Driving Through the Fog: Managing at the Edge

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Although the periphery does not occupy the centre of our attention, it should be ignored at our peril. This paper gives many examples of companies that have been heavily influenced by peripheral events, whether they started out there, or whether they hopelessly misread the oncoming signals. It argues that a monitoring of the periphery can help diffuse small problems before they becomes crises. It provides a roadmap for organisations by describing how to define the field of view and how to assess the signals from it.

Introduction

According to author E.L. Doctorow, writing is like driving in the fog. 'You can only see as far as your headlights, but you can make the whole trip that way.' Many managers can appreciate this sentiment, as they help create the stories of their own organisations and industries. Managers often conduct business in the fog of tremendous uncertainty. The world beyond their immediate vision remains elusive and emergent, just like the periphery of the moving headlights. Doctorow's image presents us with several salient features of the periphery: it is just beyond reach, it is constantly changing, and the things we don't see in this periphery (a stopped car or leaping deer) can cause serious trouble and derail our progress.

In this article, we explore the complex nature of the periphery. We consider the reasons why it is important for organisations to develop peripheral vision—to see opportunities and threats, avoid strategic blunders and anticipate changes in the environment. We discuss the complexity of the periphery and, finally, outline a strategy for learning about the periphery.

Why is the periphery important?

The periphery is easy to ignore. It is the part of the world that does not occupy the centre of attention. It may concern emerging trends in markets that a company serves or, it may be faint stirrings in a part of the world the company barely pays attention to. It may be political

movements such as the recent anti-globalisation protests in Seattle and Rome. A few years ago, they seemed to be mere fringe elements, but suddenly they broke into news headlines with high profile, violent demonstrations.

Intel's Andy Grove once compared the process of industry change to melting snow, writing that 'when spring comes, snow melts first at the periphery, because that is where it is most exposed'.[1] By paying attention to information from the periphery, he writes, the organisation can hear the dire warnings of a Cassandra or recognise other emerging shifts in the environment. Clearly, there are many reasons to pay serious attention to the periphery. It can be a source of opportunities, the area of strategic attack or a source of strategic blunders.

Seeing opportunities

By looking at the edges of traditional mail delivery, FedEx created an industry in overnight delivery. Their innovation streak continued. They found new opportunities in handling global components that emerged from the convergence of trends in global freight flow, outsourcing demands, and internet availability. Furthermore, they invited customers to do their own tracking at any time, increasing satisfaction and lowering call centre costs. They clearly saw the new options created by the internet and the shifting demands of their customers. Often, new opportunities emerge from fringe markets. Snowboarding, microbreweries and extreme sports were once sideshows, but they have now all become popular with wide audiences. Sometimes, new opportunities spring from minor bottlenecks or problems that remain at the fringes. For example, 3M recognised the need for hospitals to improve patient record retrieval and developed a Health Information Systems business in response. Once market researchers, in a variety of different businesses, started to leave their own laboratories to study actual user behaviour, they came up with products such as Liquid White-Out, Gatorade and the Sports Bra. It pays to explore the periphery.

The periphery may also suggest when it is time to shift strategic direction

The periphery may also suggest when it is time to shift strategic direction. Louis Arnitz, founder of corporate travel software company iFAO in Germany, recognised the potential impact of the emerging internet in the mid 1990s, and redirected his traditional travel agency into web-based software for managing corporate travel. His company now has more than 80 per cent of the domestic market for corporate travel software. By paying attention to the peripheral developments of the internet before the rapid rise of Netscape and the transformation of Microsoft, Arnitz was able to position his company for this new opportunity. Once the internet moved from the periphery into the mainstream of business, it disrupted the core of the traditional travel agency business. Many independent travel agencies—focusing on their core business—had to close shop because corporate customers started to take more of their travel inside the organisation and automate the process. Because Arnitz could see the developments on the periphery, he was able to act ahead of time and transform his business to offer travel management software to corporations.[2]

Recognising strategic threats

In their studies of industry disruptions, Richard Foster and Sarah Kaplan emphasise that the periphery is often where new upstarts such as Apple, Southwest Airlines or Comcast arise. Established industries are eroded by the forces of 'creative destruction' which typically arise from upstarts at the fringes of the industry. Foster and Kaplan write that in the 'vortex of creative destruction . . . attacking companies occupy the periphery, while the defenders occupy the core of the vortex, focusing on the evolutionary improvement of the existing business.'[3]

Can these companies in the core see the attacks that may come from the periphery? At the eye of the storm, things may appear calmer than they really are.

As Clay Christensen's research on disruptive technologies for products such as computer disk drives shows, once new entrants approach the core, the incumbent players may have become highly vulnerable to attacks from the new periphery.[4] Incumbents are prone to dismiss or overlook technologies on the periphery that seem applicable only to smaller market segments they do not currently serve or don't understand. For example, the large copy centres that were the mainstay of Xerox's traditional market failed to appreciate the value of compact, slow table-top copiers for homes or small businesses. This oversight opened the way for Canon's personal copier. Sears Roebuck underestimated the threat from Wal-Mart's discounting strategy because it was first implemented in small and seemingly unprofitable local markets outside of Sears' reach. How well do today's pharmaceutical companies truly appreciate the outside forces that are transforming healthcare? How well do banks, universities or government agencies appreciate the changes afoot in their own arenas?

Applications of the fast-emerging 'Solid State Technology' have started to impact the traditional lighting business—for example, LED-based systems are replacing the standard incandescent light bulbs used in traffic signals. Within the next three to four years, all traffic signals in the US will be replaced by LED-based systems as mandated by the government. This shift in technology has taken the traditional lighting manufacturers by surprise and their 'steady business' has been rendered obsolete by a new paradigm in lighting. Lamp manufacturers who supplied millions of dollars worth of incandescent lightbulbs have seen this part of their business evaporate. Interestingly enough, the LED-based systems are being produced by new players who are not typically part of the traditional lighting industry. These intergrators simply buy the chip (LED) and build the module that is retrofitted into the existing box. As these LED-based systems need very little energy, there is a high possibility of powering these by solar energy, which would have a tremendous impact on the power grid as well.

This is a great example of a fundamental shift in the value chain, enabled by technology and innovation. The miniature size of the LEDs combined with their long life and digital medium, all make this an extremely flexible and adaptable system that enhances light quality while saving energy dollars as well as replacement dollars.

A company with a very successful business using the old technology could easily be swept under by such a change, just as Digital Equipment Corporation and other companies lost their leadership when they failed to appreciate the PC revolution and other shifts in computing in the 1980s. Charles Schwab caused havoc in the traditional brokerage industry, using a discount and later its online trading strategies. To see these changes while there is still time to act requires an organisational capacity for peripheral vision. Otherwise, you may be 'Schwabbed'.

Of course, the value of scanning and interpreting the periphery in recognising strategic threats is not just restricted to business. In the wake of the tragedies on September 11, 2001, the US government established a new Department of Homeland Security to strengthen the nation's ability to recognise and act on potential terrorist threats more quickly. This initiative included expanded information gathering and better co-ordination of knowledge across diverse agencies to recognise and respond to weak signals of potential threats.

Avoiding strategic blunders and anticipating shifts in the environment

In addition to failing to see competitive threats from the periphery, companies also can make serious mistakes by failing to fully appreciate actions or reactions at the periphery. Shell's inability to appreciate the environmental protests on its periphery led to the now infamous Brent-Spar fiasco in the North Sea. The company's attempts to transform the obsolete drilling platform into an 'eco-friendly' artificial reef in April 1995 met with vehement opposition from Greenpeace and eventually a full-scale German boycott of Shell gas stations.[5] Similarly, in the late 1990s, Monsanto failed to anticipate or control GMO opposition to genetically engineered crops and foods. The company's researchers understood the science, but CEO Robert Shapiro

did not fully appreciate the social implications. These were well-managed companies. They missed something that at first appeared to be minor but later turned out to be very significant.[6] A similar fate befell the Catholic Church in the US when societal concerns arose about how poorly it was dealing with priests involved in child abuse as well as the victims of such abuse. More attention to these issues that were kept on the periphery could have allowed the church to address them before they mushroomed into a major crisis.

It is natural to ignore the periphery, especially when the focal view paints such a clear and compelling picture from a very different frame of reference. For example, in 1998, 39 pharmaceutical companies decided to sue the South Africa government—including Nelson Mandela—over violations involving their HIV drug patents for AIDS. From a legal viewpoint, the companies were protecting the intellectual property that they considered vital to their continued survival. But the public view was very different: these large corporations were seen as trying to strong arm developing countries facing a desperate AIDS crisis. It raised a firestorm of public resentment over what was perceived as an uncaring attitude. The real issue was not patent infringement, although that loomed large in the eyes of the 39 drug companies. The real issue, lying at the periphery of the prevailing industry view, was how best to provide HIV drugs to patients in underdeveloped nations who cannot afford them. The companies looked at it from a narrow legal or business perspective, where the key issues are protection of intellectual property and preservation of revenue streams needed to support future research. A better understanding of the periphery would have prevented them from being blindsided and receiving a public black eye.

Proactive attention to the periphery can help defuse small problems before they become major crises. For example, Procter & Gamble paid quick attention to the (completely unfounded) rumours that its newly launched odour removal spray was linked to untimely deaths of domestic canaries. Some consumers had posted messages on the internet that blamed the spray for the sudden death of their feathered pets. These consumers emphasised the highly sensitive respiratory system of birds, which are indeed very fragile and the reason why canaries were used in mines to detect gas. When P&G picked up these rumours from the periphery (thanks to its cyber-scanning routines), it entered the dialogue and provided new data that squelched the rumour mill. In contrast, Intel, unwisely, dismissed early complaints about its Pentium chip, exacerbating consumer discontent and leading to the well-known public relations disaster.

The value of scanning and interpreting the periphery is not just restricted to business

Vigilant peripheral vision has helped other organisations anticipate and prepare for potential shifts in their environments. During a strategic planning workshop in the late 1990s, Enron Federal Credit Union considered the unthinkable by asking: what would happen if Enron ceased to exist? Its planning offsite in early 1998 used scenario planning to direct more organisational attention toward the periphery.[7] Rather than just focusing on its core relationships with Enron, the credit union stepped up its membership and marketing efforts. These skills proved crucial to its survival when the unthinkable did happen and Enron collapsed.

The nature of the periphery: flashlights vs. lasers

The preceding discussion makes it clear that the periphery is important. It can be a source of opportunities, threats and strategic blunders. It is where the first signs of shifts in the environment might be noticed. But the periphery, by its nature, is also quite problematic. It is not easy to understand or even to define. Where is the periphery? One answer is that the periphery is
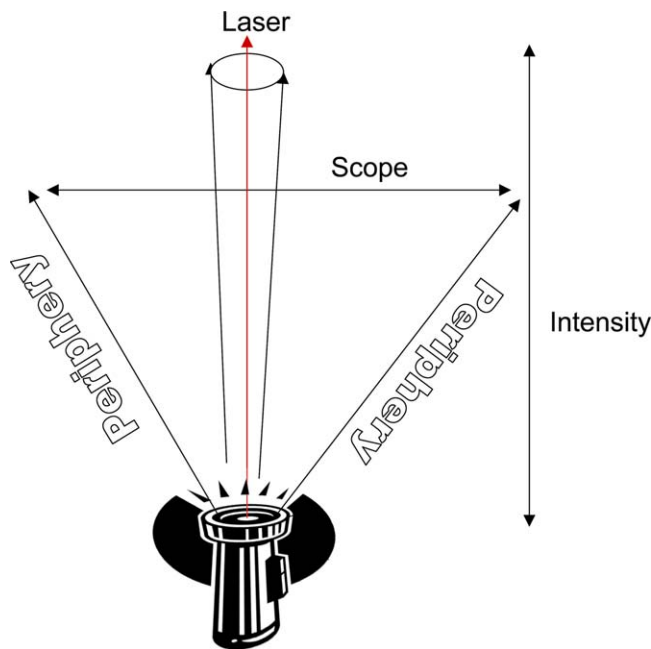
Figure 1. Flashlight or laser: tradeoffs in scope and intensity

wherever your attention is not. This may seem like a trite definitional mindtwister, but it is an important insight. In a certain sense, when one looks at the periphery, it ceases to be the periphery at all (except, perhaps, for a brief sideways glance). It becomes a focal point.

Peripheral vision entails the ability to pay attention to the part of the world you are not paying attention to. Why is this so challenging? Attention for organisations and individuals requires the use of scarce resources. Just as the eye is designed for focus on a central area of vision with a blurry periphery, individuals and organisations are wired to see clearly what lies within their current frames and less clearly what lies in their mental shadows.

The basic tradeoffs between scope and intensity of focus can be envisioned as the difference between working with a flashlight versus a laser beam (see Figure 1). A laser has a very efficient, narrow focus. A flashlight provides a broader view, with the breadth and depth of this view depending upon the design of the flashlight. Paying broader attention takes more effort or diminishes the clarity of the beam. Visibility can be enhanced by either investing in increasing the scope of the beam or by increasing its intensity (lumens). In an organisation, enhancing the scope might mean investing in a wider range of scientific disciplines or markets, whereas the intensity might be raised by, for example, increasing the size of staff or number of specialists the organisation has looking at a specific area. With limited resources, any company must ask where to focus its attention: Should it build depth in a focal area (laser beam), at the risk of increasing the size of its blindspots, or expanding the scope of vision of the periphery (flashlight), even if it means diluting the intensity of its attention to the focal area?

If an organisation knows where it needs to look, the most efficient solution is to take a laser beam and focus on that single narrow area of inquiry. A doctor may literally do this when performing laser surgery. But in an increasingly interconnected and fast-changing world, having a narrow focus can be dangerous. It makes the organisation vulnerable to attacks or missed opportunities from outside this narrow focus. The source of a medical problem could be more systemic or complex, so the laser-beam focus of a specialist may cause the doctor to overlook other potential causes of the illness or other possible cures. Narrowing the focus, while efficient, inevitably creates large blindspots. When the Encyclopedia Britannica focused nar-

rowly on improving its print products, this clear focus made it very successful. But it was caught offguard when digital rivals such as Microsoft's Encarta moved into Britannica's space using new CD-ROM technology.

On the other hand, most companies cannot afford to focus on all things with great intensity. Because there are real costs to increasing either scope or intensity, there will always be parts of the world that fall *outside* the organisation's focal vision, as illustrated in Figure 1. The challenge of peripheral vision is to fly reconnaissance missions over these areas *without* devoting the full attention of the organisation to them. This requires that the organisation has the capacity to identify what is important in these areas and to know when to turn the organisation's full attention to these new areas. However, it also requires that the organisation is good at filtering out the extraneous detail from this vast periphery. As in military reconnaissance, the key is rapid information processing, quick sense making and fast refocusing, all with an open mind and high vigilance.

The key question to ask is whether your organisation is too narrowly or broadly focused. And a related question is whether the organisation has the requisite skill set and capacity to handle whatever information is gleaned from the periphery. Many business gurus have extolled the virtue of sticking to your knitting, focusing on execution and outsourcing activities that are not core competencies. Seldom, however, does this advice consider the full price of reduced peripheral vision, which by definition is hard to assess. After all, how can we know the opportunity cost of not looking, of not asking questions that involve the edge of our business? There are no simple formulae to answer these critical questions; they require wisdom, experience, and, above all, a strategic perspective.

Confusion and diminishing returns at the periphery

In addition to the direct resources involved in gathering information about the periphery, another real cost of paying diffused attention to the periphery is the increased likelihood of confusion. To see everything is to see nothing. To look everywhere is to look nowhere in particular. We all know the dizzying experience of seeing too many images flash by at too high a speed, whether in a movie, disco, or a theme park ride. As more resources are devoted to scanning the periphery, information overload can become a serious problem. The ensuing confusion, combined with the actual out-of-pocket cost of canvassing the periphery, will cause diminishing marginal return to any additional resource allocation and eventually a point of reduced benefits (see Figure 2). At that point, no additional resources should be expanded to studying the periphery until the organisation's capacity to handle the new information supply is improved. This can be done by hiring more people, training the existing ones, or using technology to detect, codify, store and retrieve new knowledge. Also, it may require a greater capacity to discuss, debate and learn.
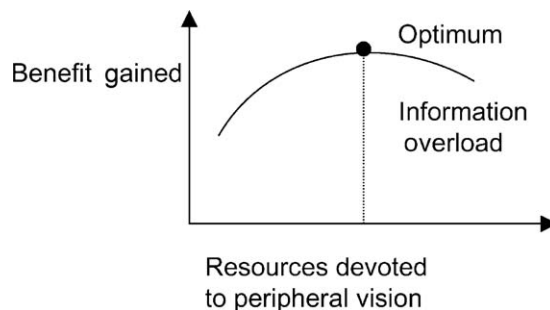
Figure 2. Trade-offs in absorbing inputs from the periphery

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Organisations often resist paying close attention to the periphery for fear of being overwhelmed and distracted by a plethora of weak signals. One medical devices maker estimated there may be as many as 1000 events, market trends, competitive activities, technological developments and macroeconomic uncertainties in their periphery. So, there is good reason to balance one's scope of vision with one's capacity to handle the information. In general, companies can get help from associations, publishers, consultants, and other infomediaries who help collect and digest information in the form of newsletters, information services, workshops, databases etc. But each organisation still needs a strategy for how best to use these external inputs, while also recognising that these infomediaries may not catch everything that is relevant to their specific business.

The problem of information overload is real and widespread. In an analysis of the failure of US intelligence to properly appreciate the threat posed by Al Qaeda, the head of the National Security Agency said: 'Our noise-to-signal ratio is 20-to-1, that one being something useful.'[8] In hindsight, it may seem obvious that someone should have connected the dots of immigration violations, foreign nationals enrolling in flight schools, and internal memos warning of a possible terrorist threat. But these were just a few of thousands of signals that needed to be encoded in a timely fashion. This security head believes that Pearl Harbor was not so much a surprise as a case where 'one could not divine the meaningful signals from the thousands that were out there'. The challenge is to assemble the myriad pieces of information into a meaningful mosaic. 'You have to collect, process, translate, move it down the funnel, transform it from noise into a signal, before you know it is useful.' This means that scanning the periphery is intimately tied to the organisation's capacity to systematically create meaning out of apparent chaos.

An issue that compounds the problem of overload is that the periphery is constantly changing. By definition, the periphery is relative to one's point of view. As Foster and Kaplan point out, one person's periphery may be another person's focal area. And, as companies refocus their strategies, what once was the periphery may become their core. But seldom does this happen easily or quickly in organisations. Deeply rooted frames of mind, established habits and entrenched routines, the way information and rewards are allocated, and the prevailing culture are designed to stabilise the focal area and thus reinforce the status quo. The key may lie in conversing more with outsiders (suppliers, customers, partners, regulators, media, students, analysts, etc.) whose own core is part of your periphery.

Learning from the periphery: A framework

How can managers better see the relevant parts of the periphery—effectively and efficiently—and act on the threats and opportunities they see there? Our conceptual model of peripheral vision, shown in Figure 3, is grounded in the descriptive realities of organisational learning, but serves a normative purpose. Organisational learning is about the general process of devel-
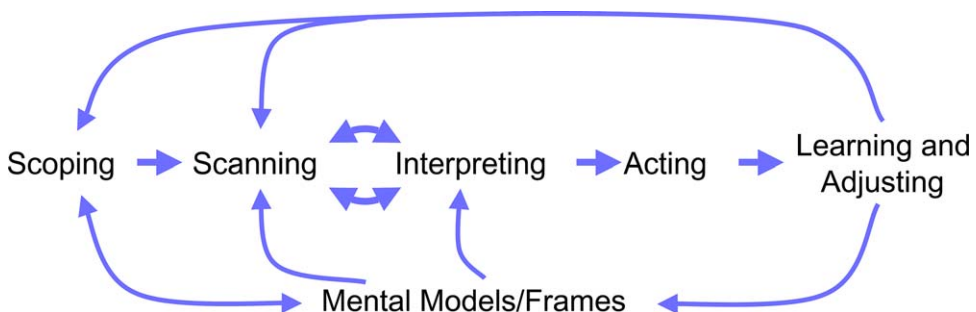

Figure 3. Peripheral vision as a learning process

oping new knowledge or collective insights that have the potential to improve behaviour. Ever since the classic work of Newell and Simon on human problem solving, many scholars of administrative behaviour have been partial to an information processing view of organisational decision making.[9] The basic stages of this information processing paradigm revolve around perception, judgment, action and feedback. At the organisational level, the parallel stages of this process are: information acquisition, information dissemination, shared interpretation, co-ordinated action and collective learning. There are many variants on this basic framework, differing by: type of learning (is it adaptive or generative?); number of stages (is 'dissemination' part of 'interpretation'?); and the role of mental representation ('pattern recognition vs. purposive construction'). Enduring research questions remain about the mix of deliberate versus unconscious cognitive processing at each stage, the influence of heuristics and biases, as well as the role of schemata, mental models and other simplifying frameworks for interpretation.

In recognition of the difference between learning from the periphery versus learning within the focal area of the organisation, we have extended the basic process to incorporate 'scoping' - deciding where to look—as an explicit, rather than implicit, forerunner to the information acquisition or scanning stage. The scan within the initial scope can be passive or active depending on whether the organisation waits for information to come to it versus launching a directed inquiry. The next step is disseminating and interpreting the information to draw out useful insights. Last, an assessment must be made whether the information should be used now, stored or ignored, followed by learning from whatever action that was taken. At all stages, the process is guided by a set of mental models or frames that reside deep within the organisation. There are multiple feedback loops because organisational learning seeks insight with the potential to make changes.

Because this model captures the complex steps humans and organisations go through from initial stimulus to final response, we can improve each phase by applying the insights and remedies proposed in such fields as decision sciences, organisation theory, strategy, marketing, and sociology. While there have been extensive studies of individual and organisational learning, one could question whether the advice developed in the core areas of these various disciplines does in fact apply at the periphery where, by definition, conscious attention and inference is limited. Consequently, we view the advice from the aforementioned fields as normative beacons which may only provide guidance to a limited extent. We have developed our basic framework around selected principles and insights that we believe can help people and organisations improve their peripheral vision. But our case is primarily based on prima facie evidence (i.e., advice that seems plausible and reasonable to apply to the domain of peripheral vision), and only to a limited extent on an established body of empirical research about the periphery. A similar approach to developing prescriptive advice from descriptive and normative work can be seen in the field of decision sciences, where normative models such as expected utility theory, despite their limitations, have helped guide the development of more practical prescriptive approaches.[10] Hence, we offer advice on improving peripheral vision with the caveat that our recommendations are based on the rather limited academic and practical knowledge that exists about this important but under-studied area.

In the following sections, we examine the specific characteristics of peripheral vision at each stage of the learning process.

Scoping

How broadly should the field of view be defined? By definition, peripheral vision requires a broad definition of scope, stretching beyond the focal area of the organisation. Hence, it entails paying attention to a lot of things the organisation might typically ignore. With a recognition of the cost of this broader focus, as discussed above, the challenge is to expand the scope just enough to include all the *relevant* parts of the environment but no further.

In general, the more uncertain the environment, the more likely there are to be threats from the periphery and the broader the scope that is needed. In establishing the scope of its learning,

the organisation needs to conduct an initial assessment of the environment to determine where relevant threats and opportunities may come from. A useful starting point is the past: what was missed and where did it come from? Then, focus on the present and future, for example through scenario planning. This particular technique typically begins with a broad assessment of potential trends and uncertainties that have the ability to transform the environment.[11] This helps determine the broadest possible *relevant* scope in terms of timeframe, market view, technology perspective, economic and political issues, legal or environmental concerns, etc.

While some organisations set their scope by gathering a small group of executives in a conference room, this can tend to reinforce current mindsets and blindspots. By expanding its view—including looking at employees, customers, competitors, channels and new technologies—the organisation can expand the scope of its view of the periphery (see Box 1 below).

Box 1
Where To Look: Expanding the Scope

- *Inside the company.* The first place to scan is within the company. The larger the company, the more points of contact it will have with the periphery - and these contact people may also have the expertise to interpret the signals. But scale and scope can also be impediments because of the problem of 'unco-ordinated distributed intelligence'. Literally the company firm doesn't know what it knows, and is unable to surface the collective insights and coalesce them in a meaningful picture.
- *Customers.* Valuable insights can come from: (1) defectors whose needs were not met; (2) those with complaints or queries due to changes in their own customer requirements; (3) lead users, who have needs in advance of the rest of the market; (4) fast-growing market segments; or (5) precursor parts of the country or world where fads, fashions or technology innovations reliably appear earlier (bell weathers).
- *Competitors.* Although most companies profess to have a competitive intelligence capability it is usually limited to direct competitors using the same business model. It pays to be attentive to start-ups at the periphery with different business models or the ability to attack the low end of the market. Study and talk with non-traditional competitors who operate from different business logics and information sets, and study what is being funded by venture capital.
- *Channels.* Retailers, wholesalers and other intermediaries are often the first to hear about changes with end consumers, or new offerings from unheralded competitors. Of course, it is not always in their interest to share what they know. But it is worth a conversation, since you may be one or two steps removed. To validate their views, you can bypass the channels and speak to customers directly.
- *Other stakeholders.* In addition to the above, there are other stakeholders who may be in touch with a relevant part of the world that is escaping your attention. Suppliers may alert you to changes upstream; regulators and politicians about pending concerns or legislation; investment analysts about broad trends and financial concerns; venture capitalists about new business ideas; and think tanks (academics, thought leaders, specialists) to offer new ways of strategic thinking.
- *Technologies.* Opportunities and threats from emerging technologies can be found: (1) within the company by cross-division teams that promote cross-fertilisation of discoveries; (2) through public licensors of technology that make available searchable databases; (3) the vast technology literature; and (4) intermediaries such as Innocentive and Nine-Sigma that connect companies with problems and independent researchers with solutions. Early signals of the convergence of independent researchers on the same technology are best collected within informal networks cultivated at scientific or trade meetings.

Scope also depends on the company's strategy. A broader scope should be pursued when there are good opportunities outside the core business that fit the company's present competencies and capabilities. When Abbott Laboratories recognised in the early 1960s that it was not likely to become a leading pharmaceutical company, it shifted and expanded its scope to encompass diagnostic products, infant nutritionals and hospital supplies. On the other hand, some companies, even in environments of rapid change, elect to 'stick to their knitting' and grow by edging carefully outward from their current scope. Their focus strategies may be motivated by asking how they can extend or leverage their current capabilities into adjacent markets. For example, Dell Computers was able to sustain its remarkable growth by extending its 'build to order' business model to similar markets such as printers and low-end servers. On the other hand, Dell has paid careful attention to changes around this focal point, such as the integration of computing and entertainment, which might have a significant impact on its focal business.

With a broadening of scope may come a new groups of customers, new technologies and business partners, unfamiliar competitors and channels, and, perhaps, unanticipated stakeholders. Some peripheries will be far more challenging than others. For example, companies participating in telecommunications and entertainment now have to contend with diverse players, including video game designers and peer-to-peer exchange sites facilitating illegal downloads. The question of scope is an important strategic decision that must ultimately be made at the top of the organisation. But, it should be based on insights about the periphery that come from many layers in the organisation. Sound scoping requires an open mind, good data and the courage to venture into unfamiliar terrain.

Scanning

Once the scope is set, learning begins with scanning. This scanning can be focused on *exploitation* or *exploration*.[12] A mindset of *exploitation* leads to directed searches within a well-defined and reasonably familiar domain. *Exploratory* scanning, in contrast, emphasises the periphery further out, and is driven by the kind of intense curiosity typical of true learning organisations.[13] The challenge here is to have an open mind and broad view.

Exploratory scans can either be active or passive. In the passive mode, the management team keeps its antennae up and waits to receive outside signals. Although the organisation may seem in tune with the periphery under this approach, it may not really be. Since most of the data come from familiar or traditional sources, this mode of scanning tends to reinforce rather than challenge prevailing beliefs. The danger of this passive stance is that it filters out unexpected weak signals, or even fails to receive them.

Active scanners have specific questions they want to answer about the periphery they are exploring. It is hypothesis driven, and if key issues are involved there should be multiple hypotheses that are tested. Such organisations are more likely to mount search parties using teams of outsiders and insiders, deploying a wide range of methods. For example, companies that are actively seeking new product opportunities at the periphery of their market scope may employ lead user analysis, metaphor elicitation and other techniques for surfacing latent needs.[14] Internet interrogations might be conducted using technology tools, as discussed later in this special issue by Anil Menon and Andrew Tomkins.

One approach is to pay attention to both the detail and the big picture

Exploratory scanning covers more ground but with less detail, making it efficient for broad-brush, big-picture views of the world. Exploitation scanning requires greater depth and related resources to mine deeply. What is the right balance between scanning for exploration and exploitation? One possible approach is to pay attention to *both* the detail and the big picture, using a strong top-down vision to identify areas that need more attention. This strategy would

require resources for learning at greater distances from the focal vision, while also having a mechanism for triggering more focused attention if needed.

The FBI, for example, trains its agents to use a scanning strategy called *splatter vision.* This involves scanning a crowd for would-be assassins by looking into the distance and not focus on anyone in particular.[15] Once this general gaze takes hold, the agent looks for deviation or change. Is someone restless, looking around too much, slowly putting his hand in his coat? Against the backdrop of hundreds of faces, the agents seek to spot a lone assassin. This suspicious activity would then trigger a more intense focus. This way, a single agent can be alert for signs of trouble across a fairly large area. From an organisational perspective, one might think of this process as having a set of surveillance units broadly scanning the globe, combined with strategic task forces that can be directed to explore potential hot spots. This approach permits a broad scope of vision without requiring the cost and complexity of carefully monitoring every square foot of the globe.

The scanning process can be aided through formal mechanisms such as membership in professional organisations, an outside speaker series, participation in industry or academic conferences, subscribing to key journals and information services, using strategic alliances or partnerships. Some companies also create formal listening posts for the organisation, such as Reebok's 'Cool Hunter' or IBM's 'Crow's Nest', that are given the task of focusing on the periphery (as discussed later in this issue).

Individuals and organisations can also create rituals to encourage broader scanning. To stay current, Buckminster Fuller would periodically select a magazine from a bookstore shelf at random, and read it in its entirety to remain fresh and see new connections. In academia, we use sabbaticals. In a similar vein, 3M and other companies allow researchers to devote a certain percentage of their time to their own offbeat projects, with a recognition that tangential searches can sometimes lead to valuable products such as Post-It notes. There is a real danger, in a world in which we receive customised information, that we get stuck in our highly limited information cocoons. We need to recreate processes for serendipity and vicarious learning.

Interpreting

Interpretation is a significant challenging in seeing and acting upon the inputs from scanning. There are a many behavioural and organisational blinders, including overconfidence and groupthink (see box below), that make it very difficult to 'see' what is right in front of one's face.[16] Winston Churchill once dryly observed that 'when people stumble on to the truth they usually pick themselves up and hurry about their business'. The quirks and foibles of the human mind, combined with the organisational and cultural pressures to see the world one way may keep most of the periphery in shadows, even in an organisation with a broadly defined scope and effective scanning (Box 2).

To improve interpretation, the organisation needs to develop appropriate channels for sharing and interpreting information internally as well as with external partners. For example, a CEO at one company was collecting information about a tangential competitor. At a senior management team meeting, the VP for manufacturing casually mentioned that this same rival had been buying equipment similar to their own, a sign that it intended to compete head on. This competitive intelligence was within the firm, but the VP didn't understand the strategic issues well enough to know that it was valuable. People must engage in frequent and free dialogue for the necessary connections to occur spontaneously. This, in turn, requires a culture of trust, respect and curiosity, plus the recognition that information sharing is crucial. Too many companies still operate in a mode where information is shared on a 'need to know basis' only. This mentality may be somewhat defensible for the performance organisation but it greatly hampers the learning organisation.

How can we become more creative in interpreting weak signals and outlier data that might come from the periphery? Certain organisational capacities can help, such as a tolerance for ambiguity and a desire to formulate and test multiple, competing hypotheses in an iterative

> **Box 2**
> **Behavioural Blinders**
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> Behavioral and organisational research shows that we are prone to lock on to a single—potentially misleading—view, and discard others possibilities, because of individual and collective cognitive blinders:
>
> - *Mental filters*: Research shows that people tend to force fit the world into their existing frames. When subjects are shown playing cards with say a red king of spades, most will transform it into a heart because they are used to seeing only black spades. Weak signals that don't fit are typically distorted or ignored. Humans see what they expect to see rather than what is there.
> - *Overconfidence*: A demonstrated tendency to be too sure also makes people far too certain that the current view they hold is correct. We are often too sure of one single view. Consequently, we ignore or discount information from the periphery, since we are certain that our current view is right.
> - *Penchant for confirming as opposed to disconfirming evidence*: A related issue is that it is harder to detect disconfirming evidence. Studies of people who win Nobel prizes show they are not necessarily 'smarter' than their best colleagues but are more willing to open themselves to new possibilities and let go of hypotheses that do not work. They do not get locked in just one point of view.[17]
> - *Dislike for ambiguity*: People dislike ambiguity, particularly in organisations in which managers are expected to have answers to questions. The philosopher Churchman wrote about the design of inquiring systems and noted that humans have a penchant for a 'one-truth' view of the world. This stance is associated with Leibnitz' view of the world and the search for one single truth. In contrast, the philosophers Kant and Hegel argued for competing interpretations and dialectic tensions.[18]
> - *Groupthink*: Members of organisations take comfort from belonging to the majority, seeing the world in the same way. It is a rare person who has the wherewithal to be a truly independent thinker. With the vision of the entire organisation focused in a single direction, who is minding the periphery?

fashion. The physicist Michael Faraday accidentally discovered induction current in 1831 when he noticed that his ampmeter moved after he changed a magnetic field around the wire. Many other physicists might have seen this brief change in the dial but would not have realised it significance. Faraday was deeply knowledgeable and interested in how magnetic fields work. He had an open mind and was truly creative by entertaining multiple hypotheses. As Louis Pasteur noted: 'Chance only favours the prepared mind.'

Organisations must likewise develop multiple hypotheses about the meaning of weak signals. Unfortunately, organisational sense-making is usually driven toward one single meaning. How we interpret signals is deeply affected by our mental models or frames of mind and these, in turn, influence our hypotheses and inquiries going forward. So, the cognitive challenges at the periphery are far greater than in our focal areas since there are less data to work with and more room for bias and distortion to trip us up. For example, to really appreciate the potential or threat from the periphery may require a shift in our mental models. We need to be prepared to make creative leaps and engage in prior brainstorming about possibilities. This requires a less rigid and formalised approach to filtering than we would apply to focal areas.

Ironically one of the biggest impediments to the creative interpretation of the periphery is the urge to impose too much order on an inherently ambiguous picture. Because humans dislike ambiguity, we tend to quickly lock in on a view of the world. Once this lock takes place—

as when an optical illusion snaps into focus—it is very difficult to reverse the process and not see the image we have interpreted. This ability to suspend focus or judgment and switch between different views is key to interpreting the periphery. Paradoxically, organisations often try to make too much sense of an inherently noisy environment. They would be better off making less sense and developing multiple views.

Acting

While organisations need to look and interpret broadly, they also need to be much more cautious about acting on input from the periphery. As noted, the optical periphery is less sharp and clear than the focal area of vision and the same is true for the organisational periphery. It is easy to jump to conclusions and actions based on an incorrect impressions or interpretation of something caught in the 'corner of one's eye'. For example, many companies with little technological experience made significant and costly errors in attempting to respond to opportunities arising from the internet or biotechnology. Conversely, an apparent danger signal may be misinterpreted. A little bit of knowledge can be a dangerous thing. The ambiguity of the periphery requires a cautious stance when confronted with relevant but ambiguous external developments.

It is important to acknowledge the dangers of first impressions

Any action should begin by sharpening the focus on areas of interest, and progressively zooming in and out to find the right level of scope and resolution, as noted in the discussions above. It is important to acknowledge the dangers of first impressions, and compensate through further exploration and testing before acting boldly. However, decision makers may not be able to wait for clear and compelling evidence before doing something. Consequently, their degree of commitment may have to range from a cautious, toe-in-the-water approach to an aggressive full-scale investment, depending on the situation. It is important to get prior agreement on the appropriate strategic posture to be adopted, which can be:

1. *Watch and wait.* This passive approach is appropriate when there is a high uncertainty due to conflicting information and/or the firm has the resources to be a fast follower and let others take the lead. 'Wait and see' is often a good approach when there is no strong first-mover advantage.
2. *Position and learn.* As uncertainty lessens or the cost of inaction increases, a more aggressive approach is needed. This can range from directed market explorations with advanced research methods to the negotiation of option agreements to ensure the rights of first refusal to an emerging technology. The idea is to purchase options.
3. *Believe and lead.* Full-scale commitment is warranted when the opportunity is very promising or the threat is imminent, and the organisation is sufficiently persuaded by the available evidence. To justify this more risky posture requires a convergence of signals from the periphery and support for the assumptions that favour bold action. It also requires recognition of the risks of acting based on the often fuzzy input from the periphery.

For all three postures listed above, the organisation needs to develop capabilities for flexible response. Among the approaches that can help the organisation act fast and flexibly are: creating a sense-and-respond management style, 'de-risking' through fast prototyping, small experiments and networking, adopting an options perspective when acting on the periphery (developing a portfolio of options rather than placing one big bet), and practicing organisational agility.

Learning and adjusting

Once we act, and start to obtain feedback, opportunities for learning and adjustment will arise. Infants refine their vision and actions by reaching out and touching the things they see. The interaction between organisational actions, perceptions and reactions will refine the organisation's understanding of its enviroment. Depending on the type of feedback it receives, an organisation's deeper image of the world may need to be adjusted. And questions may arise as to whether the organisation needs to shift its focal vision.

For example, as pharmaceutical companies become more aware of developments in biosciences and the changing nature of healthcare, they will have to make critical decisions about how they respond and position for these new developments. Do they begin to adjust their organisations to create stronger capabilities in an area such as systems biology through better connections to pioneering researchers and companies that are leaders in the field? How should they design their organisations so that they can deepen their knowledge of this important area without taking too many resources away from the products and R&D that will allow them to succeed in the short term?

As organisational processes for sense making and deciding are highly affected by managers' mental models, learning at the periphery may require a deeper change in these mental models as well. Rather than solving well-defined problems in a linear way using the convergent power of analysis, peripheral learning requires lateral thinking, asking disconfirming questions, relying on intuition and looking at data through multiple lenses. This requires an on-going, iterative process of scoping, scanning, interpreting, acting, learning, and adjusting by which individuals and organisation define and shift their vision. This process has many feedback loops and is decidedly non-linear. The results are a better understanding of the current periphery and a process for shifting the periphery toward the centre of vision if and when needed.

In summary: a different kind of expertise

As we have seen, the periphery is very important, but also frustratingly difficult, to understand and manage. While we have outlined a process in this article for exploring and acting on the periphery, there is much we don't know about this important subject, especially about what it takes to manage the periphery successfully. It is, in many ways, more art than science. Unlike individual persons, who can quickly turn their head to change their focus and explore the periphery, organisations cannot easily change focus. The organisational head is usually pointed in one direction and various institutional mechanisms as well as other internal forces try to keep it that way. These centripetal forces, which keep the organisation alive and whole, must be counterbalanced by centrifugal forces that move the organisation beyond its current boundaries and orbit. This is a precarious balancing act that defies a simple cost-benefit analysis or optimisation routine. It requires seasoned judgment and, indeed, wisdom and leadership from the top down.

The extent to which organisations need to engage in systematic external scanning and probing will naturally vary across industries and firms. Finding the right balance between the costs and benefits of developing peripheral vision is the overriding challenge. One complicating factor is that the cost will be much more concrete and immediate than the benefits, which are likely to be delayed and probabilistic in nature. How can we know, before having studied the periphery, how much can be learned there? Considering this asymmetry in the timing, visibility and certainty of the cost and benefits, the likely bias will be to underinvest in developing peripheral vision.

Another important complicating factor is how to align the mechanisms for peripheral vision with the central dilemma that all organisations face of balancing differentiation and integration. Each organisation must judge how much to engage in specialisation (i.e., division of labour) on the one hand and then what mechanism to employ to properly integrate its diverse activities on the other hand. The more specialists there are, the greater the need for generalists

and integrators as well. As economics teaches us, the optimal degree of specialisation is dictated by the size of the market. For example, New York City can sustain many more specialised lawyers and doctors than a small town with a couple of attorneys and a few general practitioners. In principle, the community of specialists in New York city should see and know more, both in their focal area as well as in the periphery, but only if there are mechanisms to share this knowledge across functional and disciplinary boundaries.

Organisations need expertise, but they also sometimes need the open minds of novices. In general, as measured across a wide range of tasks, studies show that experts tend to have deeper content knowledge, greater perceptual skills, recognise abnormalities more quickly and tend to operate from more complex mental models.[19] For example, when you walk through a European cathedral with an expert, this person will literally see and remember many more aspects of the church than you will, even if it is a first-time visit for both. One reason the expert can do this is that they think in larger chunks and can draw upon previously acquired patterns to guide their recognition and memory. If you truly want to improve your organisation's skill at sensing the periphery, studying the differences between experts and novices would be a good starting point.

In sum, we believe that peripheral vision in organisations is a skill that can be taught and learned, very much the way car drivers and pilots develop this skill. Unlike other forms of organisational expertise, however, peripheral vision has distinctive and paradoxical characteristics. Strong peripheral vision represents the ability to focus on the part of the world that is not a central focus, to 'look at' what cannot easily be seen, and to glance at the edges of vision. It might be considered 'expertise in being humble', in keeping an open mind, watching out for the unexpected, and scanning the external environment without quite knowing what deeper patterns are being sought. These are not typical ways of thinking about expertise. As we develop a richer understanding of peripheral vision and build the organisational capabilities to improve it, this process may force us to look more broadly and perhaps challenge our deeper views of expertise and learning itself.

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