Chapter 7
Search Strategies for Innovation

LEARNING OBJECTIVES

By the end of this chapter you will have explored:

- the need for a strategy to shape search for opportunities
- dimensions of search space: incremental/radical and old/new frame
- strategies for covering the space: exploit and explore
- tools and structures to support these strategies
- the concept of discontinuous and disruptive innovation
- the role of entrepreneurship as a mindset underpinning search, whether in new venture start-ups or in renewing established organizations
- the concept of absorptive capacity and building search capability.

Making Sense of the Sources

It’s clear that opportunities for innovation are not in short supply – and they arise from many different directions. The key challenge for innovation management is how to spot the potential in a sea of possibilities, and to do so with often-limited resources. No organization can hope to cover all the bases, so there needs to be some underlying strategy to how the search process is undertaken. So how can we make sense of all the sources out there? In this section we’ll begin with some lenses which help us frame the opportunities.
Push or Pull Innovation?

If we take a broad overview, we can see that all of these sources can be looked at as either a ‘push’ or a ‘pull’ stimulus for innovation. And this raises the question of which is more important. This has been the subject of many innovation studies over the years, using a variety of different methods to try to establish which is more important (and therefore where organizations could best place their resources). The reality is that innovation is never a simple matter of push or pull but rather their interaction; as Chris Freeman says: ‘Necessity may be the mother of invention but procreation needs a partner!’ Innovations tend to resolve into vectors – combinations of the two core principles. And these direct our attention in two complementary directions: creating possibilities (or at least keeping track of what others are doing along the R&D frontier) and identifying and working with needs.

In fact, most sources of innovation involve both push and pull components, for example ‘applied R&D’ involves directing the push search in areas of particular need. Regulation both pushes in key directions and pulls innovations through in response to changed conditions. User-led innovation may be triggered by user needs but it often involves their creating new solutions to old problems, essentially pushing the frontier of possibility in new directions.

There is a risk in focusing on either of the ‘pure’ forms of push or pull sources. If we put all our eggs in one basket we risk being excellent at invention but without turning our ideas into successful innovations – a fate shared by too many would-be entrepreneurs. But equally too close an ear to the market may limit us in our search. As Henry Ford is reputed to have said, ‘If I had asked the market they would have said they wanted faster horses!’ The limits of even the best market research lie in the fact that they represent sophisticated ways of asking people’s reactions to something which is already there, rather than allowing for something completely outside their experience so far.

Incremental or Radical?

Another key dimension is around incremental or radical innovation. We’ve seen that there is a pattern of what could be termed ‘punctuated equilibrium’ with innovation: most of the time innovation is about exploiting and elaborating, creating variations on a theme within an established technical, market or regulatory trajectory. But occasionally there is a breakthrough which creates a new trajectory – and the cycle repeats itself. This suggests that much of our attention in searching for innovation triggers will be around incremental improvement innovation: the different versions of a piece of software, the Mk 2, 3 and 4 of a product or the continuing improvement of a business process to make it closer to lean. But we will need to have some element of our portfolio focused on the longer-range, higher risk, which may lead to the breakthrough and set up a new trajectory.

Timing

A third issue is around timing. At different stages in the product or industry lifecycle the emphasis may be more or less on push or pull. For example, mature industries will tend to focus on pull, responding to different market needs and differentiating by incremental innovation in key directions of user need. By contrast a new industry, for example the emergent
industries based on genetics or nano materials technology, is often about solutions looking for a problem. So we would expect different balances of resources committed to push or pull within these different stages.

Back in the 1970s, two US researchers (William Abernathy and James Utterback) developed a model which has important lessons for how we think about managing innovation (Figure 7.1). In the early stage – the ‘fluid’ phase – there is a lot of uncertainty and emphasis is placed on product innovation. Typically, entrepreneurs have lots of ideas (most of which fail) about the ways to use new market and technological opportunities. (Think about the rise of the Internet and the continuing proliferation of entrepreneurial ideas as an example of a fluid phase.)

But after a while there is a stabilization around a particular configuration – the ‘dominant design’ (which may not always be the best in technical terms but is the one which matches the market’s needs and aspirations), and then emphasis shifts away from more product variety to process innovation. How can we make this in volume, to a low price, consistent quality, etc.? (Think of Henry Ford: he was a latecomer to the business of car design but his Model T became the dominant design and succeeded principally because of the extensive process innovations around mass production.)

Finally, there is a third, ‘mature’ phase in which innovation is incremental in both product and process, there is extensive competition and the scene is set for another breakthrough and return to the fluid stage. What this model means is that we could particularly look for radical product innovation ideas in the

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**FIGURE 7.1** The innovation lifecycle


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Case Study of these patterns of innovation associated with the evolution of the bicycle is available on the Innovation Portal at www.innovation-portal.info

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www.innovation-portal.info
fluid phase but in the mature stage we would be better placed concentrating on incremental improvement innovations.

**Adoption and Diffusion**

A fourth and related issue is around diffusion – the adoption and elaboration of innovation over time. Innovation adoption takes place gradually over time, following some version of an s-curve. At the early stages innovative users with a high tolerance for failure will explore, to be followed by early adopters. This gives way to the majority following their lead until finally the remnant of a potential adopting population – the laggards – adopt or remain stubbornly resistant. Understanding diffusion processes and the influential factors is important because it helps us understand where and when different kinds of triggers are picked up. Lead users and early adopters are likely to be important sources of ideas and variations which can help shape an innovation in its early life, whereas the early and late majority will be more a source of incremental improvement ideas.3 (We’ll explore this in detail in Chapter 12.)

**The Innovation Treasure Hunt**

As we saw in Chapter 2, innovation can take a variety of forms – ‘product’, ‘process’, ‘position’ and ‘paradigm’ – and comes in incremental or radical flavours. So it would help to have a map of innovation search space (the ground we want to cover) before we start out on our journey. We’ll build it with two axes to create a simple view of the search space and then look at how we can cover it (Figure 7.2).

**Incremental/Radical Innovation: Do Better/Do Different**

The vertical one is all about the novelty involved – from incremental to radical innovation, ‘doing what we do but better’ to ‘do different’. In terms of numbers, most innovation projects are around the incremental area, and the big advantage is that there is a degree of familiarity, the risk is lower and we are moving forward along a path which has already been trodden. The benefits from doing so may be small in themselves but their effect is cumulative.

By contrast, taking a leap forward could bring big gains – but also carries higher risk. Since we are moving into unknown territory, there will be a need to experiment – and a good chance that much of that experimentation will fail. We won’t be clear about the directions in which we want to go and so there is a real risk of going up blind alleys or being trapped in one-way streets. Essentially, the kind of searching we do – and the tools we use – will be different.

**Established Frame/New Frame**

The other axis is linked to how we frame the space in which we look. Just as human beings need to develop mental models to simplify the confusion which the rich stimuli in their
environment offers them, so individual entrepreneurs and established organizations make use of simplifying frames. They ‘look’ at the environment and take note of elements which they consider relevant: threats to watch out for, opportunities to take advantage of, competitors and collaborators, etc. Constructing such frames helps give the organization some stability but it also defines the space within which it will search for innovation possibility.

In practice, these models often converge around a core theme, and although organizations may differ, they often share common models about how their world behaves. So most firms in a particular sector will adopt similar ways of framing, assuming certain ‘rules of the game’, following certain trajectories in common. And this shapes where and how they tend to search for opportunities. It emerges over time but once established becomes the ‘box’ within which further innovation takes place.

It’s difficult to think and work outside this box, because it is reinforced by the structures, processes and tools which the organization uses in its day-to-day work. The problem is also that such ways of working are linked to a complex web of other players in the organization’s ‘value network’ – its key competitors, customers and suppliers – who further reinforce the dominant way of seeing the world.

Powerful though they are, such frames are only models of how individuals and organizations think the world works. It is possible to see things differently, take into account new elements, pay attention to different things and come up with alternative solutions. This is, of course, exactly what entrepreneurs do when they try to find opportunities: they look at the world differently and see opportunity in a different way of framing things. And sometimes their new way of looking at things becomes a widely accepted one, and their innovation changes the game.

Rather like the drunk who has lost his keys on the way home and is desperately searching for them under the nearest lamp post ‘because there is more light there’, firms have a natural tendency to search in spaces which they already know and understand. But we know that the weak early-warning signals of the emergence of totally new possibilities – radically different technologies, new markets with radically different needs, changing public opinion or

![FIGURE 7.2 A map of innovation search space](www.innovation-portal.info)
political context – won’t happen under our particular lamp post. Instead, they are out there in the darkness – so we have to find new ways of searching in space we aren’t familiar with.

How can this be done? By luck, sometimes – except that simply being in the right place at the right time doesn’t always help. History suggests that even when the new possibility is presented to the firm on a plate its internal capacity to see and act on the possibilities is often lacking. For example, the famous ‘not invented here’ effect has been observed on many occasions where an otherwise well-established and successful innovative firm rejects a new opportunity which turns out to be of major significance.

**Technological Excellence may not be Enough. . .**

In the 1970s, Xerox was the dominant player in photocopiers, having built the industry from its early days when it was founded on the radical technology pioneered by Chester Carlson and the Battelle Memorial Institute. But despite their prowess in the core technologies and continuing investment in maintaining an edge, it found itself seriously threatened by a new generation of small copiers developed by new entrant Japanese players. Despite the fact that Xerox had enormous experience in the industry and a deep understanding of the core technology, it took the company almost eight years of mishaps and false starts to introduce a competitive product. In that time, Xerox lost around half its market share and suffered severe financial problems.

In similar fashion in the 1950s, the electronics giant RCA developed a prototype portable transistor-based radio using technologies which it had come to understand well. However, it saw little reason to promote such an apparently inferior technology and continued to develop and build its high range devices. By contrast, Sony used it to gain access to the consumer market and to build a whole generation of portable consumer devices – and in the process acquired considerable technological experience, which enabled it to enter and compete successfully in higher-value, more complex markets.

**Exploit or Explore?**

Having drawn the map, we can begin to look at strategies which individuals and organizations could use to search across it. And that raises an important question: do we exploit or explore? One way we can innovate is by moving forward from what we already know. Individuals and organizations can deploy knowledge resources and other assets to secure returns, and a ‘safe’ way of doing so is to harvest a steady flow of benefits derived from ‘doing what we do better’. This has been termed ‘exploitation’ by innovation researchers, and it essentially involves using what we already know as the foundation for further incremental innovation. It builds strongly on what is already well established – but in the process leads to a high degree of what is called ‘path dependency’. Essentially, what we did in the past will play a strong role in shaping what we do next.
The trouble is that in an uncertain environment the potential to secure and defend a competitive position depends on ‘doing something different’, that is a radical product or process innovation rather than imitations and variants of what others are also offering. This kind of search had been termed ‘exploration’ and is the kind which involves big leaps into new knowledge territory – risky, but they enable the organization to do new and very different things.

Whether we are talking about private sector competition or public service reform, we need to recognize that ‘exploit’ may not always be a sufficient strategy. In the United Kingdom, for example, the National Health Service in 2010 was tasked with finding £20 billion of savings within four years – and while efficiency improvements will certainly contribute a proportion of this through incremental ‘do better’ innovation, the reality is that some radically different things will be needed. So the challenge is one of exploit and explore, with the need to learn some new search approaches and tools to help do that.

A good way to start understanding broad strategies is by looking at what organizations actually do when searching for innovation triggers. Table 7.1 gives an example.

Information of this kind gives us a broad picture, in this case showing that ideas for innovation come from many different sources – suppliers, universities, etc. It reinforces the view that successful innovation is about spreading the net as widely as possible, mobilizing multiple channels. Although surveys of this kind tell us a lot, they also miss important elements, for example:

- Incremental innovation and how it is triggered lies beneath their radar screen, and there is a bias towards product innovation.
- They don’t capture much of the organizational change.
- They don’t capture ‘position’ or business model innovation so well, again especially at the incremental end.

INNOVATION IN ACTION 7.2

How We Search for Innovation

We look in the usual places for our industry. We look at our customers. We look at our suppliers. We go to trade bodies. We go to trade fairs. We present technical papers. We have an input coming from our customers. What we also try to do is develop inputs from other areas. We’ve done that in a number of ways. Where we’re recruiting, we try to bring in people who can bring a different perspective. We don’t necessarily want people who’ve worked in the type of instruments we have in the same industry... certainly in the past we’ve brought in people who bring a completely different perspective, almost like introducing greensand into the oyster. We deliberately look outside. We will look in other areas. We will look in areas that are perhaps different technology. We will look in areas that are adjacent to what we do, where we haven’t normally looked. And we also do encourage the employees themselves to come forward with ideas.

Source: Patrick McLaughlin, Managing Director, Cerulean.

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They tend to focus on the ‘obvious’ search agents like R&D or market research departments but leave out others who may be involved, e.g. purchasing – and within the business the idea of suggestion schemes and high involvement innovation.

They deal with established organizations so such surveys tell us very little about where and how new start-ups seek out their opportunities.
• They mainly tells us about the ‘exploit’ area and gives less detail about the explore side of things.

Innovation Search Strategies

Of course, in reality the lines between these ‘zones’ are not clear-cut, but the idea behind the map is that we are likely to experience very different challenges in each area. Finding opportunities is going to need different strategies – and in the following section we’ll look at the challenges in a little more detail.

Strategies for Exploit

Zone 1 is all about ‘exploit’ search, assuming a stable and shared frame within which adaptive and incremental development takes place. Search ‘routines’ here are associated with refining tools and methods for technological and market research, deepening relationships with established key players. Examples would be working with key suppliers, getting closer to customers and building key strategic alliances to help deliver established innovations more efficiently. Process innovation is enabled by inviting suggestions for incremental improvement across the organization – a high-involvement kaizen model.

Understanding buyer/adopter behaviour has become a key theme in marketing studies since it provides us with frameworks and tools for identifying and understanding user needs. Advertising and branding play a key role in this process – essentially using psychology to tune into, or even stimulate and create – basic human needs. Another strand has focused on detailed studies of what people actually do and how they actually use products and services – using the same approaches which anthropologists use to study new tribes to uncover hidden and latent needs.

Strategies for Explore

Zone 2 involves searching new territory, pushing the frontiers of what is known and deploying different search techniques for doing so – but still doing so within an established framework. R&D search investments here tend to include big projects with high strategic potential, patenting and intellectual property (IP) strategies aimed at marking out and defending territory, and riding key technological trajectories (such as Moore’s law in semiconductors). Market research similarly aims to get close to customers but to push the frontiers via empathic design,
latent needs analysis, etc. Although the activity is risky and exploratory, it is still governed strongly by the frame for the sector.

‘Explore’ strategies are much more about specialist groups and networks inside and outside the organization, for example with university, public and commercial laboratories and other firms. The highly specialized nature of the work makes it difficult for others in the organization to participate. Indeed this gap between worlds can often lead to tensions between the ‘operating’ and the ‘exploring’ units, and the boardroom battles between these two camps for resources are often tense. In similar fashion market research is highly specialized and may include external professional agencies in its network with the task of providing sophisticated business intelligence around a focused frontier.

From the standpoint of the entrepreneur, this zone is interesting since there may be significant opportunities. Individuals and start-up businesses with highly specialized knowledge assets, for example hi-tech spinouts from universities, may feature strongly on the radar screens of large established organizations looking to explore. This pattern of ‘symbiosis’ (mutual dependency and advantage for new and established players) is a common pattern in fields like pharmaceuticals, electronics, software and biotechnology.

### Strategies for Reframing

Zone 3 is essentially associated with *reframing*. It involves searching a space where alternative architectures are generated, exploring different permutations and combinations of elements in the environment. Importantly, this often happens by working with elements in the environment not embraced by established business models, for example, working with fringe markets, looking at the ‘bottom of the pyramid’ or collaborating with ‘extreme users’.

This zone often favours entrepreneurs on the outside of established organizations because they can see ways of putting the pieces together differently. Importantly, this may not involve pushing the technological frontiers with radical innovation in the core offering or process. It is often about change in the ways the architecture works.

Table 7.2 describes some of the additional approaches which organizations use to try to extend their peripheral vision and find new innovation opportunities.
TABLE 7.2  Developing New Ways of Searching

<table>
<thead>
<tr>
<th>Search Strategy</th>
<th>Mode of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sending out scouts</td>
<td>Dispatch idea hunters to track down new innovation triggers</td>
</tr>
<tr>
<td>Exploring multiple futures</td>
<td>Use futures techniques to explore alternative possible futures; and develop innovation options from that</td>
</tr>
<tr>
<td>Using the Web</td>
<td>Harness the power of the Web, through online communities and virtual worlds, for example to detect new trends</td>
</tr>
<tr>
<td>Working with active users</td>
<td>Team up with product and service users to see the ways in which they change and develop existing offerings</td>
</tr>
<tr>
<td>Deep diving</td>
<td>Study what people actually do, rather than what they say they do</td>
</tr>
<tr>
<td>Probe and learn</td>
<td>Use prototyping as a mechanism to explore emergent phenomena and act as a boundary object to bring key stakeholders into the innovation process</td>
</tr>
<tr>
<td>Mobilize the mainstream</td>
<td>Bring mainstream actors into the product and service development process</td>
</tr>
<tr>
<td>Corporate venturing</td>
<td>Create and deploy venture units</td>
</tr>
<tr>
<td>Corporate entrepreneurship and intrapreneuring</td>
<td>Stimulate and nurture the entrepreneurial talent inside the organization</td>
</tr>
<tr>
<td>Use brokers and bridges</td>
<td>Cast the ideas net far and wide and connect with other industries</td>
</tr>
<tr>
<td>Deliberate diversity</td>
<td>Create diverse teams and a diverse workforce</td>
</tr>
<tr>
<td>Idea generators</td>
<td>Use creativity tools</td>
</tr>
</tbody>
</table>

INNOVATION IN ACTION 7.3

Scouting for Ideas

The mobile phone company O2 has a trend-scouting group of about 10 people who interpret externally identified trends into their specific business context, while BT has a scouting unit in Silicon Valley which assesses some 3000 technology opportunities a year in California. The four-man operation was established in 1999 to make venture investments in promising telecom start-ups, but after the dotcom bubble burst it shifted its mission towards identifying partners and technologies that BT was interested in. The small team looks at more than 1000 companies per year and then, based on their deep knowledge of the issues facing the R&D operations back in England, they target the small number of cases where there is a direct match between BT’s needs and the Silicon Valley company’s technology. While the number of successful partnerships that result from this activity is small – typically four or five per year – the unit performs an invaluable service by keeping BT abreast of the latest developments in its technology domain.
Innovation in Action

Online Innovation Markets

Karim Lakhani (Harvard Business School) and Lars Bo Jeppesen (Copenhagen Business School) studied the ways in which businesses are making use of the innovation market platform Innocentive.com. The core model at Innocentive is to host ‘challenges’ put up by ‘seekers’ for ideas which ‘solvers’ offer. They examined 166 challenges and also carried out a Web-based survey of solvers and found that the model offered around a 30% solution rate – of particular value to seekers looking to diversify the perspectives and approaches to solving their problems. The approach was particularly relevant for problems that large and well-known R&D-intensive firms had been unsuccessful in solving internally. Innocentive currently has around 200 000 solvers and as a result considerable diversity; their study suggested that as the number of unique scientific interests in the overall submitter population increased the higher the probability that a challenge was successfully solved. In other words, diversity of potential scientific approaches to a problem was a significant predictor of problem-solving success.

Interestingly, the survey also found that solvers were often bridging knowledge fields – taking solutions and approaches from one area (their own specialty) and applying it to different areas. This study offers systematic evidence for the premise that innovation occurs at the boundary of disciplines.

Strategies for Co-Evolution

Exploring Complexity: Working at the edge of chaos

Zone 4 represents the ‘edge of chaos’ complex environment where innovation emerges as a product of a process of co-evolution. In this space many different elements are involved and each affects the other so that it becomes impossible to predict the outcome. Think about the emerging future for health care: it’s unlikely that the current models (whether publicly or privately funded) will survive long into the future because of the pressures of greater demand, an ageing population, spending cuts, etc. But any new model is going to be hard to predict because so many factors are involved – technology, markets, global distribution, public/private sector split, increasing lobbying by different interest groups, etc. Instead, we should see it as a complex system in which there is extensive interaction and where what happens in one part of the system will affect the others.

Under conditions like these, it is easy to assume that there is nothing we can do – and more importantly for our entrepreneurs, nowhere in which they could find opportunities except by accident or by waiting until the new game has fully emerged. But we do know something about these situations. There is a body of knowledge around ‘complexity theory’ which specializes in them. And there are some simple principles which can help us work in innovation space of this kind. In particular, there is a pattern of what is called ‘co-evolution’ in which different interacting elements begin to converge on a particular solution. (An example in nature is the way ice crystals can form into the particular and organized pattern of a snowflake.)
As this pattern begins to emerge, it can be amplified through feedback, making the signal about the pattern clearer than all the other competing background signals. And gradually the system acquires momentum to move in a particular direction – and a dominant pattern emerges. We see this a lot in what is sometimes called the ‘fluid phase’ in the innovation lifecycle, when new combinations of technologies and markets swirl around and entrepreneurs try out many different ideas. Eventually, out of the turbulent and unpredictable set of possibilities a dominant design emerges which sets the pattern for future innovation – think about the motor car or the bicycle as simple examples.

So for entrepreneurs to work in this complex space there are some simple rules:

- Be in the game early – the signals about the emergence of the dominant design will be weak at first and hard to spot from the outside.
- Be in there actively and prepared to experiment – there is no ‘right’ answer but a lot of playing with possibilities.
- Be prepared for failure – essentially working in zone 4 is about probe and learn, mostly about what won’t work.
- Be aware of others in the system, picking up weak signals and amplifying what seems to work.

To summarize, Table 7.3 shows the different approaches – search strategies – which could be used to explore innovation space.

Strategies for Searching

As we have seen, organizations need to be able to cover all the innovation search space – and to do so with limited resources. So their approaches need to be strategic and in this section we’ll briefly look at some of the underlying approaches which successful innovators use. In particular, we’ll look at:

- Open innovation
- Networks for innovation
- Knowledge management.

Open Innovation

Building rich and extensive linkages with potential sources of innovation has always been important, for example studies in the United Kingdom in the 1950s identified one key differentiator between successful and less successful innovating firms as the degree to which they were ‘cosmopolitan’ as opposed to ‘parochial’ in their approach towards sources of innovation.4 Entrepreneurs starting up new ventures know the importance of building networks – the essence of what they do in spotting opportunities is to make connections which others may have missed.
TABLE 7.3 Challenges in Navigating Innovation Search Space

<table>
<thead>
<tr>
<th>Zone</th>
<th>Search challenges</th>
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<tbody>
<tr>
<td>1. 'Business as usual' – innovation but under 'steady state' conditions, little disturbance around core business model</td>
<td>Exploit – extend in incremental fashion boundaries of technology and market. Refine and improve. Build close links/strong ties with key players. Favours established organizations with resources – start-up entrepreneurs are looking to spot niches within the mainstream</td>
</tr>
<tr>
<td>2. 'Business model as usual' – bounded exploration within this frame</td>
<td>Exploration – pushing frontiers of technology and market via advanced techniques. Build close links with key strategic knowledge sources, inside and especially outside the organization. Entrepreneurs with key knowledge assets – for example spin-off ventures from a university research lab – can benefit from this search process and link their ideas with the resources which a major organization can bring</td>
</tr>
</tbody>
</table>
| 3. Alternative frame – taking in new/different elements in environment  
Variety matching, alternative architectures | Reframing – explore alternative options, introduce new elements. Experimentation and open-ended search  
Breadth and periphery important. Entrepreneurs have a significant advantage here since they can bring fresh thinking and perspectives to an established game.  
Mainstream organizations often seek to explore here through setting up internal entrepreneurial groups – corporate venturing, ‘intrapreneurs’, etc. |
| 4. Radical – new to the world – possibilities. New architecture around as yet unknown and established elements | Emergence – need to co-evolve with stakeholders  
• Be in there  
• Be in there early  
• Be in there actively  
Entrepreneurs have advantages here since this resembles the ‘fluid’ state in innovation lifecycle and requires flexibility in thinking, tolerance for failure, willingness to take risks, etc. Big problem is the high rate of failure here which established organizations have some capacity to absorb but which is an issue for start-up entrepreneurs. |

There are, of course, arguments for keeping a relatively closed approach – for example there is a value in doing your own R&D and market research because the information collected is then available to be exploited in ways which the business can control. It can choose to push certain lines, hold back on others, keep things essentially within a closed system. But as we’ve seen the reality is that innovation is triggered in all sorts of ways and a sensible strategy is to cast the net as widely as possible.

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This is especially true when we move into our ‘explore’ spaces on the map. We are going to need different knowledge sets and perspectives, and this requires learning new search strategies. Innovation has always been a multiplayer game, one which involves weaving together many different strands of what could be termed ‘knowledge spaghetti’ to create something new. What’s different about today’s context is the sheer volume and distribution of that knowledge – for example it’s estimated that nearly $1500 billion ($920 billion) of new knowledge is being created every year in public and private sector R&D around the world. Keeping track of growth on this scale – especially when this R&D is increasingly globalized and coming from an ever-wider range of players – becomes a major headache even for major technology-based firms.

US professor Henry Chesbrough coined the term ‘open innovation’ to describe the challenge facing even large organizations in keeping track of and accessing external knowledge rather than relying on internally generated ideas. Put simply, open innovation involves the recognition that ‘not all the smart guys work for us’.

Of course, it is not simply new R&D knowledge about science and technology which is exploding. There are similar seismic shifts on the market demand side, and on the interests of users in greater customization and even participation in the innovation game.

What this means is a significant acceleration in the opening-up of the innovation search game in a number of converging areas, as indicated by Figure 7.3.

These themes are playing an increasingly important role in shaping our innovation landscape and we will explore them in detail in Chapter 17.

**Innovation Networks**

One consequence of the increasing openness in innovation is the growing importance of networks as a way of accessing and working with other people’s knowledge. There are many ways in which innovation networks can contribute. Box 7.1 gives some examples.
There are four major arguments pushing for greater levels of networking in innovation:

- **Collective efficiency** – in a complex environment requiring a high variety of responses it is hard for all but the largest firm to hold these competencies in-house. Networking offers a way of getting access to different resources through a shared exchange process – the kind of theme underlying the cluster model which has proved so successful for small firms in Italy, Spain and many other countries.

- **Collective learning** – networking offers not only the opportunity to share scarce or expensive resources. It can also facilitate a shared learning process in which partners exchange experiences, challenge models and practices, bring new insights and ideas, and support shared experimentation. ‘Learning networks’ have proved successful vehicles in industrial development in a variety of cases (see later in the chapter for some examples).

- **Collective risk-taking** – building on the idea of collective activity, networking also permits higher levels of risk to be considered than any single participant may be prepared to undertake. This is the rationale behind many pre-competitive consortia around high-risk R&D.

- **Intersection of different knowledge sets** – networking also allows for different relationships to be built across knowledge frontiers and opens up the participating organization to new stimuli and experiences.

**Knowledge Management**

We’ve seen throughout the book that knowledge plays a key role in innovation – and so it makes sense to understand how it is created and moved around our organization and in its wider environment. This idea of ‘knowledge management’ has been studied for many years and there are some useful pointers emerging around helpful strategies. (We’ll look in more detail at this question in Chapter 13.)

For example:

- Mobilizing employee ideas and knowledge around incremental product and especially process innovation. This has always been a powerful source of innovation but has been given additional impetus through communication and networking technologies which allow for innovation contests, ‘innovation jams’ and other approaches, bringing more people into the game.6

- Bringing the ‘voice of the customer’ into all areas of the organization and using that to focus and draw out relevant ideas and knowledge. Amongst recipes for achieving this are to rotate staff so that they spend some time out working with and listening to
customers, and the introduction of the concept that ‘everybody is someone’s customer’.

- Using our understanding of social networks and how ideas flow within and across organizations. Of particular significance in this context is the role played by various forms of ‘gatekeeper’ in the organization. This concept, which goes back to the pioneering work of Thomas Allen in his studies within the aerospace industry of the 1970s, relates to a model of communication in which ideas flow via key individuals to those who can make use of them in developing innovation.7

- Using ‘communities of practice’, for example Procter and Gamble’s successes with ‘connect and develop’ owe much to the company’s mobilizing rich linkages between people who know things within their giant global operations and increasingly outside it. P&G uses ‘communities of practice’, where people with different knowledge sets can converge around core themes. Intranet technology links around 10000 people in an internal ‘ideas market’ – and some of the company’s significant successes have come from making better internal connections. 3M puts much of its success down to making and managing connections, and Larry Wendling, Vice President for Corporate Research, calls the rich formal and informal networking which links the thousands of R&D and market-facing people across the organization 3M’s ‘secret weapon’!

- ‘Intrapreneurship’ – mobilizing internal entrepreneurship. A rich source lies in the entrepreneurial ideas of employees – projects which are not formally sanctioned by the business but build on the energy, enthusiasm and inspiration of people passionate enough to want to try out new ideas. Encouraging this kind of activity is increasingly popular and organizations like 3M and Google make attempts to manage it in a semi-formal fashion, allocating a certain amount of time/space to employees to explore their own ideas. Managing this is a delicate balancing act: on the one hand there is a need to give both permission and resources to enable employee-led ideas to flourish, but on the other there is the risk of these resources being dissipated with nothing to show for them. In many cases there is an attempt to create a culture of what can be termed ‘bootlegging’ in which there is tacit support for projects which go against the grain.8

Learning to Search

As we saw in Chapter 1, managing innovation is something which individuals and organizations learn to do through a mixture of trial and error, imitation and borrowing of good practices, improvisation, etc. Over time, they accumulate experience about what works best for them – and this becomes a highly specific approach, almost like a personality. The idea of ‘routines’ – repeated, learnt and embedded patterns of behaviour – very much applies here in
the area of search tools. Individuals and organizations develop and refine the tools they use to trawl the innovation space, building on tried-and-tested techniques but also experimenting and adding new ones to deal with new challenges in their search space.

For example, much experience has been gained in how R&D units can be structured to enable a balance between applied research (supporting the ‘exploit’ type of search) and more wide-ranging, ‘blue sky’ activities (which facilitate the ‘explore’ side of the equation). These approaches have been refined further along ‘open innovation’ lines where the R&D work of others is brought into play, and by ways of dealing with the increasingly global production of knowledge, for example the pharmaceutical giant GSK deliberately pursues a policy of R&D competition across several major facilities distributed around the world.

In similar fashion, market research has evolved to produce a rich portfolio of tools for building a deep understanding of user needs – and continues to develop new and further refined techniques, for example empathic design, lead-user methods and increasing use of ethnography. The choice of techniques and structures depends on a variety of strategic factors like those explored above, balancing their costs and risks against the quality and quantity of knowledge they bring in. Throughout this book, we stress the idea that managing innovation is a dynamic capability – something which needs to be updated and extended on a continuing basis to deal with the ‘moving frontier’ problem. As markets, technologies, competitors, regulations and all sorts of other elements in a complex environment shift, we need to learn new tricks and sometimes let go of older ones which are no longer appropriate.

The label ‘absorptive capacity’ has been widely used to describe this learning capability and it can be expressed as ‘the ability of a firm to recognize the value of new, external information, assimilate it, and apply it’. It’s an important concept because it is easy to make the assumption that, because there is a rich environment full of potential sources of innovation, every organization will find and make use of these. The reality is, of course, that they differ widely in their ability to make use of such trigger signals. For various reasons, organizations may find difficulties in growing through acquiring and using new knowledge.

Some may simply be unaware of the need to change never mind having the capability to manage such change. Such firms, a classic problem of small business growth for example, differ from those which recognize in some strategic way the need to change, to acquire and use new knowledge but lack the capability to target their search or to assimilate and make effective use of new knowledge once identified. Others may be clear what they need but lack the capability to find and acquire it. And others may have well-developed routines for dealing with all of these issues and represent resources on which less experienced firms can draw, as is the case with some major supply chains focused around a core player.

The key message from research on absorptive capacity is that acquiring and using new knowledge involves multiple and different activities around search, acquisition, assimilation and implementation. It’s essentially about learning to learn – building capabilities for search, acquire, assimilate, etc. which allow organizations to repeat the trick. Developing absorptive capacity involves two complementary kinds of learning. Type 1 (adaptive learning) is about reinforcing and establishing relevant routines for dealing with a particular level of environmental complexity, and type 2 (generative learning) for taking on new levels of complexity.
Summary

- Faced with a rich environment full of potential sources of innovation, individuals and organizations need a strategic approach to searching for opportunities.

- We can imagine a search space for innovation within which we look for opportunities. There are two dimensions: ‘incremental/do better vs. Radical/do different innovation’, and ‘existing frame/new frame’.

- Looking for opportunities can take us into the realms of ‘exploit’ – innovations built on moving forward from what we already know in mainly incremental fashion. Or it can involve ‘explore’ innovation, making risky but sometimes valuable leaps into new fields and opening up innovation space.

- Exploit innovation favours established organizations, and start-up entrepreneurs mostly find opportunities within niches in an established framework.

- Bounded exploration involves radical search but within an established frame. This requires extensive resources (e.g. in R&D) but although this again favours established organizations there is also scope for knowledge-rich entrepreneurs (e.g. in high-tech start-up businesses).

- Reframing innovation requires a different mindset, a new way of seeing opportunities – and often favours start-up entrepreneurs. Established organizations find this area difficult to search in because it requires them to let go of the ways they have traditionally worked. In response many set up internal entrepreneurial groups to bring the fresh thinking they need.

- Exploring at the edge of chaos requires skills in trying to ‘manage’ processes of co-evolution. Again, this favours start-up entrepreneurs with the flexibility, risk-taking and tolerance for failure to create new combinations and the agility to pick up on emerging new trends and ride them.

- Search strategies require a combination of exploit and explore approaches, but these often need different organizational arrangements.

- There are many tools and techniques available to support search in exploit and explore directions; increasingly, the game is being opened up and networks (and networking approaches and technologies) are becoming increasingly important.

- Absorptive capacity (the ability to absorb new knowledge) is a key factor in the development of innovation management capability. It is essentially about learning to learn.

Further Resources

The concept of ‘exploit’ vs. ‘explore’ was first discussed by James March and has formed the basis for many studies since then. See March, J. (1991) Exploration and exploitation in organizational learning, Organization Science, 2(1): 71–87; and Benner, M. J. and M. L. Tushman
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The difficulties of reframing are well explored by Day and Shoemaker, who argue the need for ‘peripheral vision’ amongst entrepreneurs; see Day, G. and P. Schoemaker *Peripheral Vision: Detecting the weak signals that will make or break your company* (Harvard Business School Press, 2006). This theme is also picked up in Foster, R. and S. Kaplan *Creative Destruction* (Harvard University Press, 2002); and Christensen, C., S. Anthony and E. Roth *Seeing What’s Next* (Harvard Business School Press, 2007).

Searching at the frontier is one of the questions being addressed by the Discontinuous Innovation Laboratory, a network of around 30 academic institutions and 150 companies; see [www.innovation-lab.org](http://www.innovation-lab.org) for more details. Reports on their work are available for download at [www.aim-research.org](http://www.aim-research.org).


Open innovation was originated by Henry Chesbrough but has been elaborated on in a number of other studies. Case examples include the Procter and Gamble story, and Alan Lafley’s book provides a readable account from the perspective of the CEO: Lafley, A. and R. Charan *The Game Changer* (Profile, 2008).


### References


**Deeper Dive** explanations of innovation concepts and ideas are available on the Innovation Portal at [www.innovation-portal.info](http://www.innovation-portal.info)

**Quizzes** to test yourself further are available online via the Innovation Portal at [www.innovation-portal.info](http://www.innovation-portal.info)
### Evolution of the bicycle
- Tesco
- Cerulean
- Kumba Resources
- NPI
- Hosiden
- Philips Lighting
- Fujifilm
- Learning networks
- Procter and Gamble

### 3M lead user methods
- Tesco goes West
- Patrick McLaughlin, Cerulean
- Veeder Root
- Emma Taylor, Denso
- David Simoes-Brown, 100% Open
- Catherina Van Delden, Innosabi
- Michael Bartl, Hyve

### Market research toolkit
- Continuous improvement toolkit
- Futures toolkit
- Search strategies for peripheral vision
- Learning networks
- Quality function deployment
- High involvement innovation audit

### Sources of innovation
- Innovation family trees
- Quality function deployment
- Absorptive capacity audit

### Networks for learning
- Absorptive capacity

Summary of online resources for Chapter 7 – all material is available via the Innovation Portal at www.innovation-portal.info