From Global to Metanational

How Companies Win in the Knowledge Economy

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Chapter 6

Learning from the World

AT THE CORE of a metanational's advantage is the capacity to innovate by tapping and connecting pockets of knowledge scattered around the world. This innovation process draws its lifeblood from the ability to sense new pockets of knowledge before competitors recognize them, and then to access this new knowledge more effectively than the competition. Building this sensing capability—the ability to learn from the world—is therefore a critical prerequisite for winning in the global knowledge economy.

Sensing involves the following:

- The capacity to identify a *sensing need.* A goal, even if broadly defined, is essential to move from aimless exploration to purposeful reconnaissance work.
- The capability to *prospect* the world for sources of relevant knowledge, unearthing new pockets of knowledge ahead of competitors.
- The capacity to *access* new knowledge once its location is identified—not a trivial task when the required knowledge is complex (tacit, experiential, or embedded in a local context, as described in chapter 5) or when it needs to be pried loose from a tight-knit local club.

Even well-established multinationals will need to augment and bolster their sensing capabilities to compete in the global knowledge

economy. Global projectors lack a "prospecting" mentality. Rather than actively looking for new hotbeds of disruptive technology, skills, and market needs, most global companies are trying to find the most fertile ground to project their standard, existing competitive advantages. Global projectors are attracted by similarities to their home base that will provide maximum returns with minimum adaptation. Metanational prospectors, by contrast, seek out environments and knowledge that are most differentiated from their home base, because diversity provides the best raw material for innovation.

Global projectors also lack structures that would allow them to access unique local knowledge. Their subsidiaries are well plugged in to the global corporate network—but not to the local, external environment. The subsidiary of a global company is designed to deliver rather than to question and learn the idiosyncrasies of the local environment.

Multidomestic companies generally have better developed local sensing skills. But companies with a multidomestic heritage also need to be careful not to bask in false security about their sensing capabilities. Their problem is that, while they may use the knowledge they access to build their businesses locally, they have difficulty sharing that knowledge globally. (We address this problem of how to mobilize scattered and locally imprisoned knowledge in chapter 7.) Furthermore, not all multidomestic companies are well-connected externally. Their local sensing capabilities are not necessarily high, particularly if corporate headquarters emphasizes reliable profitability more than growth and innovation. And because the location of existing subsidiaries is usually determined by local market potential or low operating costs, multidomestic companies may have only a token local presence in interesting, peripheral locations where new hotbeds of technology or bellwether customer behaviors are emerging.

In this chapter, we explore how multinationals can augment their sensing capacity: deciding what to sense, prospecting for new knowledge, and accessing (or "plugging in to") pockets of knowledge they identify both within and outside their existing organization. We lay out alternative channels for accessing new knowledge and discuss the pros and cons of each. Finally, we examine who needs to be involved in a sensing network (including the key role of senior management as knowledge surveyors), how the sensing process needs to be managed,

how its success should be measured, and how its people should be rewarded.

IDENTIFYING A SENSING NEED

The concept of sensing new, globally dispersed pockets of knowledge can easily conjure up an image of executives aimlessly running up expensive travel bills in the hope of making a grand discovery. It is true that the sensing process needs to be given some space: We cannot precisely predetermine what nuggets of new knowledge we will find and when and where we will find them. Sensing is, in part, a process of learning. It thrives on surprise and serendipity. But sensing also needs to be purposeful. It needs to start out with a definition of the sensing need: an opportunity to be created or a problem to be solved. Merely being on the ground in distant markets is not enough.

Recall from chapter 3 that Shiseido had a clear purpose: to gain access to the complex know-how that had been amassed by the French fragrance industry and to use this knowledge to bolster its competitiveness against large global companies like L'Oréal and Estée Lauder. When it set out to achieve this goal, Shiseido couldn't have specified exactly the pieces of knowledge it was looking for—it simply didn't know enough about the perfume business to develop such a specification. But its purpose was clear. Likewise, when ST began its quest to create system chips, it didn't know exactly what knowledge it would need, or precisely where to look. Its purpose, however—to replace circuit boards with dedicated chips designed to meet the needs of a customer application—was well-defined.

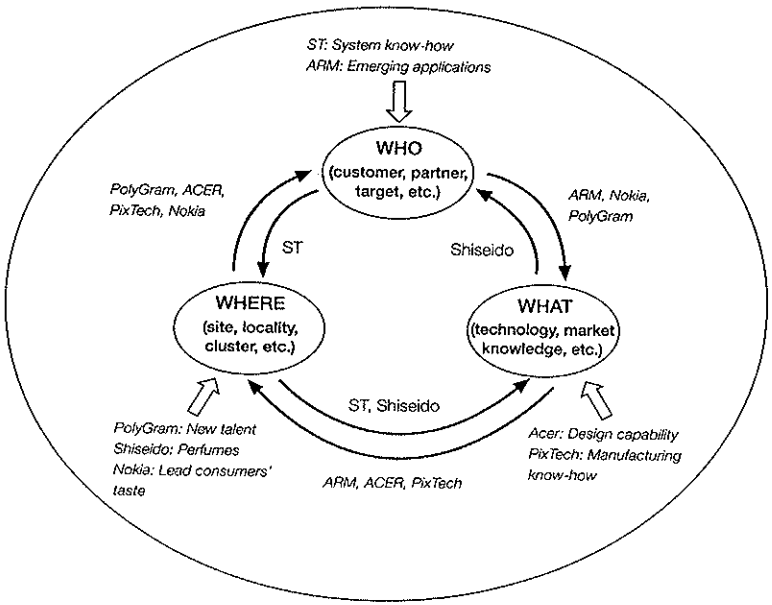
Identifying key sensing needs will be an important role for the CEO and other senior management in tomorrow's metanational. This will be a critical aspect of setting the direction in a company that can win by learning from the world. The role will be difficult to perform from the proverbial ivory tower of an executive suite. It will require senior management to lead by walking about—in this case walking about the world—because identifying a sensing need is a subtle combination of defining where a company will seek future competitive advantage and what areas of emerging technology or market behavior

might contribute to this advantage. STMicroelectronics' system-on-a-chip strategy didn't emerge simply from a corporate planning whiteboard. It emerged because senior management was able to listen and make the connection between customers' needs for improved performance and the newly available, but disconnected, technologies that could be deployed to satisfy them. That strategy, in turn, led management to begin to define a set of sensing needs.

Once a sensing need takes shape, it has to be refined. Sensing requires substantial investment, so companies must choose the locations that seem likely to provide the best returns. A metanational cannot afford to sense randomly; nor can it search over an unlimited area for new knowledge. Sensing can be either too broad or excessively focused.

Finding the right balance requires tradeoffs. The choices revolve around three aspects of the sensing problem: *what* to sense, *where* to look for it, and *who* might provide a fertile source. Figure 6-1 depicts the process of homing in on a new pocket of knowledge.

Figure 6-1 Addressing Sensing Needs



It is possible to enter the cycle illustrated in figure 6-1 at any point. ST began with an appreciation of *who* might have the systems knowledge it needed to build its system-on-a-chip: potential lead customers like Seagate. Early discussions with these customers helped ST define more precisely what it needed to sense. Armed with this understanding, it was able to identify *where* the knowledge might be found—inside Seagate's global network, within ST's own multinational organization, and from locations outside either of these networks. Similarly, ARM identified the partners that could help it set a global standard for embedded Reduced Instruction Set Computing (RISC) chips. They helped ARM define *what* new knowledge it required and *where* it could be accessed.

PolyGram, by contrast, entered the cycle with a guess as to *where* it might find the new talent from which it could fashion a global hit record. At the time, for example, there seemed to be an active group of young artists producing innovative music in Venezuela and Italy. PolyGram didn't start with a profile of the type of artist it was looking for, but by choosing a set of likely hotspots for musical innovation. It eventually homed in on the *who* (choosing an artist with global potential) and the *what* (finding suitable repertoire). Likewise, Shiseido started from a location, France, and developed from there its understanding of *who* could provide the knowledge it needed (small design companies and hair salons) and ultimately *what* it needed to learn.

Acer, on the other hand, knew *what* it needed to inject—new design skills—into its innovation process to come up with the kind of PC that users would be proud to have as an addition to their office furniture. This definition led it to California and, in turn, to discover the Frog design company. PixTech understood it needed display manufacturing know-how. This led it to Taiwan and ultimately to its partner, Unipac.

The winners in the global knowledge economy will generally be proactive about sensing, given the critical role it plays in creating metanational advantage. But this doesn't mean that a company gains all of its new knowledge by going out and searching for it. As we discuss in more detail later, it is sometimes possible to engineer a situation in which the relevant knowledge comes to you. One method may be to set up a venture capital fund that acts as a honey pot, attracting people with new technologies and other novel ideas.

Whatever method of sensing a company ultimately chooses, however, the key objective is to create competitive advantage. Those starting from behind may need to begin by sensing additional knowledge in places that its competitors have already mined in order to catch up. But to innovate and open up a competitive lead, the future metanational will need to be able to unearth emerging sources of technology and market behavior that its competitors haven't yet identified, possibly in places where competitors haven't even looked.

Catching Up and Keeping Up

Followers and aspiring challengers typically sense in locations where the industry leaders are already established—in the well-trodden capitals of their industry. For example, when Korea's Samsung entered the microelectronics industry in the 1980s, it was not difficult to decide where to establish its sensing activities. Silicon Valley was the uncontested world capital of that industry, and for Samsung, as a latecomer to that industry, sensing in Silicon Valley was a clear priority.

Samsung began by acquiring failing semiconductor firms in the Valley. The company used these firms to experiment with and sense manufacturing processes. Eventually it moved some of their production equipment to Korea to experiment with technology transfer. When Samsung decided to aim for mass production of a 64K DRAM with a high-yield ratio, in 1983, it set up two R&D teams. One was home-based, while the other was hired and settled in Silicon Valley. The latter consisted of five Korean-American Ph.D. students and three hundred American engineers who were recruited from the competition. This arrangement quickly enabled Samsung to catch up with the technology it needed.[1]

Sometimes, then, the choice of sensing location is obvious: You need to sense in the capital of the industry, and the issue boils down to choosing the "who" to use and the "what" to sense. It may be easier to sense from a weaker, smaller source than from a larger, stronger one, but the former may have less to contribute. But deciding to sense from locations your competitors have already discovered is a deceptively easy choice. For latecomers, sensing from the same knowledge sources as everyone else is unlikely to be enough to win.

By turning over the tailings in a gold field that your competitors have already mined, you may find the odd nugget that has escaped their attention—especially if you have better sensing tools. More likely, sensing in locations where your global competitors preceded you (the wait-and-see approach) will, at best, bring knowledge parity. The most rewarding, but also the most difficult, challenge for sensing is to discover new locations that your competitors are not yet aware of—perhaps by anticipating where new hotbeds of knowledge are starting to emerge before others do.

The same is true for identifying potential lead customers, partners, or suppliers—the *who* in the sensing cycle depicted in figure 6-1. Going to the large or dominant partners may only give you knowledge that competitors have already identified. By contrast, smaller customers or partners who are experimenting with new applications may offer the richest sensing grounds.

Likewise, looking for technological advances—the *what*—in your own restricted field may provide less scope for competitive advantage than anticipating the potential application of technologies developed in another industry that is about to converge with yours.

Getting Ahead: Moving beyond the Obvious

The winners in the new knowledge economy will go far beyond being customer-led. Witness the fate of several U.S. computer companies on the East Coast. They repeatedly missed out on personal and network computing, largely because of their intimate relationships with the data processing departments of large companies that were insensitive to individual users. Being too close to existing corporate customers blinded the industry to the shift from hobbyist computer nerds to individual users in large companies and then to network computing.

Anticipating the emerging hotbeds of knowledge ahead of competitors requires an insight into some tough questions. *What* disruptive technologies may affect my industry? *Where* are critical technology and market discontinuities likely to originate? *Who* will be the lead customers of the future?

In some cases, the answers are fairly predictable. The biochemistry-on-a-chip technology, fast becoming so essential to new drug discovery and development, could hardly have arisen anywhere but in a

handful of places—the San Francisco Bay–Silicon Valley region in the United States or the Lyon–Grenoble region in France. There, and only there, were all the various underlying technologies, scientific insights, and venture capital acumen present in a single location. But was it obvious in the early 1990s that the critical new knowledge about mobile telephone technology and customer behavior would emerge in Finland? Surely the clusters around Bell Laboratories (which invented much of the underlying technology) or around the then industry leader, Motorola, would have been more likely bets. Would we expect one of the world's leading markets for Internet and mobile phone-enabled banking to be Brazil? Yet Brazil's largest bank, Bradesco, is a leader in the application of these technologies. It introduced Internet banking in May 1996 and had attracted 1.5 million online banking customers out of 14 million Brazilian Internet users by 2000.

Clearly there is no surefire way to anticipate who, what, and where to sense for the next technological and market advances. But failure is assured for those who don't even try. While forecasting is fraught with uncertainty, it pays to have a solid strategy for prospecting the world in search of new hotbeds of knowledge.

PROSPECTING FOR KNOWLEDGE

The most successful prospectors look for certain indicators of emerging knowledge hotbeds. Their experience suggests four rules of thumb for an effective prospecting strategy:

1. **Look for leapfroggers** among consumers least hampered by previous product experiences. These can be found by studying users' learning experiences with new technologies. Attention to leapfroggers often points toward the most innovative, leading-edge lifestyles and customers, but relevant knowledge can also come from other segments that leapfrog in less spectacular ways. Unilever's subsidiary in Brazil, Gessy Lever, sensed the emergence of a new, low-end detergent segment that had grown up in India following the entry of a local competitor there. This knowledge led Gessy Lever to open up a customer segment that Unilever had studiously ignored: the poor in the Nordeste and the Amazon. The Brazilian unit developed and introduced quality detergents for lower-income consumers who were ready for "new" laundry products.

   Leapfrogging also happens when corporate customers and partners are least hampered by an installed base. New knowledge is more likely to be generated in markets unencumbered by legacy technologies. Consider the emergence of smart cards, which have an embedded microchip rather than a simple, magnetic strip. The market leaders are from Europe: Bull and Gemplus in France, Siemens in Germany, Mondex in Great Britain, Danmont in Denmark. The fact that the card's inventor, Roland Moreno, was a European is not sufficient to explain this success in Europe. More important was the fact that smart cards leapfrogged traditional credit cards, in an environment where the legacy of magnetic-strip technology was less forceful. With a new, pan-European set of transaction standards, the smart cards also helped overcome the old country-by-country fragmentation of the financial industry.

   Across the Atlantic, the smart card faced more resistance. The United States held on to the magnetic strip. Banks in the United States and Canada tested the smart card only sporadically in pilot projects, as the cost of change for the existing credit card transaction infrastructure was considered very high, notably for point-of-sale terminals. Furthermore, smart card manufacturers and U.S. banks competed to develop products with different technical standards, although compatibility is key to the smart card's acceptance.

2. **Think through metaphors from other industries.** Adversity forced Acer's founder and CEO, Stan Shih, to seek a drastic change in his company's business system. To stimulate his thinking, he took the metaphor of the fast-food industry that creates a standard approach to local needs but offers a large choice of fresh (read: nonobsolete) products. Computers would be assembled locally, in close contact with customers, using only the latest high-performance components. Shih divided Acer into forty independent local companies, partly owned by local entrepreneurs (like fast-food franchisees), which act not

just as assembly and sales outfits but also as local market sensors. He named the subsystems "perishable" or "nonperishable," based on the pace of new product introductions, and managed accordingly—for instance, minimizing inventories of perishable products. Acer adjusted as much as possible to local tastes: Production, distribution, sales, and service were adapted to the local market. With this unique structure, Acer reduced its inventory by 50 percent, thus avoiding the risk of inventory obsolescence, decreasing working capital, and lowering costs to create a strong advantage over its less-nimble competitors. Explicitly adopting the fast-food industry as a model gave Acer a consistent and profitable new approach to the computer business. A traditional PC maker would probably not have selected McDonald's as a place to sense new knowledge, yet understanding the McDonald's business system proved important to Acer.

Likewise, from its start in 1985, Dell kept costs down by using a direct-marketing business model inspired by catalog retailers such as Lands' End. By 1992, Dell was selling no more than 15 percent of its computers through resellers such as Staples. The rest was mainly sold directly via phone or mail orders, and increasingly on the Web. In the mid-1990s, Michael Dell understood that his low-price direct-sales positioning would no longer differentiate the company in the long run, so he focused on rapid, reliable customer service, enlisting underused local service forces from Honeywell and Xerox to provide next-day, onsite support for service, installation, and parts.[2]

3. **Identify locations where technologies are converging.** Here, mutually reinforcing innovative trends are likely to create a new knowledge base. The invention of biochips, for example, had its roots in the convergence of microelectronics and biotechnology in the San Francisco Bay area. Jim Neidel, the head of research for Glaxo Wellcome, which acquired the combinational chemistry pioneer Affymax in 1995, commented: "Affymax is in the right place, Silicon Valley, where innovation springs forth between computer industries, robotics, miniaturization, pharmaceutical industries, biotechnologies. The environment is right, the context is right."

The specifics of biochip development could hardly have been anticipated. But an astute observer in Silicon Valley could be certain she was looking in the right place, as the key enabling technologies and scientists were available there, waiting for someone like Affymax founder Alex Zaffaroni to unleash their combined potential.

Or consider the innovative use of global positioning system (GPS) chips in motor vehicles in Japan. GPS was developed in the United States. America arguably led the world in GPS electronics. But it was the convergence of this technology and a natural market need, in a hotbed of auto design where existing maps were a poor representation of a dense and complex street network in Japan, that engendered the new application.

4. **Look for lifestyle leaders.** Changing lifestyles can indicate the emergence of new technologies and market trends. IKEA's success in modern, affordable furniture, for example, could have been anticipated by looking for leadership in lifestyle trends. Is Hong Kong today a pilot of how consumers in a future, richer China would behave? Are there lifestyle indicators that will distinguish the technology and market trendsetters of the twenty-first century?

Other Signs of Emerging Hotbeds

Beyond leapfrogging customers, cross-industry metaphors, converging technologies, and emerging lifestyles, other indicators can be useful in anticipating new knowledge hotbeds. Savvy metanationals will further augment their prospecting strategies by doing the following:

- Staking out government/university science centers with resources, skills, and aspiring entrepreneurs. Stanford University was the original driving force behind the development of Silicon Valley. Bangalore's IT cluster was built on the site of the military software research labs that were located there after the British left. Hsinchu, in Taiwan, strives to "engineer" the birth of a Chinese Silicon Valley. Orsay and Grenoble, in France, thrive on spin-offs and subcontractors from the Commissariat a l'Energie

Atomique, which has major research centers in both cities. Cambridge University is at the origin of many new technologies, as are Los Alamos and Santa Fe, with their spillovers from the U.S. nuclear research programs.

- Watching for growth in long-distance and international phone traffic, and Internet nodes, denoting a concentration of educated, curious, and cosmopolitan communities.
- Monitoring the presence of complementary skills and precursor industries (such as for plastic molds in Portugal), suppliers, and customers.
- Identifying regulatory differences that promote innovation: for example, a fax has the value of an authentic document in Japan; advanced Internet encryption (based on regulatory requirements) facilitates e-commerce in the United States.
- Looking for locations with early regulatory approvals and sophisticated user communities: for example, microsurgery developed faster in Europe, where registration of new products and approval of new surgical procedures takes two years less than it does in the United States.
- Tracking the personal mobility of people and the incentives to innovate: Sense where the interesting people are migrating to live.
- Monitoring rapid changes in disposable income. Time-starved wealthy people invent new lifestyles that require new services and generate new expectations. Rapid declines in income (as in Asian countries that suffered massive devaluation in the financial crisis of the late 1990s) can also spawn innovation: The crisis in Thailand, for example, spurred the development of e-auctions to liquidate inventories and personal possessions.
- Seeking out the cradles of disruptive technologies, where maverick competitors are willing to break traditional industry rules.

At the end of the day, of course, prospecting is an art, not a science: It requires the proverbial helicopter view, informed by a good understanding of the world, as well as by creativity and a sense of the future. As we argue, it also requires a certain type of person, with the right role and possibly an unorthodox incentive system. And when the prospectors find important new knowledge, the organization has to know how to access it.

ACCESSING LOCAL KNOWLEDGE: PLUGGING IN

Accessing a pocket of local knowledge may involve very different degrees of effort. Sometimes knowledge can be accessed quickly and cheaply, requiring little more than casual observation. In other cases, gaining access is costly and protracted, requiring substantial, long-term investments (recall Shiseido's experience accessing knowledge about fragrances in France).

The difficulty of accessing knowledge from a distant location depends importantly on the nature of that knowledge. Recognizing the distinction between "simple" and "complex" knowledge, as discussed in chapter 5, is critical when choosing the right way to access it.

For simple, well-articulated knowledge that is publicly available, the problem of access is almost trivial. Desk research or short information gathering visits will usually suffice. A trip to the U.S. Patent Office, for example, will provide a wealth of knowledge about the technical specifications of, for example, mobile telephony. The rise of the Internet has dramatically reduced the difficulty of accessing distant yet simple knowledge.

In the case of complex, context-dependent knowledge, however (such as the learning Shiseido sought in France), accessing is a more involved process that occurs gradually and within the local environment. A hit-and-run approach will access only part of the complex knowledge bundle and so is bound to lead to misinterpretation. Accessing complex knowledge requires mechanisms for experimentation and immersion. One cannot imagine PolyGram's local talent scouts, for example, identifying new talent with global potential purely on the basis of what they can hear on a tape. Instead, they must endure the arduous task of attending an endless round of nightclub gigs and parties.

Accessing complex knowledge may be difficult because the holders may not be able to articulate it: They may not be conscious of what

they know; hence they can't explain it. Their knowledge may be tacit. Another barrier, for both simple and complex knowledge, may arise if the knowledge holders do not wish to divulge what they know or lack the time to communicate it. In all of these cases, access will generally require some sort of collaboration. To learn what it needed from its lead customers, for example, STMicroelectronics had to set up alliances. These enabled it to locate an office for ST engineers at Western Digital headquarters in Lake Forest (not far from Los Angeles) and to establish a joint design team with Seagate in Scotts Valley (close to San Jose).

These kinds of interactions and alliances can be costly and time-consuming. How, then, can managers maximize the return on their investments in accessing new knowledge? The answer lies in choosing the right vehicle to access each type of knowledge that they need.

Choosing the Right Approach

The effectiveness of a vehicle for accessing knowledge is determined by the *quality* of the access it opens up rather than its size and resources. The fallacy of equating size and resources (or what we term "weight") with quality of access is illustrated by several Western companies that located large research centers in Japan. These multinationals recognized Japan as an important hotbed of technology and new processes, but their results were disappointing. Despite lavish resources, the new centers failed because they remained disconnected from the local scientific and technical establishment.

The myth that resources equate to quality of access may be fed by those with a vested interest in getting control of additional resources locally. They may argue that "you need to show the commitment of a large presence to be credible in the local community." But large, local investments may actually be self-defeating if, as often happens, the large research center or marketing office turns its attention inward instead of outward, toward accessing local knowledge.

The successful experience of the Japanese pharmaceutical company Eisai illustrates the advantages of emphasizing strong local connections over weight. In both Boston and Cambridge (in the United Kingdom), Eisai set up relatively small R&D labs, but they were

headed by highly regarded local scientists, surrounded by doctoral students, and connected with top-notch local university biology laboratories.[3] A strong flow of new knowledge was quickly established.

Contrast this with Sony's multibillion-dollar acquisition of Columbia Pictures. Columbia had little interest in facilitating Sony's understanding of the movie business in Hollywood. As a large studio in its own right, Columbia had an independent agenda (which probably included maintaining its Hollywood-style spending levels) and little desire to help Sony access complex knowledge about content and entertainment. But it was just this kind of Hollywood-based knowledge that Sony wanted to integrate with its own hardware capabilities that came primarily from Japan.[4]

A second important rule for accessing complex knowledge from distant locations is that the job is best done by local insiders, who share an understanding of the local context, culture, and values. A local can sense subtleties that are unintelligible to corporate expatriates less attuned to the meanings that depend on context. Their outsider's bias for the explicit and the familiar will tend to get in the way. The U.S. Army understood this as far back as the eighteenth century, when it began using Indian scouts for reconnaissance in the Indian wars.

But how do you recruit top-notch locals when you are a newcomer from outside the system? For those seeking to access biotech knowledge in a new location, for example, it might seem a safe bet to go for Nobel Prize winners and pay them well. But this may lead you into hiring the voices of the past, not the future. And in less well-defined skill areas, such as movie-making, how do you spot new talents from outside and avoid hiring the wrong people?

It helps to get advice from local experts—for instance, venture capitalists who are increasingly specialized, who live and breathe the local environment and who are intimately familiar with the technology. Such advisers can also help you decide whether to establish a more permanent sensing node—a probe into a local pocket of knowledge. Sensing nodes can take many different forms, from external alliances to dedicated internal units or new task assignments in existing operating facilities.

External Alliances

Metanational winners find many ways of working with outsiders to access the intelligence they need. Each has advantages and drawbacks.

Customers. Alliances with customers can play an important role in helping to access market knowledge ("outside" the customer) or application knowledge ("inside" the customer). There are many potential benefits of learning with and from customers. Lead customers are the locus of industry knowledge about existing and coming needs.[5] Lead customers provide a proxy for being in the local environment and can help interpret and translate complex, local knowledge to be mobilized and leveraged elsewhere.

But not just any customer can serve as the basis of a local accessing node. We need to identify customers that possess relevant knowledge and have an incentive to share it with us.

Using its knowledge prospecting skills, ST identified Seagate and Western Digital as "strategic partners" from whom it could access the knowledge about HDD systems that it needed to create dedicated chips. Through these alliances with such customers, it located knowledge it needed in various customer sites in the United States and the Far East. To access this knowledge, it created a sales and support network that mirrored the customers' R&D and purchasing networks. This involved such steps as establishing a design center in San Jose, just a few miles from Seagate headquarters, and relocating dedicated staff inside Seagate's quality labs in Singapore. The customers' incentive to cooperate was the prospect of a global vendor that would provide new, more efficient system chips, customized to their needs and available ahead of competitors—advances that would differentiate their own products in the market.

In another case, ST and its customer Thomson Multimedia (TMM), the leading French consumer electronics multinational, jointly created a design center (named TCEC) in Grenoble, France's hotspot for high technologies. TCEC was set up in the early 1990s to develop new semiconductor products for home appliances, such as televisions and TV set-top boxes. TCEC's costs were split 50/50 between ST and TMM. Its 120 engineers and designers worked in teams that included one

coordinator from ST and one from TMM to ensure good connection back with each corporation. TCEC's steering and product committees supported interaction between senior executives of ST and TMM. The link with TMM was instrumental in conveying to ST the needs of TMM's own distant American customers, like DirecTV, providing ST with the knowledge it needed to design chips customized to TV set-top boxes.

Using customers as the vehicle for sensing distant knowledge can involve substantial costs, including the costs of coordination and the need for at least partial co-location with customer development centers and operations. There are also potential strategic costs, which may be less obvious at the outset. Lead customers have an incentive to encourage excessive commitment of your resources to their local needs. Once their needs are served, they are unlikely to be sensitive to your further accessing needs, particularly if these involve other customers. You may become hostage to powerful customers who are not necessarily forthcoming about their intentions—they may let you know only what they want you to know.

Distributors. Distributors may also provide valuable access to complex knowledge about unfamiliar environments. In their drive to penetrate the U.S. market, for example, Japanese and Korean consumer electronics firms often relied on U.S. mass merchandisers, such as Sears and Wal-Mart, to specify products for them. This allowed them to access knowledge about the peculiarities of the U.S. market—knowledge that paved the way for later investments in building their own brands and distribution channels. Likewise, Acer used its distributors in Mexico to access knowledge about the needs of small and medium-sized businesses in a developing country. This knowledge played a critical role in helping Acer design a successful product for this market, which it subsequently leveraged across other markets throughout the developing world.

Dealers can offer access on an ongoing basis. Caterpillar, for example, works with dealers around the world so that "information about the customer constantly feeds back into the system and drives new product development and enhancements in service."[6] Like one's own sales force, however, distributors may be too focused on short-term responsiveness and problem-solving to be good sensors of really

new important knowledge that does not have an immediate impact on day-to-day operations.

Suppliers. Suppliers can provide access to new knowledge. But it is important to remember that accessing knowledge from suppliers means going well beyond the kind of sensing that takes place in the traditional purchasing process. Purchasing offices may be useful sensing bases but only if they offer access and legitimacy in the local business and governmental communities. For the Taiwanese electronics giant Tatung, purchased components and other inputs amount to 70 percent to 80 percent of the final products' costs. Tatung used purchasing as a tremendous sensing engine to access technology and capabilities from the United States, Europe, Japan, and Korea. To do so, however, the traditional reporting structures, goals, and incentives of its purchasing organization first had to be augmented. Tatung's purchasing heads have explicit responsibility for seeking new product information, exploring materials and suppliers, and obtaining new technology for the Taiwanese headquarters. They report jointly to the heads of global purchasing and new product development.

At Nestlé, in Singapore, sensing tasks were differentiated from the operational short-term priorities of efficient purchasing. Nestlé's local R&D center had the secondary but nonetheless important task of monitoring quality assurance for suppliers in the Far East. It ensured that all the input products met Nestlé's standards. This close attention to the suppliers' activities allowed it to keep in touch with new market needs and emerging technologies within local suppliers.

Other Partners. Other partners can offer access to both technical and market knowledge. PixTech, as we saw in chapter 1, built a web of alliances for its flat-panel screens with that goal. Of course, partners also have limitations as sensing nodes: Like customers, they have their own agendas and may want to influence the scope of the alliance or limit it to dimensions they can manage. Obviously, some reciprocity is likely to be required, and it may be difficult to find a worthwhile exchange that goes both ways.

Targeted Acquisitions. When the pharmaceutical giant Glaxo Wellcome (GW) bought Affymax, a pioneer in solid-state combinatorial chemistry, it got more than a technology for speeding up its development pipeline. As a senior executive at GW put it, "There was a more strategic aim [than obtaining access to existing combinatorial chemistry techniques] when GW bought Affymax. It was to have a group of technologists and scientists in the San Francisco area, in the middle of the hive of innovation." So, through Affymax, GW firmly established a sensor in California, near and in tune with other companies innovating in computers and biotechnology.

Sony Music sensed local markets in Europe through minority ownership in a number of small independent music labels. This equity participation kept it aware of—and in tune with—the local music trends and talents. Likewise, recall the role of Shiseido's acquisitions of beauty parlors and specialist perfumeries in accessing French knowledge about fragrance design and marketing.

Sometimes it is difficult to use small technology acquisitions effectively as a vehicle for accessing complex knowledge. There is a temptation to believe that "We own them, thus we have their knowledge at our disposal." In fact, as we discuss later, it takes tremendous effort for a global corporation to internalize the knowledge embedded in a small acquisition.

Venture Capital Funds. Venture capital funds can provide a way of accessing emerging technologies and ideas for new business models by attracting entrepreneurs in search of funding. Rather than going out in search of new knowledge scattered around the world (which can be like looking for the proverbial needle in a haystack), companies can launch a venture fund to attract some of the knowledge they need. The Finnish telecommunications company Sonera, for example, has successfully partnered with an experienced Californian venture capital company to access new knowledge that complements its own strengths in emerging mobile telephony technologies.

Local Universities and Research Centers. Local universities and research centers can offer powerful ways of accessing new technical and scientific knowledge. Sponsoring local research helps to engage local scientists who can blend academic and corporate research programs and link them to other projects. Mere sponsorship, however, may be ineffective unless there is a parallel investment in local presence or staff. When Eisai first began to move outside Japan in the 1980s, instead of opening sales offices, its first move was to set up a

biology laboratory in the United Kingdom. It signed a fifty-year contract with the University of Cambridge, which stipulated that Eisai would operate on campus doing research, enroll its scientists in doctoral study programs, benefit from teaching positions, and collaborate with local scientists to keep up with the latest basic or applied research. On its side, the university enjoyed the benefits of Eisai's funds and scholarships, scientific information, and visiting world-class scientists on campus.

Knowledge Brokers. Another vehicle for accessing distant knowledge is to seek out companies that generate knowledge as a by-product from their operations. What is operational data for one may be a source of new and valuable knowledge for another. Dun & Bradstreet, for example, sells what it calls "the largest company information database in the world," which is built from its clients' exhaustive databases and can therefore become an extremely useful sensing tool for others.

Emigrant Populations. Emigrant populations that have penetrated distant hotbeds of new knowledge can provide very valuable links. Some individuals may even be lured back to the old country as it grows, liberalizes, and creates opportunities, reversing brain drain. Acer, for example, has accessed knowledge about where new technologies were emerging by recruiting Taiwanese engineers and scientists working in the United States. Likewise, Israeli companies have tapped into Jewish scientists living abroad and programmers moving from Russia to Israel. These people may have the added advantage of being cross-cultural integrators able to translate knowledge from one local context to another. But beware of emigrants who have turned their backs on their original country and have done their best to disappear into their country of adoption: They can be out of touch. Examples might include Indians or Chinese who moved to America long ago, central Europeans who fled communism, and others who have outdated perceptions and feelings about their home countries.

Competitors. Although the idea of accessing knowledge from competitors may seem counterintuitive, it can work if there is potential

learning for both sides. Consider the case of NUMMI, a 50/50 joint venture between Toyota and General Motors. NUMMI was established in 1984 at an existing GM car manufacturing plant in Fremont, California. The two partners took joint responsibility for managing the plant. GM's goal was to access the complex bundle of existential knowledge that comprised the widely respected Toyota production system. Meanwhile, Toyota wanted to access an equally complex bundle of knowledge about managing a U.S. workforce in an American legal environment, as well as to gain insights about the supply chain, marketing, and distribution of vehicles in the United States.

When the NUMMI project was launched, the first of about 450 American team leaders traveled to Toyota's Takaoka plant in Japan for three weeks of classroom and on-the-job training. These initiatives were followed by further on-the-job training in which team members worked side-by-side with Toyota trainers.

In 1998, NUMMI—by now producing more than 300,000 cars per annum, including the Toyota Corolla sedan, the Toyota Tacoma truck, and the Chevrolet Prizm—won the United States' National Association of Manufacturers Award for Workforce Excellence. Both companies accessed a great deal of complex knowledge by working together in the NUMMI joint venture (although GM found it difficult to integrate this new knowledge into its mainstream automaking operations back in Detroit).

The Dangers of Overreliance on Third Parties

Each of the approaches just outlined offers practical mechanisms to help a company access new knowledge in distant pockets outside its organization. All require a degree of commitment and investment in order to obtain that knowledge. All involve partial reliance on the competence of third parties and their willingness to cooperate. As such, they require proactive management of the relationship. And they require that the third party learns with you, too. A passive approach (effectively relying on the third party to take the initiative and "tell you what you need to know") both increases your dependence and reduces the likelihood of successfully accessing the knowledge you need. Overreliance on third parties is dangerous for a number of reasons:

- The third parties may have limited resources or little interest in revealing everything that would be useful for you to learn, or they may themselves have an incomplete understanding of the local technology or market knowledge that you wish to access.
- The third party may control your pace of learning, even without you fully recognizing that this is happening.
- The third party can be of only limited help in addressing the problem of translation: Complex, context-dependent knowledge obtained locally still needs to be made meaningful to the potential users elsewhere in your organization.
- Overreliance on a third party may give you a false sense of security that keeps you from recognizing the need for firsthand learning, so instead you rely too much on vicarious learning.

The risks of overreliance on third parties for sensing can be mitigated by setting up internal sensing units.

INTERNAL SENSORS

Your sensing units (or probes) may take the form of a laboratory, a plant, a design center, or a marketing center. On the surface, they may look like the familiar day-to-day operations that supply, market, or distribute products and services, but they have a very important additional duty. Management must recognize the dual role of these units as both sensors and operational sites and actively promote double-tasking to capture the valuable knowledge that arises as a by-product of selected operations.

Some internal units may be solely dedicated to the sensing function. Dedicated sensing units can more easily include people, structures, and incentive systems that are appropriate to the task of sensing but that sit uneasily within the mainstream network of operations.

Dedicated Sensors

The stand-alone status of a dedicated sensing unit has both advantages and disadvantages. On the positive side, a dedicated sensing unit can be used to establish a presence where the company has no other operations at all. This means the company can access pockets of new knowledge where it doesn't make sense to have a sales, a supply, or even an R&D operation.[7] By contrast, a company that limits the location of its sensing units to places where the company has established operations may find that important pockets of new knowledge remain outside of its reach. Dedicated sensing units also have the advantage of pursuing their mission free from the constraints of the operating plane.

Recall the successful strategy followed by Shiseido when it established sensing probes to access hotbeds of knowledge about the fragrance business in France. The units it established and acquired had a clear mission: to learn, uncompromised by potentially conflicting objectives that would have between introduced if Shiseido had asked these units to be responsible for large-scale production, sales, or distribution. Several companies, seeking to come to grips with the complexity of the Chinese market, have set up units to learn by providing after-sales service to machinery supplied by competitors, by leasing equipment, or by refurbishing existing plants.[8]

On the other hand, some sensing units may need to be engaged in a substantial amount of day-to day activity in order to perform their sensing role. It may not be possible to understand emerging market trends, for example, without a close involvement with sales and distribution. Dedicated sensors can also become isolated from the rest of the business. For example, by the time Cable & Wireless saw all the benefits it gained from C&W Innovations, a sensing unit it had set up in Silicon Valley to scout for Internet businesses in the early 1990s, the headquarters had already closed the unit for lack of results.

Clearly, dedicated sensing units have a potentially important role in unearthing new knowledge that lies outside the reach of a company's existing operational network (either because this knowledge exists in places where the firm doesn't operate or because prejudices within the established organization make it impossible to access). But before establishing a dedicated sensing, we need to be able to answer the following questions: What kind of people would be assigned to the new sensing unit? What would be their future in the organization? How would we measure their performance? How would we reward them?