should focus the bulk of their attention on delivering consistent, high-quality intellectual output.

The value of intellect increases markedly as one moves up the scale from cognitive knowledge to self-motivated creativity.

Because professionals have specialized knowledge and have been trained as an elite, they often tend to regard their judgment in other realms as sacrosanct as well. Professionals generally hesitate to subordinate themselves to others or to support organizational goals not completely congruous with their special viewpoint. That is why most professional firms operate as partnerships and not as hierarchies, and why it is difficult for them to adopt a unified strategy.

Members of every profession tend to look to their peers to determine codes of behavior and acceptable standards of performance. They often refuse to accept evaluations by those outside their discipline.

Many doctors, for example, resist the attempts of HMOs and insurance companies to tell them how to practice medicine. Such a posture is the source of many professional organizations' problems. Professionals tend to surround themselves with people who have similar backgrounds and values. Unless deliberately fractured, these discipline-based cocoons quickly become inward-looking bureaucracies that are resistant to change and detached from customers. Consider the many software or basic research organizations that become isolated inside larger organizations, creating conflicts with other professional groups such as marketing or manufacturing departments.

Developing Professional Intellect

At the heart of the most effective professional organizations we have observed are a handful of best practices for managing intellect that resemble successful coaching more than anything else.

Recruit the best. The leverage of intellect is so great that a few topflight professionals can create a successful organization or make a lesser one flourish. Marvin Bower essentially created McKinsey & Company; Robert Noyce and Gordon E. Moore spawned Intel; William H. Gates and Paul Allen built Microsoft; Herbert W. Boyer and Robert A. Swanson made Genentech; and Albert Einstein put Princeton's Institute for Advanced Study on the map. But even such organizations must find and attract extraordinary talent.

It is no accident that the leading management consultants devote enormous resources to recruiting and that they heavily screen the top graduates of the leading business schools. Microsoft interviews hundreds of highly recommended people for each key software designer it hires, and its grueling selection process tests not only cognitive knowledge but also the capacity to think about new problems under high pressure. The Four Seasons Hotels often interviews 50 candidates to make one hire. Venture capital firms, recognizing talent and commitment as the most critical elements for their success, spend as much time selecting and pursuing top people as they do making quantitative analyses of projects.

Because the most qualified professionals want to work with the best in their field, leading organizations can attract better talent than their lesser competitors. The best commercial programmers, for example, seek out and stay with Microsoft largely because they believe Microsoft will determine where the industry will move in the future and because they can share the excitement and rewards of being at that frontier. But second-tier organizations are not destined always to lag behind. Managers who understand the importance of the right kind of talent can pull a jujitsu reversal on industry leaders by acquiring such talent. When CEO Marshall N. Carter led State Street Bank's entry into the rapidly emerging custodials business, he hired world-class data processing managers to seed his new organization. Today State Street handles $1.7 trillion in custodial accounts, and virtually all its senior managers have data processing rather than traditional banking backgrounds.

Force intensive early development. Professional know-how is developed most rapidly through repeated exposure to the complexity of real problems. Thus for most professionals, the learning curve depends heavily on interactions with customers. Accordingly, the best companies systematically put new professionals in contact with customers, where they work under the watchful eye of an experienced coach. Microsoft, for example, assigns new software developers to small teams of three to seven people. Under the guidance of mentors, the developers participate in the design of complex new software systems at the frontier of users' needs.

The legendary 80-hour weeks and all-nighters that give investment bankers and software developers their bragging rights serve a more serious developmental purpose: They enable the best talent to move up a learning curve that is steeper than anyone else's. On-the-job training, mentoring, and peer pressure can force professionals to the top of their knowledge ziggurat. Although burnout can be a problem if people are pushed too far, many studies show that intensity and repetition are critical to developing advanced skills in fields as diverse as the law and piloting aircraft.

People who go through these intensive experiences become noticeably more capable and valuable – compared with their counterparts in less intensively managed organizations – within six months to a year. If they are properly coached, they also develop a greater in-depth feel for systems interactions (know-why) and identify more with the company and its goals (care-why). The most successful organizations ensure such growth through constantly heightened (preferably customer-driven) complexity, thoroughly planned mentoring, substantial rewards for performance, and strong incentives to understand, systematize, and advance the discipline. The great intellectual organizations all seem to develop deeply ingrained cultures that emphasize these values. Most others do not.

Constantly increase professional challenges. Intellect grows most when professionals buy into a

serious challenge. Leaders of the best organizations tend to be demanding, visionary, and intolerant of halfhearted efforts. They often set almost impossible "stretch goals" – as did Hewlett-Packard's William R. Hewlett (improve performance by 50%), Intel's Gordon Moore (double the number of components per chip each year), and Motorola's Robert W. Galvin (achieve six sigma quality). Some professionals may drop out in response to such demands. Others will substitute their own even higher standards. The best organizations constantly push their professionals beyond the comfort of their book knowledge, simulation models, and controlled laboratories. They relentlessly drive associates to deal with the more complex intellectual realms of live customers, real operating systems, and highly differentiated external environments and cultural differences. Mediocre organizations do not.

Evaluate and weed. Professionals like to be evaluated, to compete, to know they have excelled against their peers. But they want to be evaluated objectively and by people at the top of their field. Hence, heavy internal competition and frequent performance appraisal and feedback are common in outstanding organizations. As a result, there is a progressive winnowing of talent. For example, at Andersen Consulting, only 10% of the carefully selected professional recruits move on to partnerships – a process that takes 9 to 12 years. Microsoft tries to force out the lowest-performing 5% of its highly screened talent each year. Great organizations are unabashed meritocracies; great organizations that fail are often those that forget the importance of objective praise and selective weeding.

Leveraging Professional Intellect

Conventional wisdom has long held that there are few opportunities for leverage in professional activities. A pilot can handle only one aircraft at a time; a chef can cook only so many different dishes at once; a researcher can conduct only so many unique experiments; a doctor can diagnose only one patient's illness at a time. In such situations, adding professionals at the very least multiplies costs at the same rate as benefits. In the past, growth most often brought diseconomies of scale as the bureaucracies coordinating, monitoring, or supporting the professionals expanded faster than the professional base. Universities, hospitals, research firms, accounting groups, and consultancies all seemed to pay the price.

For years, there were only two ways in which many organizations could create leverage: by pushing their people through more intensive training or work schedules than their competitors or by increasing the number of "associates" supporting each professional. The latter practice even became the accepted meaning of the term *leverage* in the fields of law, accounting, and consulting.

> The best organizations push their professionals beyond the comfort of their book knowledge.

But new technologies and management approaches are changing the traditional economics of managing professional intellect. Organizations as diverse as Merrill Lynch, Andersen Worldwide, and NovaCare have found effective ways to link new software tools, incentive systems, and organizational designs in order to leverage professional intellect to much higher levels. Although each organization has developed solutions tailored to the specific needs of its business, there are a handful of common underlying principles.

Boost professionals' problem-solving abilities by capturing knowledge in systems and software. The core intellectual competence of many financial organizations – such as Merrill Lynch and State Street Bank – lies in the human experts and the systems software that collect and analyze the data that are relevant to investment decisions. A few financial specialists working at headquarters leverage their own high-level analytical skills through close interactions with other specialists and "rocket scientist" modelers, and through access to massive amounts of data about transactions. Proprietary software models and databases leverage the intellect of those professionals, allowing them to analyze markets, securities, and economic trends in ways that otherwise would be beyond their reach. Software systems then distribute the resulting investment recommendations to brokers at retail outlets who create further value by customizing the center's advice in order to meet the needs of individual clients. If one thinks about this organization as a center connected to customers at multiple points of contact, or nodes, leverage equals the value of the knowledge multiplied by the number of nodes using it. Value creation is enhanced if experimentation at the center increases know-why and incentive structures stimulate care-why.

Merrill Lynch's retail brokerage business follows the basic structure outlined above. Roughly 18,000 Merrill Lynch brokers operate out of more than 500 geographically dispersed offices to create custom investment solutions for clients. The typical retail broker is not a highly skilled financial professional with years of advanced training. Yet the firm's brokers serve millions of clients worldwide with sophisticated investment advice and detailed, up-to-date information on thousands of complex financial instruments. Information systems make this extraordinary leverage possible.

Electronic systems capture Merrill Lynch's aggregate experience curve, quickly enabling less-trained people to achieve performance levels ordinarily associated with much more experienced personnel. The firm's computer network ensures that the retail brokers' cognitive knowledge is current and accurate. Merrill Lynch's information technologies allow the center to capture and distribute to the brokerage offices information about transactions, trading rules, yields, securities features, availability, tax considerations, and new offerings. Proprietary software, available on-line, serves as an instant training vehicle. It ensures that all brokers adhere to current regulations, make no arithmetic or clerical errors, and can provide customers with the latest market information. Capturing and distributing the firm's knowledge base through software allows Merrill Lynch to leverage the professional intellect at its core.

Information technology allows a large modern brokerage to be both efficient and flexible. At the center, it can achieve the full information power and economies of scale available only to a major enterprise. Yet local brokers can manage their own small units and accounts as independently as if they alone provided the service on a local basis. Their reward system is that of local entrepreneurs. The center functions primarily as an information source, a communications coordinator, or a reference desk for unusual inquiries. Field personnel connect with the center to obtain information to improve their performance, rather than to ask for instructions or specific guidance. At the same time, the center can electronically monitor local operations for quality and consistency. Most operating rules are programmed into the system and changed automatically by software. Electronic systems replace human command-and-control procedures. They also can eliminate most of the routine in jobs, free up employees for more personalized or skilled work, and allow tasks to be more decentralized, challenging, and rewarding.

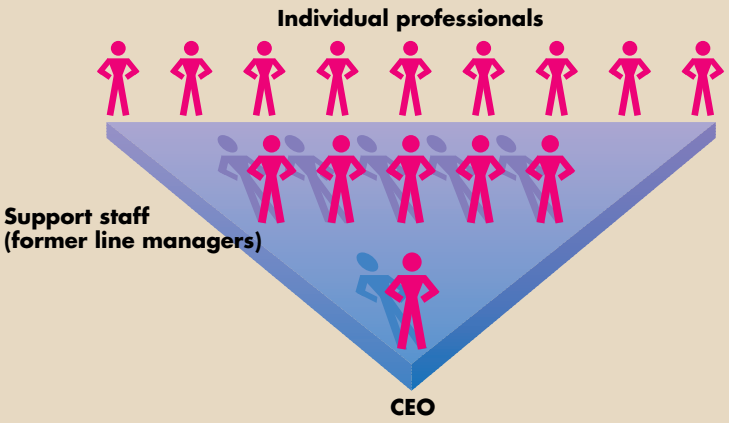
Overcome professionals' reluctance to share information. Information sharing is critical because intellectual assets, unlike physical assets, increase in value with use. Properly stimulated, knowledge and intellect grow exponentially when shared. All learning and experience curves have this characteristic. A basic tenet of communication theory states that a network's potential benefits grow exponentially as the nodes it can successfully interconnect expand numerically. It is not difficult to see how this growth occurs. If two people exchange knowledge with each other, both gain information and experience linear growth. But if both then share their new knowledge with others – each of whom feeds back questions, amplifications, and modifications – the benefits become exponential. Companies that learn from outsiders – especially from customers, suppliers, and specialists such as advanced design or software firms – can reap even greater benefits. The strategic consequences of exploiting this exponential growth are profound. Once a company gains a knowledge-based competitive edge, it becomes ever easier for it to maintain its lead and ever harder for its competitors to catch up.

Overcoming professionals' natural reluctance to share their most precious asset, knowledge, presents some common and difficult challenges. Competition among professionals often inhibits sharing, and assigning credit for intellectual contributions is difficult. When professionals are asked to collaborate as equals in problem solving, slow response is common as specialists try to refine their particular solutions to perfection. Because professionals' knowledge is their power base, strong inducements to share are necessary.

The tendency of each profession to regard itself as an elite with special values may get in the way of cross-disciplinary sharing.

Even then, the tendency of each profession to regard itself as an elite with special cultural values may get in the way of cross-disciplinary sharing. Many professionals have little respect for those outside their field, even when all parties are supposedly seeking the same goal. Often, in manufacturing companies, researchers disdain product design-

In Inverted Organizations, Field Experts Become Bosses



The center provides support services that leverage the professionals in the field. Inverted organizations are appropriate when individual professionals have enough expertise to be self-sufficient and can act independently to meet specific customer needs. Many health-care providers, technical troubleshooting units, and universities are inverted organizations.

ers, who disdain engineers. In health care, basic researchers disdain physicians (because "they don't understand causation"). Physicians disdain both researchers (who "don't understand practical variations among real patients") and nurses (who "don't understand the discipline"). Nurses disdain both doctors and researchers (who "lack true compassion"). And all three groups disdain administrators (who are "nonproductive bureaucrats").

To facilitate sharing, Andersen Worldwide has developed an electronic system linking its 82,000 people operating in 360 offices in 76 countries. Known as ANet, the T1 and frame-relay network connects more than 85% of Andersen's professionals through data, voice, and video interlinks. ANet allows Andersen specialists – by posting problems on electronic bulletin boards and following up with visual and data contacts – to self-organize instantly around a customer's problem anywhere in the world. ANet thus taps into otherwise dormant capabilities and expands the energies and solution sets available to customers. Problem-solving capacity is further enhanced through centrally collected and carefully indexed subject, customer-reference, and resource files accessible directly through ANet or from CD-ROMs distributed to all offices.

Initially, Andersen spent large sums on hardware, travel, and professional training to encourage people not only to follow up on network exchanges but also to meet personally to discuss important problems – with disappointing results. Major changes in incentives and culture were needed to make the system work. Most important, participation in ANet began to be considered in all promotion and compensation reviews. To stimulate a cultural shift toward wider use of ANet, senior partners deliberately posed questions on employees' E-mail files each morning "to be answered by 10." Until those cultural changes were in place, ANet was less than successful despite its technological elegance.

Organize around intellect. In the past, most companies aimed to enhance returns from investments in physical assets: property, plant, and equipment. Command-and-control structures made sense when management's primary task was to leverage such physical assets. For example, the productivity of a manufacturing facility is determined largely by senior managers' decisions about capital equipment, adherence to standardized practices, the breadth of the product line, and capacity utilization. With intellectual assets, on the other hand, individual professionals typically provide customized solutions to an endless stream of new problems.

Inverting Organizations

Many successful enterprises we have studied have abandoned hierarchical structures, organizing themselves in patterns specifically tailored to the particular way their professional intellect creates value. Such reorganization often involves breaking away from traditional thinking about the role of the center as a directing force.

Consider NovaCare, the largest provider of rehabilitation care and one of the fastest-growing health-care companies in the United States. Its critical professional intellect resides in its more than 5,000 occupational, speech, and physical therapists. As professionals, they work alone to customize their expertise for individual patients at 2,090 locations in 40 states. To be of greatest value, they must be highly trained and constantly updated on the best practices in their fields.

By organizing around the work of its therapists, NovaCare achieves considerable leverage. To focus their time on serving patients' needs, the organization frees the therapists from administrative and business responsibilities by, for example, arranging and managing their contracts with care facilities, scheduling and reporting on treatments they give, handling their accounting and credit activities, providing them with training updates, and increasing their earnings through the company's marketing capabilities.

NovaCare's software system, NovaNet, captures and enhances much of the organization's systems knowledge, such as the rules with which therapists must comply and the information they need about customers, schedules, and billing; it highlights for executives those trends or problem areas most pertinent to future operations. NovaNet collects information from all therapists about, for example, their costs and services, techniques that have worked well, and changing care patterns in different regions. This information is vital for recruiting, training, motivating, and updating therapists.

To facilitate the collection and analysis of knowledge, NovaCare records its therapeutic care activities in ten-minute blocks. This detailed information creates a database that can be used by a diverse group of stakeholders: caregivers, hospitals, clinics, payers, government agencies, executives, and outside financial and regulatory bodies. NovaCare utilizes extensive peer and customer reviews in evaluating its therapists' work and (based on the time units captured in NovaNet) rewards them on the amount and quality of the care they deliver.

NovaCare's professionals are highly self-sufficient; they have tremendous autonomy on questions involving patient care. Therapists can give orders to all intermediate line organizations. The company's regional and functional specialists in accounting, marketing, purchasing, and logistics exist primarily to support the therapists. Even CEO John H. Foster refers to the therapists as "my bosses." The leverage of NovaCare's organizational structure is "distributive" – that is, the support organization efficiently distributes logistics, analysis, and administrative support to the professionals. But it does not give them orders.

NovaCare has thus inverted the traditional organization. The former line hierarchy becomes a support structure, intervening only in extreme emergencies – as might the CEO of a hospital or the chief pilot of an airline. The function of former line managers changes: Instead of giving orders, they are now removing barriers, expediting resources, conducting studies, and acting as consultants. They support and help articulate the new culture. In effect, line managers evolve into staff people. (See the exhibit "In Inverted Organizations, Field Experts Become Bosses.")

Inverted organizations like NovaCare make sense when individual experts embody most of the organization's knowledge, when they do not have to interact with one another to solve problems, and when they customize their knowledge at the point of contact with customers. The software behind inverted systems must serve two somewhat conflicting goals: rules enforcement and professional empowerment. First, because professionals often resist regimentation, the software forces NovaCare's therapists to provide information in a consistent format, to comply with corporate rules and external regulations, and to originate the information necessary to monitor quality, costs, and trends for the organization's overall operation. Second, the software captures and distributes to professionals all the knowledge the company has built up over time so they can do their jobs better or more efficiently. That knowledge includes information about customers, professional databases, analytical models, successful solutions to problems, and access to specialized sources of knowledge.

Inverted organizations pose some unique managerial challenges. The apparent loss of formal authority can be traumatic for former line managers. And field people who are granted formal power may tend to act more and more like specialists with strictly "professional" outlooks and to resist any set of organizational rules or business norms. Given those tendencies and without a disciplining software, field people often don't stay current with details about their organization's own complex internal systems. And their empowerment without adequate information and controls embedded in the company's technology systems can be dangerous. A classic example is the rapid decline of People Express, which consciously inverted its organization and enjoyed highly empowered and motivated point people but lacked the systems or the computer infrastructures to enable them to adapt as the organization grew.

If such organizations fail, it is usually because – despite much rhetoric about inversion – their senior managers did not support the concept with thoroughly overhauled performance-measurement and reward systems. Inverted systems rarely work until field people largely determine their "support people's" wages, promotions, and organizational progress. Former line people are reluctant to take this last crucial step. In our studies of more than 100 major structural changes in 60 large service or-

ganizations, less than 20% of the organizations had changed their performance-measurement systems significantly, and only about 5% had changed their reward systems (*Information Technology in the Service Society*, National Academy Press, 1993).

At Merrill Lynch, people share knowledge because their compensation is attached to the mosaic of peer relationships.

Without such changes, the complications were predictable: People continued to perform according to the traditional measures.

Creating Intellectual Webs

In NovaCare's business, the professional therapists who create value are largely self-sufficient individual contributors. The inverted organization, coupled with the right software and incentives, allows NovaCare to enhance its therapists' productivity while giving them the operating autonomy they need. In other businesses, professional intellect is called on to create value by solving problems that exceed the capabilities of any solo practitioner. When problems become much more complex or less well defined, no one person or organization may know exactly what their full dimensions are, where key issues will ultimately reside, or who may have potential new solutions.

To tackle such problems – and to leverage their own intellectual assets to the maximum – a number of companies are using a form of self-organizing network that we call a *spider's web*. We use this term to avoid confusion with other, more traditional networklike forms more akin to holding companies or matrix organizations. Typically, a spider's web brings people together quickly to solve a particular problem and then disbands just as quickly once the job is done. The power of such interconnections is so great that even with a modest number of collaborating independent professionals (8 to 10), a spider's web can leverage knowledge capabilities by hundreds of times. (See the exhibit "In Spider's Webs, a Few Experts Team Up to Meet a Specific Challenge.")

Consider Merrill Lynch's mergers and acquisitions group. At the firm's center, specialists work primarily with others in their own disciplines – for example, acquisitions, high-yield financings, or equity markets. But when a large financing opportunity emerges, the project becomes an intellectual focal point and a team of specialists from different locations forms to pursue each individual deal. Such projects are so complex that, as one executive says, "no one can be a know-everything banker. You can't have only specialists doing their own thing, and the client is not interested in dealing with multiple specialists." The key problem is focusing Merrill Lynch's rich but dispersed talents on a single customer's problem for a short time. Client-relationship managers, who best understand the customer's integrated needs, usually coordinate these teams, but they don't have direct, hierarchical control over team members.

Despite the current popularity of virtual organizations and of networks, few companies understand when and how to use networked forms to leverage professional intellect. As the Merrill Lynch example shows, networks can flexibly combine high specialization in many different disciplines with multiple geographic contact points and a sharp focus on a single problem or customer set. But without the firm's specifically tailored promotion and compensation evaluation processes, the system probably would not work.

At Merrill Lynch, individuals work with many different colleagues on a variety of projects over the course of a year. All of them submit a confidential evaluation on everyone with whom they have worked closely. People are willing to share knowledge and cooperate because their compensation is attached to this mosaic of peer relationships, and compensation is a major motivating factor in this business. There are enough close personal team contacts to allow a truly multifaceted picture of an individual's performance. According to one vice president of the mergers and acquisitions group, "In addition to profits generated, people are evaluated on how well they throw themselves into various projects, work with different groups to meet priorities, and meet clients' needs. The culture penalizes those who fail to be team players or to meet clients' needs. Under these rules, spider's webs have worked well in our relationship world. In our transactional world, however, we generally win by having the best specialists for that transaction."

Because each spider's web is unique in its purpose, patterns, and organizational power relationships, there is no single "best way" to manage all of them. For many projects, there may not be a single

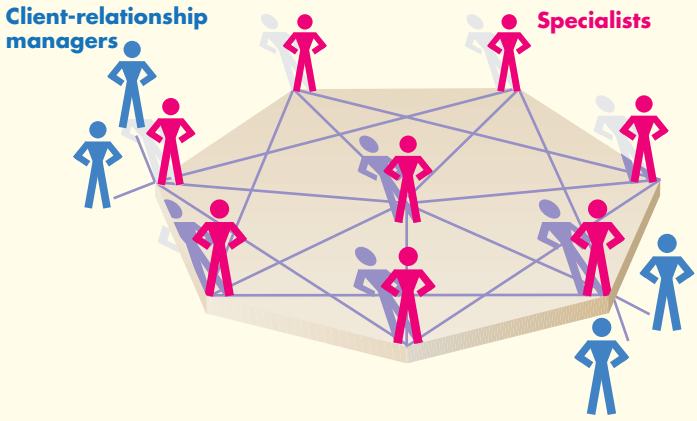
authority center. Often if the goal, problem, or solution is sufficiently clear, decisions may occur through informal processes if the parties agree. When the various centers of excellence need to operate in a highly coordinated fashion, they may delegate temporary authority to a project leader – as when widely dispersed researchers present a contract proposal. In other cases, the organization may designate one person as the lead in order to force decisions or to make final commitments – as when an insurance or investment banking consortium faces a deadline.

How groups communicate and what they voluntarily communicate are as important as the advanced knowledge each center of excellence may have. For virtually all purposes, however, encouraging shared interests, common values, and mutually satisfying solutions is essential for leveraging knowledge in these structures. Research suggests that to accomplish this goal, network managers should force members to overlap on different teams in order to increase continuity of contact, joint learning, and informal information sharing; purposely keep hierarchical relations ill defined; constantly update and reinforce project goals; avoid overly elaborate rules for allocating profits to individual nodes; develop continuous mechanisms for updating information about the external environment (for example, tax code changes, customer needs, or scientific results); involve both clients and peers in performance evaluations; and provide node members with both individual and team rewards for participation. Such consciously structured management interactions can mitigate the most common failures and frustrations.

The other key leverage factor in most spider's webs is technology. Electronics allow many more highly diverse, geographically dispersed, intellectually specialized talents to be brought to bear on a single project than ever before. Because public telecommunications networks allow interconnection almost anywhere, the key to effective network systems generally lies in software that provides a common language and database for communications, captures critical factual data about external environments, helps players find knowledge sources (usually through electronic menus, Web browsers like Netscape, or bulletin boards), and allows interactive sharing and problem solving. Each node will of course have its own specialized analytical software. But networking, groupware, and interactive software – along with a culture of and incentives for sharing – are the keys to success in these systems.

Much can be done to leverage professional intellect through extraordinary recruitment, training, and motivational measures. But, increasingly, managing human intellect alone is not enough. More radical organizational structures, supported by specifically designed software systems, are essential to capture, focus, and leverage capabilities to the fullest. Such systems have become the glue that both joins together highly dispersed service-

In Spider's Webs, a Few Experts Team Up to Meet a Specific Challenge



Spider's webs form to accomplish a particular project and disband when the project is completed. They are appropriate when knowledge is dispersed among many specialists, who must provide a coordinated solution to a complex customer problem. Many consulting firms, investment banks, research consortia, and medical diagnostic teams make use of spider's webs.

How groups communicate is as important as the knowledge each center of excellence may have.

delivery centers and leverages the critical knowledge bases, intellectual skills, and accumulated experience in professional organizations. They also bond professionals to the organization by providing them with databases, analytical models, and communication power that they cannot find elsewhere. These tools enable professionals to extend their performance beyond their personal limits, allowing them to achieve more inside the organization than they could on their own.

No organizational form is a panacea. In fact, many different forms often coexist successfully in the same company. Properly used, each helps a company attract, harness, leverage, and deploy intellect for a quite different purpose. Consequently, each requires a carefully developed set of cultural norms supported by software and by performance-measurement and reward systems tailored to the organization's specific purposes.

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