executive briefing

aim research

Advanced Institute of Management Research

Dealing with Discontinuity

How to sharpen up your innovation act

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The Advanced Institute of Management Research (AIM) develops UK-based world-class management research. AIM seeks to identify ways to enhance the competitiveness of the UK economy and its infrastructure through research into management and organisational performance in both the private and public sectors.

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about AIM

AIM consists of:

- Over 150 AIM Fellows and Scholars – all leading academics in their fields…

- Working in cooperation with leading international academics and specialists as well as UK policymakers and business leaders…

- Undertaking a wide range of collaborative research projects on management…

- Disseminating ideas and shared learning through publications, reports, workshops and events…

- Fostering new ways of working more effectively with managers and policy makers…

- To enhance UK competitiveness and productivity.

AIM's Objectives

Our mission is to significantly increase the contribution of and future capacity for world class UK management research.

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- Conduct research that will identify actions to enhance the UK's international competitiveness

- Raise the quality and international standing of UK research on management

- Expand the size and capacity of the active UK research base on management

- Engage with practitioners and other users of research within and beyond the UK as co-producers of knowledge about management

contents

AIM research themes

Current AIM research projects focus on:

UK productivity and performance for the 21st century.
How can UK policy makers evaluate and address concerns surrounding the UK's performance in relation to other countries?
National productivity has been the concern of economists, government policymakers, and corporate decision-makers for some time. Further research by scholars from a range of disciplines is bringing new voices to the debates about how the productivity gap can be measured, and what the UK can do to improve the effectiveness of UK industry and its supporting public services.

Sustaining innovation to achieve competitive advantage and high quality public services.
How can UK managers capture the benefits of innovation while meeting other demands of a competitive and social environment?
Innovation is a key source of competitive advantage and public value through new strategies, products, services and organisational processes. The UK has outstanding exemplars of innovative private and public sector organisations and is investing significantly in its science and skills base to underpin future innovative capacity.

Adapting promising practices to enhance performance across varied organisational contexts.
How can UK managers disseminate their experience whilst learning from others?
Improved management practices are identified as important for enhancing productivity and performance. The main focus is on how evidence behind good or promising practices can be systematically assessed, creatively adapted, successfully implemented and knowledge diffused to other organisations that will benefit.

Every now and then a disruptive event happens, such as the invention of the internet, that changes markets, industries, even societies. Successful well-managed companies thrive in mature markets by focusing on doing what they do, just a little bit better. Consequently, when a disruptive event, such as new technology or a regulatory change comes along, the successful company is often blindsided. It is just not very good at the 'doing it different' type of innovation. The very attributes that make it successful in stable conditions hinder its ability to detect or exploit the change.

The consequences of failing to take advantage of such disruptive change are all too frequently severe. Companies lose out to new entrants. Eastman Kodak, for example, struggled to cope with a shift to digital photography. Xerox failed to capitalise on digital photocopying. Many companies missed out on the internet.

Our research suggests that companies should adopt parallel routines for managing innovation related to discontinuous events, alongside their routines for managing innovation in stable conditions.

Key Findings

- The ability to manage innovation well during steady state periods and the types of routines employed, may hinder a company's ability to develop routines to deal with innovation during discontinuous change.

- Companies should develop good practice innovation routines, to deal with both continuous steady state situations and periods of discontinuous change.

- To exploit opportunities presented by disruptive events organisations must be adept at the 'doing things different' type of innovation, as opposed to 'doing the same things better' type.

To help develop routines that are suitable to deal with innovation related to a disruptive event, companies should consider doing the following:

- **Extending peripheral vision.** Find a way to look at the fringes of markets, existing technologies and existing corporate activity.

- **Enhancing signal processing capacity.** Make sure that the company doesn't automatically filter out information about discontinuous events and disruptive technologies.

- **Developing alternative strategic frames.** Build scenario planning into the firm's strategic planning process in order to consider alternative futures.

- **Extending resource allocation approaches.** Adopt decentralised resource allocation strategies that encourage risky innovation.

> The very attributes that make it successful in stable conditions hinder its ability to detect or exploit the change.

Innovation is the lifeblood of organisations. They survive or fail, grow or decline, depending on how good they are at product or service innovation, as well as at improving the ways that they go about doing whatever it is that they do – process innovation.

The way organisations innovate is usually the result of trial and error over a period of time. A firm organises and manages its activities and, eventually, creates structures, policies and procedures that become firm-specific routines, defining the way the firm approaches innovation.

Together these routines form the innovation culture of the organisation – 'the way we do things around here'. Not all routines are equal, however. Some companies have better routines than others. They may, for example, have better routines for acquiring and absorbing new knowledge, or the strategic allocation of limited resources.

> In a competitive environment the firms that are better at innovation tend to be more successful overall.

In a competitive environment the firms that are better at innovation tend to be more successful overall. As a result less successful firms attempt to imitate the way the successful firms approach innovation. A consensus of what constitutes best practice emerges.

Successful innovation management, therefore, tends to come down to a two-step process.

Step 1: The firm must imitate and configure generic routines associated with good practice. These need reshaping to suit a particular organisational environment.

Step 2: Through a process of experimentation and consolidation the firm adapts the routines to obtain a specific competitive advantage. This pattern of incremental learning and sharpening up of innovation management capability conforms to what Peter Senge, founder of the Centre for Organisational Learning at MIT's Sloan School of Management, calls 'adaptive learning' and what US academics Chris Argyris and Donald Schon term 'single loop learning'. It focuses on the present and doesn't question underlying assumptions.

When companies are mature and operating in mature markets their innovation focuses on improving the way that they do what they do, and pushing the boundaries of existing products and processes. In this phase of a firm's life there is a high degree of imitation and an incremental pattern to innovation in products and processes.

In competitive markets competitive advantage is difficult to obtain directly from products or processes. Often, because the imitation of best practice in managing innovation is difficult and takes time, good practice in managing innovation can be a key competitive advantage.

So successful firms in mature industries develop sophisticated suites of routines that they constantly modify through an adaptive learning process to retain competitive edge. Even in relatively fast moving environments this can be sufficient to maintain continuous product innovation.

Innovation is a little more complicated than this however. Every so often events occur that are outside the normal experience of organisations. Companies that have developed the ability to deal effectively with 'steady state' continuous incremental innovation are not necessarily prepared to deal with discontinuous innovation. Failure to respond to such events can threaten the survival of the company.

So how can organisations become good at dealing with both continuous and discontinuous organisations?

Discontinuous shifts and innovation cycles

Discontinuous shift may sound like a term from Star Trek but in fact it is something much closer to home. Usually the conditions within organisations operate are relatively stable: a steady state. Markets mature and are dominated by one or more established incumbent players. The firms maintain a competitive advantage by tweaking products and services, a steady improvement, a continuous renewal. They get good at managing this type of innovation.

Every now and then, however, a dramatic change occurs, a new technology, or political or regulatory change, for example, rewrites the rules of the game. It is a revolution. Companies that see the revolution coming, and are able to adapt to it, are best placed to survive.

Following a discontinuous event, that disrupts the existing stability, there is a phase in which lots of companies rush to explore new options, learning fast and at the same time looking for ways to develop the technology into a form which can become widely adopted. This 'fluid' phase is characterised by the co-existence of old and new technologies and by rapid improvements of both.

Eventually there is a 'dominant design' established – not always the best in purely technological terms, but one which becomes the innovation standard. The establishment of the dominant design then gives way to a phase of consolidation innovation; first around stabilising the product concept, and later around the processes which create and deliver it. Eventually it moves from the mature phase into a new period of fluidity and the cycle repeats itself but with a new technology.

Medproducts – steady state innovation best practice

A star of Danish industry, medical products company Medproducts is an excellent example of building and sustaining competitive advantage through innovation capability. Founded in 1957, Medproducts has built a highly profitable position as a global player in the medical products field. The company has grown through a series of innovations that combine a deep understanding of a specialist medical field, with strong and focused technical competencies.

Medproducts has evolved into a firm where competitive advantage is increasingly built on the ability to manage the steady state innovation process effectively, fine tuning and extending a repertoire of established and proven routines.

Two examples illustrate this innovation best practice.

1   User involvement in the product innovation process

Getting close to the customer is key to successful innovation. Managed properly the user can become a key part of the innovation process, feeding in ideas and improvements to help define and shape the innovation.

Medproducts developed user interaction during development of an ostomy bag product. The company embeds the involvement of end users in its innovation process through a panel of users, specialist nurses and other healthcare professionals located in different countries.

This provides an informed perspective from those involved in post-operative care and treatment. By setting up panels in different countries the company factors in to its product design and development differences in cultural attitudes and concerns.

What started as five boards – Denmark, UK, Holland, France and Spain – has expanded to 24 boards in 17 countries, involving around 350 Stoma Care Nurses. Each board meets twice yearly. The core objective within the boards is to try and create a sense of partnership with key players, either as key customers or key influencers.

Selection is based on an assessment of technical experience and competence but also depends on the degree to which they will act as opinion leaders and gatekeepers, by influencing colleagues, authorities, hospitals and patients for example. These people are a key link in the clinical trials process.

Expert in patient care and articulating user needs, the specific role of the panel members is particularly to help with two elements in innovation: To identify, discuss and prioritise user needs; and to evaluate product development projects from idea generation right through to international marketing.

The views of board members provide valuable market and technical information at both the early stages around concept formulation – where the input is helpful in testing and refining perceptions about real user needs and fit with new concepts – and around product development – where involvement is concerned with evaluating and responding to prototypes, suggesting detailed design improvements, and design for usability.

2   The Accelerating Ideas to Market strategic decision process for progressing ideas into products

Another area that represents good practice in innovation management is the use of an organised and accepted process for managing risk, and for progressing projects from initial selection through to strategic commitment of resources.

Medproducts uses a process called Accelerating Ideas to Market. It provides a clear and widely accepted framework to take ideas and progress them through to successful products launched in the marketplace. The purpose of the Accelerating Ideas to Market process is: To provide common rules for product development at Medproducts; To make clear decisions at the right moment; To clarify responsibility.

The objective of the process is to ensure a high, uniform level of professionalism in product development yielding high quality products.

Product development is carried out by project teams consisting of selected specialists from marketing, R & D, clinical affairs and manufacturing. Each project team has a designated project manager, and the Accelerating Ideas to Market process defines the rules to be followed by the project team.

Under the Accelerating Ideas to Market process the development of new products is divided into five manageable stages. Each stage contains a number of parallel and coordinated activities designed to refine the definitions of customer needs and to develop technological solutions and capacity for efficient manufacturing.

Each stage is followed by a 'gate'. This is a decision point when the project is reviewed by 'gatekeepers' – senior managers with the authority to keep promising projects moving ahead quickly. The gate serves as a critical quality control checkpoint between the stages. A 'go' decision is made when the gatekeepers decide that a project is likely, both technically and economically, to meet the needs of the customers, as well as to comply with Medproducts' high standards for Return on Investment, and quality and environmental impact.
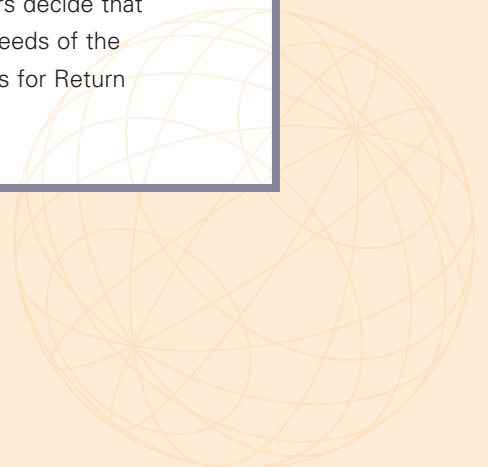
the challenge of discontinuity

A company may cope well with managing the process of innovation in stable conditions, but what happens when the company confronts situations outside of its normal operating conditions? How will it cope then? Such a break with the normal environment can come in many forms. For example, it might be a step change in technological development like the invention of the internet, or the emergence of a totally new market such as the ringtone market, or a dramatic shift in the political or regulatory environment.

Ironically it is often the firms that excel at managing innovation in a steady state environment that suffer most when discontinuous shifts occur. These firms have developed best practice steady state routines. For example, they work closely with customers and suppliers, make use of sophisticated resource allocation mechanisms to select a strategically relevant portfolio of projects, and use advanced project and risk management approaches in developing new products and processes.

These routines are the product of well-developed adaptive learning processes that give the firm a strong position in managing innovation under steady-state conditions. However, they also act as a barrier to detecting and responding to innovation threats and opportunities associated with discontinuous shifts.

Ironically it is often the firms that excel at managing innovation in a steady state environment that suffer most when discontinuous shifts occur.

The Innovators Dilemma – Clayton Christensen

In his book *The Innovator's Dilemma* Harvard Business School Professor Clayton Christensen argues that while well-managed companies are excellent at developing sustaining technologies, they are not as good at dealing with disruptive technologies.

Sustaining technologies are technologies that improve the performance of their existing products and services in order to keep the customers satisfied.

Disruptive technologies change the value proposition in a market. Christensen used computer disk drive product market as an example. When disruptive technology comes along it is often less attractive to mainstream users. For example it may offer less storage space. To fringe users, however, it offers a number of desirable features such as smaller size, portability, interchangeability, and convenience.

The new technology creates new markets. With adequate investment and management experience those companies that create and embrace disruptive technologies early on often become the dominant players.

Christensen outlines four principles that explain why the management practices that are suited to sustaining technologies are not suited developing disruptive practices.

- Companies depend on customers and investors for resources: It is more economic for companies to serve the needs of their existing customers and satisfy the desires of existing shareholders. Risky investments in unproven technologies are less likely to attract support.

- Small markets don't solve the growth needs of large companies: Successful companies need to keep growing. Entering new markets with disruptive technology is not a sufficiently guaranteed source of growth.

- Markets that don't exist can't be analysed: Successful companies remain successful through good strategic planning and effective execution of those plans. They are not well suited to doing business in markets that barely exist and are certainly not amenable to detailed analysis.

- Technology supply may not equal market demand: Initial demand for disruptive technologies may not be that great. In the long run however it is likely to outstrip that of existing technologies.

The challenge for firms is less to do with the scale of novelty or dislocation. It is more concerned with the fact that the conditions are beyond the experience – the normal operating envelope – of the company.

It is not simply a matter of being surprised by a single unexpected event, like being caught out by a new technology that a new entrant has brought to market. Nor does each new discontinuity bring with it a wave of new players, with the old ones falling away. Radical technological shifts do not necessarily disrupt the existing order. With the internet for example, financial broking firm Charles Schwab was able to use the new technology to its advantage. Other research suggests that those companies that became the dominant producers of US television sets were previously the dominant producers of radio sets.

Much turns on the ability of the established firm to detect on its innovation radar the often weak signals of a technology that has the possibility to change markets, industries, even societies. How many successful companies didn't see internet coming? Even tech companies. It took a while, for example, for Microsoft to get it's act together on it's internet strategy.

Established firms are often not responsive enough to exploit or deal with the new situation. Instead research shows that it is usually new entrant firms who are best able to exploit the 'fluid phase' and develop innovations to take advantage of the conditions.

The challenge then is to build a capability within the company that enables it to prepare for, to pick up on, and to proactively deal with, innovation opportunities and threats created by emerging discontinuous conditions.

A company with good routines for managing innovation in steady state conditions cannot rely on those routines to get it through a discontinuous situation. Steady innovation is 'do better' innovation. Discontinuous innovation is 'do different' innovation and requires alternative routines.

Companies need a new set of approaches to organising and managing innovation. They must be able to deal with issues such as how to search for and detect signals, no matter how weak, about potential discontinuities. They will need to make strategic choices in the face of high uncertainty and resource projects that lie far outside the mainstream of their usual innovation operations.

To develop new behaviours suited to these conditions, and then embed them into routines requires a different kind of learning: generative or double loop learning. That is learning that is prepared to question fundamental underlying assumptions. Learning that is not adaptive or reactive, but about adaptability.

This is one reason new entrants do better under discontinuous conditions than the existing companies in an industry; they don't have to unlearn a set of well-established behavioural routines. Equally, it explains why those same new entrants are themselves often upstaged by subsequent generations, when they become the existing incumbents.

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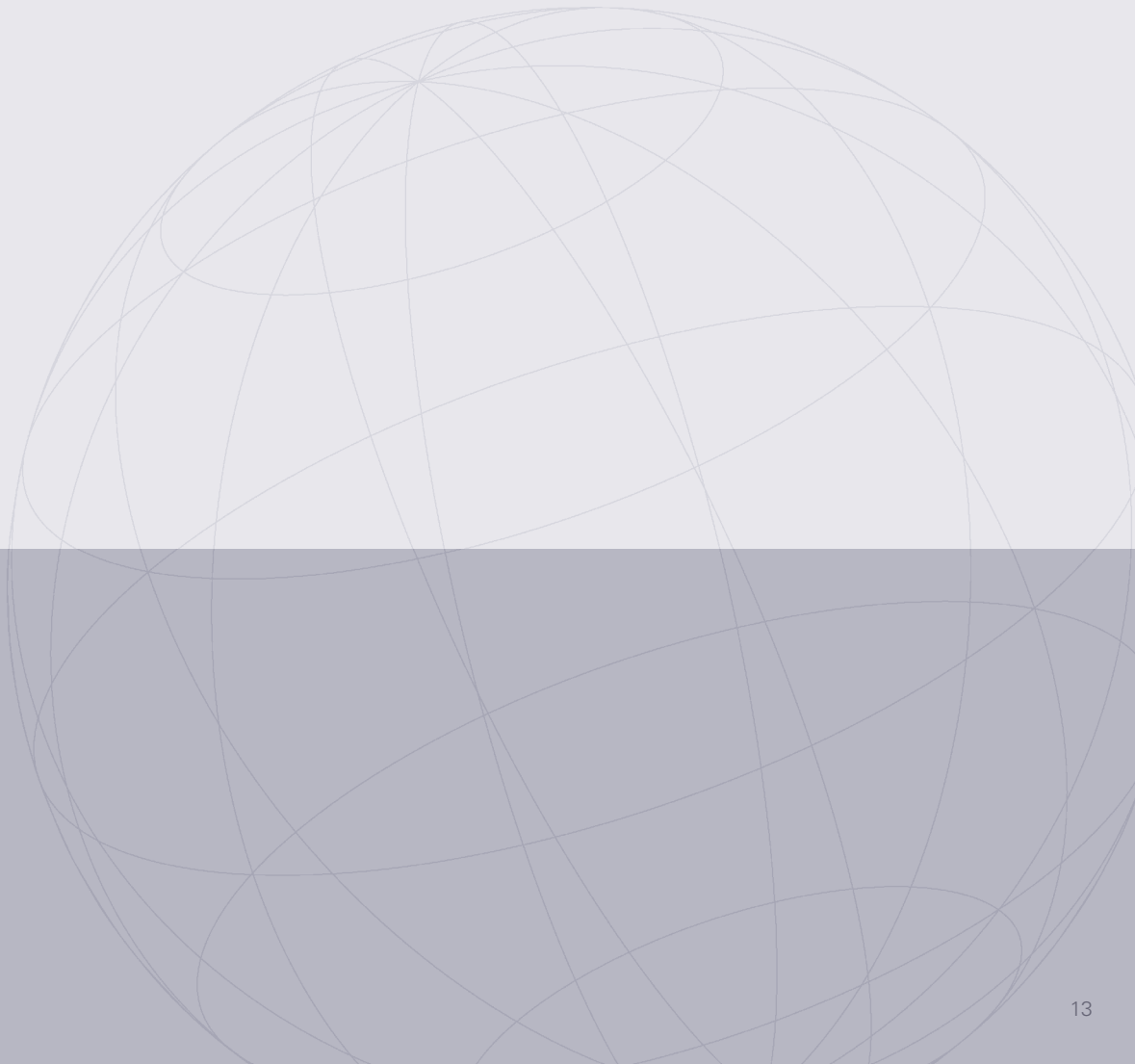
Why companies struggle

Why do established players find discontinuous innovation problematic? It would be easy to blame it on firms getting old and sluggish in their willingness to look at new things, but the true reasons are more complex.

It does have something to do with the way that companies see the world, and the relevance they attach to signals about particular new developments. The reluctance to embrace innovation that comes from elsewhere – the 'not-invented-here' pattern of behaviour – is not necessarily the response of a stupid firm. Often it is the response of a firm that does not – or chooses not to – see the significance and relevance of a new idea being offered to it.

It's like the problem of 'cognitive dissonance' in individual psychology, which refers to the ways in which people selectively perceive the world in order to maintain stability. Organisations find considerable difficulties in adjusting their mental models.

Plus there are other factors at play; there are political and operational problems for example.

> It would be easy to blame it on firms getting old and sluggish in their willingness to look at new things, but the true reasons are more complex.

Portfolio management and resource allocation techniques which may work well at ensuring a good fit between strategic directions and firm competencies, may not be appropriate for reviewing apparently wild and unexpected ideas heading in completely new directions. Risk management systems operating with stage gate reviews over the development life of a new project may not deal well with apparently high-risk projects that involve a high level of market and technological uncertainty.

The problem is further compounded by the networks of relationships the firm has with other firms. Typically, much of the basis of innovation lies at a system level involving networks of suppliers and partners configuring knowledge and other resources to create a new offering.

Discontinuous innovation is often problematic because it may involve building and working with a different set of partners than those the firm is used to working with. When it comes to enabling a steady stream of continuous improvement innovations 'strong ties' – close and consistent relationships with regular partners in a network – are important. However, evidence suggests that where firms are seeking to do something different, they need to exploit much weaker ties across a very different population in order to gain access to new ideas and different sources of knowledge and expertise.

Finding another way

If companies need to build alternative routines to enable them to cope with discontinuous conditions, what strategies can they adopt? One option is to split off the organisation concerned with 'doing it different' routines; examples include setting up 'skunk works' (self-contained innovation teams), corporate venture units, spin-off ventures and establishing new companies.

On the positive side this makes the management task simpler as it effectively creates a new entrant set of conditions. On the negative side it breaks the links with the established resource and competence base – for example, access to technological or market know-how, distribution channels, and key individual knowledge sets.

An alternative is to try and develop the capability to do both 'do things better' and 'do things different' modes of innovation at the same time. On the plus side there are advantages of resource complementarity and synergy. The risk is that the default behaviour patterns will be those concerned with steady state innovation rather than exploring new directions.

In practice these two approaches represent two poles of a spectrum along which firms are experimenting with different ways of dealing with the challenge of developing and embedding routines suited to the challenge.

Medproducts – parallel routines in practice – the challenge

The case study (*see pages 8-9*) shows that much of Medproducts' success is due to the way it creates competitive advantage through a steady stream of market-focused innovations.

Yet, despite its strength in this area of innovation, Medproducts realises it may struggle in the face of discontinuous events – technological, market, political or regulatory – at some point in its future. It is aware of the need to build complementary routines to deal with such events but it also recognises the difficulties in fitting these alongside its existing set of approaches.

For example, the boards established by Medproducts represent an excellent mechanism for identifying and testing new concepts, as long as these fall within the general ambit of current operations. These are the best people to consult in order to maintain the existing development trajectory. However, they represent a problem when it comes to exploring new concepts. This is because the board is less likely to support the entry of, or active evaluation of, alternative concepts, but is primarily about reinforcing the existing ones.

In similar fashion, the Accelerating Ideas to Market process which functions well as a widely accepted stage-gate mechanism for risk management and resource allocation is not suited to dealing with risky new concepts about which information is limited.

A recent innovation audit of the company reveals that, despite the strength of the current routines in dealing with the steady state challenge, employees understand something different is required for discontinuous conditions.

Statements from the Medproducts innovation audit

- You will end up with frustration – people get all these good ideas but there's nowhere to take them.
- On some things we're starting to be very good… but because it's so structured there's no real room for radical ideas.

- Sometimes what you need is radical, 'out of the box' – you need a separate kind of structure for that because it can't fit the optimising one.

- Because it's all focused on this well-oiled machine there are no resources for the radical ideas.

- If you just have the task to say 'new machine this year, new machine next year, etc.' you'll never be innovative, because your ordinary tasks will fill up your whole programme.

- People aren't taken enough out of their daily work to think differently.

- Because it is so structured there's no real room for radical ideas, no 'let's try this', no way to run with it outside the structures.

- For new ideas, the organisational framework has to be fitted to the size of them.

The case of Medproducts is typical of successful firms confronting a major organisational development challenge. How can they build, alongside existing and proven successful routines for innovation, a new and complementary set to help them deal with the challenges of discontinuous events? Although there is an accepted model of good practice based on research across many different kinds of enterprise, this has effectively evolved through studies of steady state innovation.

Far less is known about the ways in which organisations can – or should – deal with the parallel challenge of discontinuous change. As a result firms like Medproducts are engaged in a 'learning-by-doing' process of experimentation with: New structures – such as a business development team acting as 'scouts' for new options; new processes – such as a revised more open-ended version of the Accelerating Ideas to Market process approach; and new underlying beliefs – like the need to accept high levels of failure in risky ventures, but to balance this by failing early and learning fast from mistakes.

Developing routines for managing discontinuous innovation

In order to develop capability to deal with discontinuous shifts, organisations need to experiment, imitate, adapt and in other ways learn new routines, which can become structured and embedded.

Our research reveals a number of principles around which such learning can take place, based on the experience of organisations experimenting in this way. We have structured this according to a simple process model of innovation with five key dimensions (Figure 1).
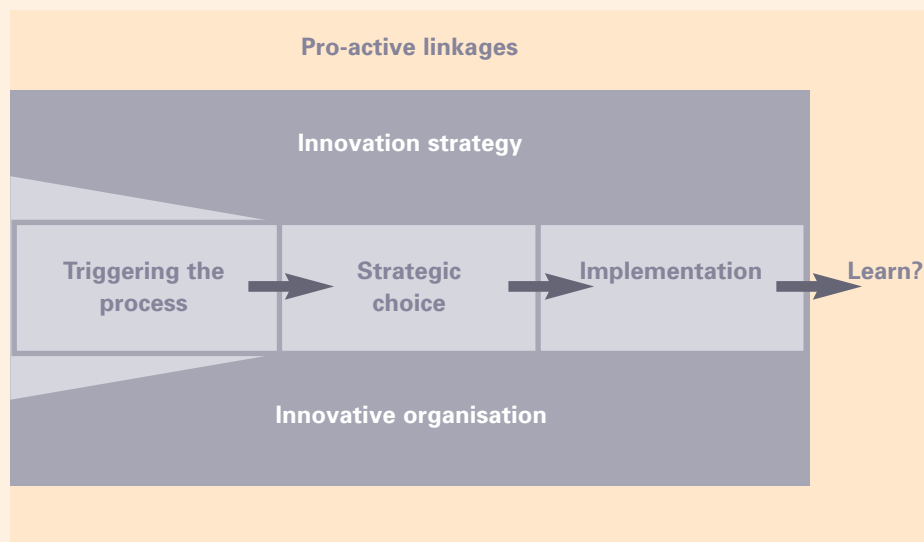
Figure 1

Pro-active linkages

Innovation strategy

| Triggering the process | → | Strategic choice | → | Implementation | → | Learn? |

Innovative organisation

Table 2 distills some elements of the emerging 'good practice' model for discontinuous innovation management mapped on to this framework.
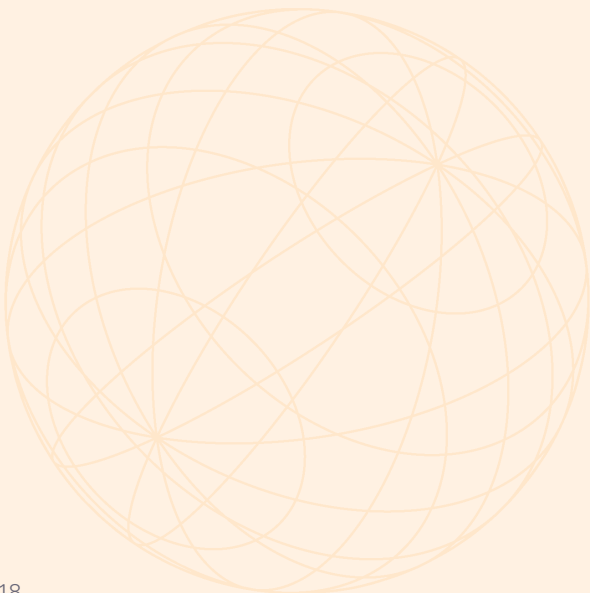
Table 2: An emergent good practice model outline for discontinuous innovation

Element in innovation model	Type 2 characteristics
Triggering the process	Search at the edges of the firm – subsidiaries, joint ventures, distributors for sources of innovation. Pick up and amplify weak signals. Work with fringe users, visit trendsetting locations, (such as chat rooms on the internet). Use multiple and alternative perspectives. Manage the idea generation process – enable systematic and high involvement in innovation. Use scenario planning to develop future exploring capability – scenario and alternatives. Bring in outside perspectives.
Strategic choice and portfolio management	Build dual structures for innovation development and decision making. Build pluralism into decision-making processes. Decentralise seed funding for new ideas – for example via internal venture funds or development budgets.
Implementation	Build flexible project development organisations – emphasise probe and learn, rather than predictive project planning. Work actively with users on the co-evolution of innovation. Build parallel resource networks.
Innovation strategy	Explore alternative future scenarios and consider parallel possibilities. Identify strategic domains within which targeted hunting can take place. Build capacity for ambiguity and multiple parallel strategies. Actively explore 'how to destroy the business' to enable reframing.
Innovative organisation	Build a culture that supports and encourages diversity and curiosity-driven behaviour. Set up appropriate incentive structures. Enable complex knowledge flows.
Pro-active linkages	Develop non-committal exploratory supply relationships in addition to longer-term strategic alliances. Explore and develop parallel weak ties.
Learning and capability development	Enhance absorptive capacity. Encourage heterogeneity in learning groups.

Towards a new set of routines

The process of developing routines is essentially one of trial and error. Given the potential threat to incumbents from discontinuity, it is not surprising to find considerable experimentation taking place in an attempt to develop alternative and complementary approaches to deal with the challenges.

Our research highlights some key issues associated with improving an organisation's capacity for dealing with discontinuous change.

(a) Extending peripheral vision

If organisations can pick up early signals that alert them to new discontinuities, even if those signals are comparatively weak, they can gain a competitive advantage over other organisations. In other words, it pays to discover the next big thing before other organisations do.

One way companies can do this is by extending and enhancing their peripheral vision, and broadening the scope of research activities into new and unexpected areas. There will often be resistance though as it is difficult to justify the use of resources. Deciding where to focus such alternative search activity is a bit of a shot in the dark.

One approach is to increase the number of antennae available to the organisation, within the organisation by, for example, using the internet as a technological amplifier for weak signals.

Another approach is to build on the principle of networks. With networks, research suggests that the number of nodes within a given network increases the range of possible connections by a geometric progression. The more players in the network, in other words, the more potential points at which an interesting new signal might be detected.

(b) Enhancing signal processing capacity

The difficulty is not just in picking up on a wide variety of signals. Organisations are bombarded by information that needs filtering and processing. Typically they evolve a sophisticated signal processing capacity only allowing strategically relevant information through. The challenge with discontinuous innovation is to build a parallel capacity where interesting, but apparently off-message signals, can be processed into a form where they can be communicated to the rest of the organisation.

One firm, for example, has set up a small team of technology and market scouts who pick up on potential weak signals. They then process the information into a form which is palatable to the rest of the organisation, avoiding the instant rejection that would normally follow. Building a business case lite for such ideas regards a sophisticated understanding, not only of the new possibilities, but also the internal context (political as well as resources) into which they will be introduced.

One way companies can do this is by extending and enhancing their peripheral vision, and broadening the scope of research activities into new and unexpected areas.

20

(c) Developing alternative strategic frames

A significant problem for existing incumbents in the face of discontinuous challenges appears to be a reluctance to reframe the underlying models of the business. Firms became heavily committed to defending a status quo in terms of such models. The problem is compounded by routines, which reinforce existing models such as reward systems that favour working with established customers.

One way of escaping the status quo is to explore alternative scenarios for the future, and look at ways in which the current resource base could be reconfigured to provide an alternative but viable business model.

For example, Shell has developed its long-established capabilities in scenario planning into an approach called Gamechanger, in which detailed alternative future scenarios are developed and used to provide challenging reframing possibilities. Such exploration provides a mechanism for pursuing several 'parallel future' development projects without compromising mainstream activities and helps maintain a tolerance for ambiguity suited to discontinuous conditions.

(d) Extending resource allocation approaches

Strategic resource allocation and review systems often evolve as a robust way of managing a stream of projects under steady state innovation conditions. They may not be as effective when confronted with more radical challenges.

For this reason a number of organisations decentralise the funding process for high risk, more radical venturing, and make use of various forms of corporate venturing. These arrangements range from completely separate venture units to internal venture capital sources for which project owners can make bids. The intention – although not always the outcome – is to provide an alternative and parallel channel for exploring radical options and allocating early stage funding at the least.

conclusions

The challenge of discontinuous change is not new. History is full of examples where dislocations occur across industries, sometimes even civilisations, as a result of discontinuous shifts in technologies, markets or political conditions. While discontinuous change can pose a threat, it also offers considerable new growth opportunities for both new entrants and established players, but the latter often find difficulty exploiting these.

Our research suggests that organisations that appear to excel at managing innovation may still not be able to cope with situations of discontinuous change.

One reason for this is because the set of routines for managing innovation under steady state conditions is not suited to more turbulent situations, instead a new and complementary set must be deployed. Note that this is in order to provide a general capability to manage innovation to exploit discontinuous conditions – not the threats or opportunities posed by a single specific example.

Key issues for practitioners

Companies should be aware that:

- There is a need to be able to develop good practice innovation routines, to deal with both continuous steady state situations and periods of discontinuous change.

- In times of turbulence, organisations must be good at the 'doing things different' type of innovation, as opposed to 'doing the same things better' type.

- The ability to manage innovation well during steady state periods – in mature markets for example – and the types of routines employed, may hinder a company's ability to develop routines to deal with innovation during discontinuous change.

- Instead of missing the next market changing opportunity, companies need to develop innovation routines that enable them to detect, deal and exploit discontinuous change.

Companies should consider taking the following action:

- Extending peripheral vision. Find a way to look at the fringes of markets, existing technologies and existing corporate activity.

- Enhancing signal processing capacity. Make sure that the company doesn't automatically filter out information about discontinuous events and disruptive technologies.

- Developing alternative strategic frames. Build scenario planning into the firms strategy process in order to consider alternative futures.

- Extending resource allocation approaches. Adopt decentralised resource allocation strategies that encourages risky innovation.

Developing parallel routines to deal with steady state innovation and innovation in situations of disruptive change and discontinuous events is not easy. The companies that succeed in doing so, however, will have a considerable advantage over those that do not.

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