

## Management of Innovation

# Topic 1 Innovation: what it is and why it matters

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J. Tidd, J. Bessant and K. Pavitt, *Managing Innovation. Integrating Technological, Market and Organizational Change*  
John Wiley & Sons Ltd, 2018

## Innovation ....

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The word 'innovation' comes from the Latin, *innovare*, and is all about **change**.

Perhaps a more helpful definition of innovation is:

**'the process of creating (and then capture) value from ideas'**

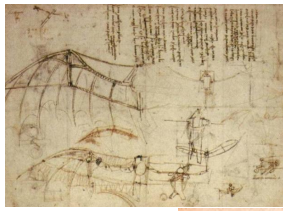


"Innovation distinguishes between a leader and a follower".

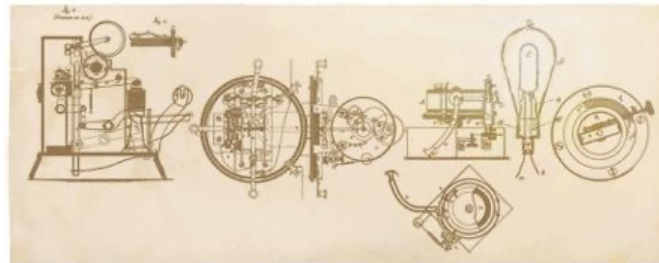
Steve Jobs, Apple

# Inventors vs. Innovators

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Leonardo da Vinci – Thomas Edison – Steve Jobs



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## Invention and innovation

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Invention is the solution of a technical problem, achieving a solution that did not exist before.

Innovation is the successful exploitation of new ideas.

An invention can take many years before becoming an innovation, may be moved forwards by a different person than the inventor ... or might never be introduced in the marketplace!

A great inventor might not be a great innovator (and viceversa).

*«An innovative business is one which lives and breathes outside the box. It is not just good ideas; it is a combination of good ideas, motivated staff and an instinctive understanding of what your customer wants»*

Richard Brenson

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# Who is an innovator?

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One of America's most successful innovators was Thomas Alva Edison.



Edison appreciated better than most that the real challenge in innovation was not invention –coming up with good ideas –but in making them work technically and commercially. His skill in doing this created a business empire worth, in 1920, around \$21.6bn.

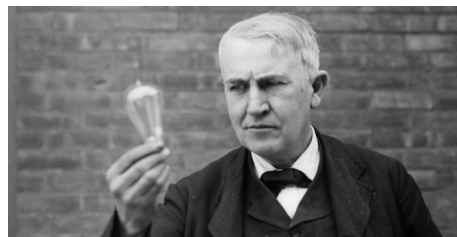


He put to good use an understanding of the interactive nature of innovation, realizing that both **technology push** (which he systematized in one of the world's first organized R&D laboratories) and **demand pull** need to be mobilized.

Edison recognized that although the electric light bulb was a good idea it had little practical relevance in a world where there was no power point to plug it into.

Consequently, his team set about building up an entire electricity generation and distribution infrastructure, including designing lamp stands, switches and wiring.

In 1882 he switched on the power from the first electric power generation plant in Manhattan and was able to light up 800 bulbs in the area. In the years that followed he built over 300 plants all over the world.



As Edison realized, innovation is more than simply coming up with good ideas; it is the *process* of growing them into practical use.

# What innovation is about?

Areas of innovation	Examples
<b>Identifying or creating opportunities</b>	Innovation is driven by the ability to see connections, to spot opportunities and to take advantage of them. Sometimes this is about completely new possibilities – for example, by exploiting radical breakthroughs in technology. New drugs based on genetic manipulation have opened a major new front in the war against disease. Mobile phones, tablets and other devices have revolutionised where and when we communicate.
<b>New ways of serving existing markets</b>	Innovation can also offer new ways of serving established and mature ones. Low cost airlines are still about transportation – but the innovations which firms like Southwest Airlines, Easyjet and Ryanair introduced have revolutionised air travel and grown the market in the process. Despite a global shift in textile and clothing manufacture towards developing countries the Spanish company, Inditex (through its retail outlets under various names including Zara) have pioneered a highly flexible, fast turnaround clothing operation with over 2000 outlets in 52 countries.
<b>Growing new markets</b>	Equally important is the ability to spot where and how new markets can be created and grown. Alexander Bell's invention of the telephone didn't lead to an overnight revolution in communications – that depended on developing the market for person-to-person communications. Henry Ford may not have invented the motor car but in making the Model T – "a car for Everyman" at a price most people could afford- he grew the mass market for personal transportation. And eBay justifies its multi-billion dollar price tag not because of the technology behind its on-line auction idea but because it created and grew the market.

Areas of innovation	Examples
<b>Rethinking services</b>	In most economies the service sector accounts for the vast majority of activity and there are many opportunities for new entrants and radical change are greatest in the service sector. On-line banking and insurance have become commonplace but they have radically transformed the efficiencies with which those sectors work and the range of services they can provide. New entrants riding the internet wave have rewritten the rule book for a wide range of industrial games – for example, Amazon in retailing, eBay in market trading and auctions, Google in advertising, Skype in telephony, Uber in transportation and Air BnB in accommodation.
<b>Meeting social needs</b>	Innovation offers huge challenges – and opportunities – for the public sector. Pressure to deliver more and better services without increasing the tax burden is a puzzle likely to keep many civil servants awake at night. But it's not an impossible dream – right across the spectrum there are examples of innovation changing the way the sector works. For example, in healthcare there have been major improvements in efficiencies around key targets such as waiting times.
<b>Improving operations – doing what we do but better</b>	Many companies are revising their production processes, in order to improve quality and/or reduce costs. This is for instance the case with Toyota.

# Innovation and entrepreneurship

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According to Schumpeter, entrepreneurs will seek to use technological innovation to get strategic advantage. For a while they might be the only ones but soon other entrepreneurs will see what they have done and try to imitate them. There is a process of “creative destruction” with the constant search of something new which simultaneously destroys the old rules.

Survival and growth poses a problem for established players but a huge opportunity for newcomers to rewrite the rules of the game.

One person’s problem is another’s opportunity and the nature of innovation is that it is fundamentally about *entrepreneurship*.

*'Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practised.'*

Peter Drucker

## Innovation & Entrepreneurship

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Stage in life cycle	Start-up	Growth	Sustain/scale	Renew
<b>Creating wealth</b>	Individual entrepreneur exploiting new technology or market opportunity	Growing the business through adding new products/services or moving into new markets	Building a portfolio of incremental and radical innovation to sustain the business and/or spread its influence into new markets	Returning to the radical frame-breaking kind of innovation which began the business and enables it to move forward as something very different
<b>Creating social value</b>	Social entrepreneur, passionately concerned to improve or change something in their immediate environment	Developing the ideas and engaging others in a network for change – perhaps in a region or around a key issue	Spreading the idea widely, diffusing it to other communities of social entrepreneurs, engaging links with mainstream players like public sector agencies	Changing the system - and then acting as agent for next wave of change

# Strategic advantages through innovation

Mechanism	Strategic Advantage
<b><i>Novelty in product or service offering</i></b>	Offering something no one else can.
<b><i>Novelty in process</i></b>	Offering it in ways other cannot match – faster, lower cost, more customized, etc.
<b><i>Complexity</i></b>	Offering something which others find it difficult to master.
<b><i>Legal protection of intellectual property</i></b>	Offering something which others cannot do unless they pay a licence or other fee.
<b><i>Add/extended range of competitive factors</i></b>	Move basis of competition-e.g.from price of product to price and quality, or price, quality, choice, etc.
<b><i>Timing</i></b>	First-mover advantage-being first can be worth significant market share in new product fields. Fast follower advantage

Mechanism	Strategic Advantage
<b><i>Timing</i></b>	Fast follower advantage-sometimes being first means you encounter many unsuspected teething problems, and it makes better sense to watch someone else make the early mistakes and move fast into a follow-up product.
<b><i>Robust/platform design</i></b>	Offering something which provides the platform on which other variations and generations can be built
<b><i>Rewriting the rules</i></b>	Offering something which represents a completely new product or process concept- a different way of doing things- and makes the old ones redundant
<b><i>Reconfiguring the parts of the process</i></b>	Rethinking the way in which bits of the system work together-e.g. building more effective networks, outsourcing and co-ordination of a virtual company, etc.
<b><i>Transferring across different application contexts</i></b>	Recombining established elements for different markets.

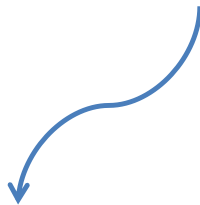
# A process view of innovation

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There are **four key stages** in the innovation process – each of which requires dealing with particular challenges – and only if we can manage the whole process is innovation likely to be successful.

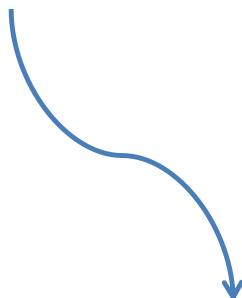
## Phase one - Search:

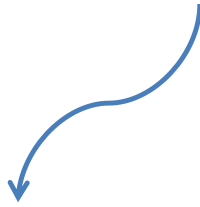
- Bringing new ideas to the system. These can come from R&D, 'Eureka' moments, copying, market signals, regulations, competitor behaviour –the list is huge but the underlying challenge is the same –how do we organise an effective search process to ensure a steady flow of variety which gives us a better chance of surviving and thriving?



## Phase two - Select:

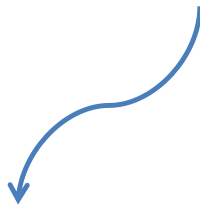
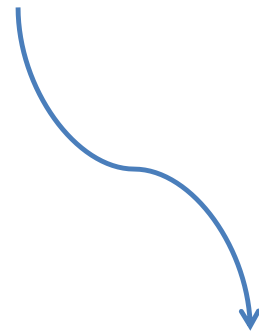
- We need to select the options that are most likely to help us grow and develop. Unlike natural selection where the process is random we are concerned here with some form of *strategic choice* – out of all the things we could do, what are we going to do –and why? This process needs to take into account competitive differentiation –which choices give us the best chance of standing out from the crowd? –and previous capabilities –can we build on what we already have or is this a step into the unknown ..?





### **Phase three - Implementation:**

- Converting ideas into reality. The task is essentially one of managing a growing commitment of resources –time, energy, money and above all mobilising knowledge of different kinds –against a background of uncertainty. Unlike conventional project management the innovation challenge is about developing something which may never have been done before –and the only way we know whether or not we will succeed is by trying it out.



### **Phase four – Capturing Value:**

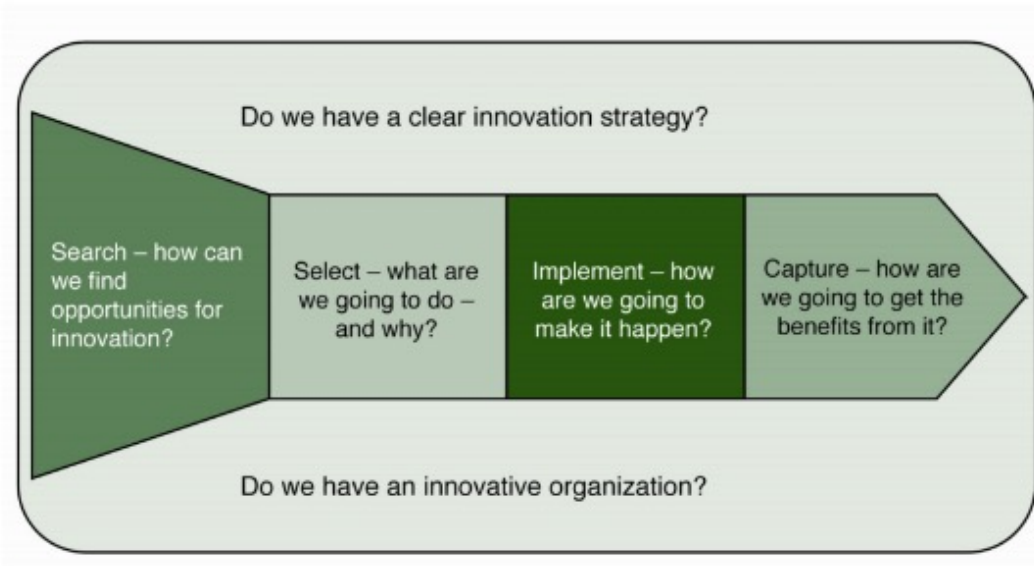
- How will we ensure that the efforts have been justified –in commercial terms or in terms of creating social value? How will we protect the gains from appropriation by others? And how might we learn from the experience and capture useful learning about how to improve the innovation process in the future



# Managing innovation

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Figure 1.6: Simplified model of the innovation process



## Scope for/types of innovation

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If innovation is a process we need to consider the **output** of that process.

In what ways can we innovate – what kinds of opportunities exist for use to create something different and capture value from bringing those ideas into the world?

- Sometimes it is about completely new possibilities.
- Equally important is the ability to spot where and how new *markets* can be grown.
- Nott just about *new* markets, Innovation can also offer new ways of serving established and mature ones.
- And it isn't just about manufactured products; in most economies the service sector accounts for the vast majority of activity so there is likely to be plenty of scope.

# Four dimensions of innovation space

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Essentially we are talking about **change**, and this can take several forms; for the purposes of this book we will focus on our broad categories:

- Product innovation – changes in the things (products/services) which an organization offers;
- Process innovation – changes in the ways in which they are created and delivered;
- Position innovation – changes in the context in which the products/services are introduced;
- Paradigm innovation – changes in the underlying mental models which frame what the organization does.

## 1.8.3: Mapping innovation space

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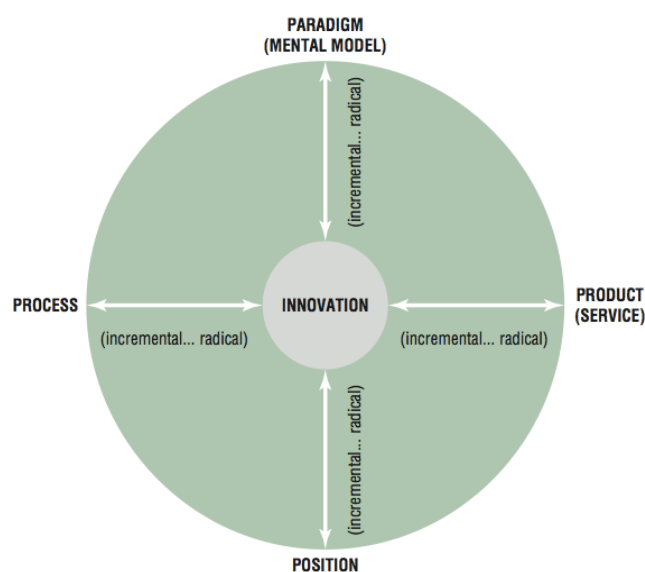


FIGURE 1.4 Exploring innovation space

<https://www.youtube.com/watch?v=ZRxAliN-Kbl>

# Dimensions of innovation – what can we change?

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Dimension	Type of change
‘Product’	Changes in the things (products/services) which an organization offers
‘Process’	Changes in the ways in which these offerings are created and delivered
‘Position’	Changes in the context into which the products/services are introduced
‘Paradigm’	Changes in the underlying mental models which frame what the organization does

## Exploring different aspects of innovation

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The characteristics of innovation which might shape our strategic decisions include:

- **Degree of novelty** –incremental or radical innovation?
- **Platforms and families** of innovations
- **Discontinuous innovation** - what happens when the rules of the game change?
- **Level of innovation** –component or architecture?
- **Timing** –the innovation life cycle

We will explore these –and the challenges they pose for managing innovation - a little more in the following section.

# 1. Incremental innovation – doing what we do but better

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A key issue in managing innovation relates to the degree of **novelty** involved in different places across the innovation space.

There are degrees of novelty, running from **minor, incremental improvements** right through to **radical changes** which transform the way we think about and use them.

As far as managing the innovation process is concerned, these differences are important. The ways in which we approach incremental, day-to-day change will differ from those used occasionally to handle a radical step change in product or process. But we should also remember that it is the *perceived* degree of novelty which matters; novelty is very much in the eye of the beholder.

The reality is that although innovation sometimes involves a discontinuous shift, most of the time it takes place in **incremental** fashion.

**Process innovation** is mainly about optimization and getting the bugs out of the system.

- Studies of incremental process development (such as Hollanders famous study of Du Pont rayon plants) suggest that the cumulative gains in efficiency are often much greater over time than those which come from occasional radical changes .

- Continuous improvement of this kind received considerable attention as part of the ‘total quality management’ movement in the late 20th century, reflecting the significant gains which Japanese manufacturers were able to make in improving quality and productivity through sustained incremental change.

- These ideas are not new –similar principles underpin the famous ‘learning curve’ effect where productivity improves with increases in the scale of production; the reason for this lies in the learning and continuous incremental problem-solving innovation which accompanies the introduction of a new product or process.

- More recent experience of deploying ‘lean’ thinking in manufacturing and services and increasingly between as well as within enterprises underlines further the huge scope for such continuous innovation.

## 2. Platform innovation

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One way in which the continuous incremental innovation approach can be harnessed to good effect is through the concept of 'platforms'.

This is a way of creating stretch and space around an innovation and depends on being able to establish a strong basic platform or family which can be extended.



Boeing's 737 airliner, for example, was a major breakthrough innovation back in 1967 when it first flew –and it cost a great deal to develop. However the robustness and flexibility in the design means that many variants and improvements have been made over the years and the plane is still being manufactured today, nearly 60 years later! Rothwell and Gardiner call this kind of platform a 'robust design' and examples can be seen in many areas.

In processes much has been made of the ability to enhance and improve performance over many years from the original design concepts – in fields like steel-making and chemicals, for example.



Service innovation offers other examples where a basic concept can be adapted and tailored for a wide range of similar applications without undergoing the high initial design costs –as is the case with different mortgage or insurance products.



Sometimes platforms can be extended across different sectors –for example, the original ideas behind 'lean' thinking originated in firms like Toyota in the field of car manufacturing - but have subsequently been applied across many other manufacturing sectors and into both public and private service applications including hospitals, supermarkets and banks.

Platforms and families are powerful ways for companies to recoup their high initial investments in R&D by deploying the technology across a number of market fields.



If we take the idea of **position innovation** mentioned earlier then the role of brands can be seen as establishing a strong platform association which can be extended beyond an initial product or service.



In their work on what they call 'management innovation' Julian Birkinshaw and Gary Hamel highlight a number of core organizational innovations (such as 'total quality management' which have diffused widely across sectors. These are essentially **paradigm innovations** which represent concepts which can be shaped and stretched to fit a variety of different contexts – for example Henry Ford's original ideas on mass production became applied and adapted to a host of other industries. McDonalds owed much of their inspiration to him in designing their fast food business and in turn they were a powerful influence on the development of the Aravind eye clinics in India which bring low cost eye surgery to the masses.

### 3. Discontinuous innovation – what happens when the game changes?

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Most of the time innovation takes place within a set of rules of the game which are clearly understood, and involves players trying to innovate by doing what they have been doing (**product, process, position, etc.**) but better. Some manage this more effectively than others but the 'rules of the game' are accepted and do not change.

But occasionally something happens which dislocates this framework and changes the rules of the game. By definition these are not everyday events but they have the capacity to redefine the space and the boundary conditions – they open up new opportunities but also challenge existing players to reframe what they are doing in the light of **new conditions**.

This is a central theme in Schumpeter's original theory of innovation which he saw as involving a process of 'creative destruction'.

- Changes of this kind can come from the emergence of a new technology.
- Or it can come from the emergence of a completely new market with new characteristics and expectations.
- Discontinuity can also come about by reframing the way we think about an industry- changing the dominant business model and hence the 'rules of the game'. (Think about the revolution in flying which the low cost carriers have brought about).



The challenge of discontinuous innovation is that the industries involved most often are not lacking in innovation or commitment to change, but their innovations are taking place within a known context. When shifts in technology, new market emergence or new business models come about, they change the context in which these industries are used to innovating. Under these conditions, it is often the new players who do better, as they do not have to wrestle with learning new tricks and getting over old ones.

## 4. Component/architecture innovation and the importance of knowledge

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Another important lens through which to view innovation opportunities is as components within larger systems.

Rather like Russian dolls we can think of innovations which change things at the level of components or those which involve change in a whole system.

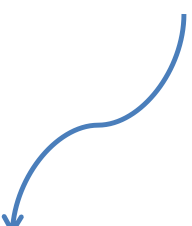


There's scope for innovation at each level –but changes in the higher level systems often have implications for lower down. For example, if cars –as a complex assembly –were suddenly designed to be made out of plastic instead of metal it would still leave scope for car assemblers –but would pose some sleepless nights for producers of metal components!

Innovation is about knowledge – creating new possibilities through combining different knowledge sets.

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- These can be in the form of knowledge about what is technically possible or what particular configuration of this would meet an articulated or latent need.
  - Such knowledge may already exist in our experience, based on something we have seen or done before.
  - Or it could result from a process of search –research into technologies, markets, competitor actions, etc.
  - And it could be in explicit form, codified in such a way that others can access it, discuss it, transfer it, etc.
  - Or it can be in tacit form, known about but not actually put into words or formulae.

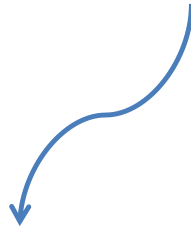
Henderson and Clark, who looked closely at the kinds of knowledge involved in different kinds of innovation, argue that innovation rarely involves dealing with a single technology or market but rather a bundle of knowledge which is brought together into a configuration. Successful innovation management requires that we can get hold of and use knowledge about *components* but also about how those can be put together –what they termed **the architecture of an innovation**.



One of the difficulties with this is that innovation knowledge flows – and the structures which evolve to support them – tend to reflect the nature of the innovation. So if it is at component level then the relevant people with skills and knowledge around these components will talk to each other –and when change takes place they can integrate new knowledge. But when change takes place at the higher system level – ‘architectural innovation’ in Henderson and Clark’s terms – then the existing channels and flows may not be appropriate or sufficient to support the innovation and the firm needs to develop new ones.



A variation on this theme comes in the field of ‘technology fusion’, where different technological streams converge, such that products which used to have a discrete identity begin to merge into new architectures.



Many businesses are now built on business models which stress integrated solutions – systems of many components which together deliver value to end-users. These are often complex, multi-organization networks – examples might include rail networks, mobile phone systems, major construction projects or design and development of new aircraft like the Boeing Dreamliner or the Airbus A-380. Managing innovation on this scale requires development of skills in what Mike Hobday and colleagues call ‘the business of systems integration’.

## 5. The innovation life cycle – different emphasis over time


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Initially, under the discontinuous conditions which arise when completely new technology and/or markets emerge, there is what they term a ‘fluid phase’ during which there is high uncertainty along two dimensions:


- *The target – what will the new configuration be and who will want it?*
- *The technical – how will we harness new technological knowledge to create and deliver this?*

No one knows what the ‘right’ configuration of technological means and market needs will be and so there is extensive experimentation (accompanied by many failures) and fast learning by a range of players including many new entrepreneurial businesses.


Gradually these experiments begin to converge around what they call a '**dominant design**' – something which begins to set up the rules of the game.




This represents a convergence around the most popular (importantly not necessarily the most technologically sophisticated or elegant) solution to the emerging configuration.



At this point a '**bandwagon**' begins to roll and innovation options become increasingly channelled around a core set of possibilities –what Dosi calls a '**technological trajectory**'.




It becomes increasingly difficult to explore outside this space because entrepreneurial interest and the resources which that brings increasingly focus on possibilities within the dominant design corridor.




This can apply to products or processes; in both cases the key characteristics become stabilized and experimentation moves to getting the bugs out and refining the dominant design.


The period in which the dominant design emerges and emphasis shifts to imitation and development around it is termed the '**transitional phase**' in the Abernathy and Utterback model.




Activities move from radical concept development to more focused efforts geared around product differentiation and to delivering it reliably, cheaply, with higher quality, extended functionality, etc.



As the concept matures still further so incremental innovation becomes more significant and emphasis shifts to factors like cost –which means efforts within the industries which grow up around these product areas tend to focus increasingly on rationalization, on scale economies and on process innovation to drive out cost and improve productivity.



Product innovation is increasingly about differentiation through customization to meet the particular needs of specific users. Abernathy and Utterback term this the '**specific phase**'. Finally the stage is set for change –the scope for innovation becomes smaller and smaller whilst outside –for example, in the laboratories and imaginations of research scientists –new possibilities are emerging.



Eventually a new technology emerges which has the potential to challenge all the by now well-established rules –and the game is disrupted.

# Managing innovation

## IDEA GENERATION

## CONVERSION

## DIFFUSION

Companies need to take care of three main phases in the innovation process

- **Ideas GENERATION:** nurturing new ideas in the R&D Departments, across units or from outside the firm
- **Ideas CONVERSION:** creating organizational mechanisms to select high-potential ideas and develop them
- **Ideas DIFFUSION:** having the buy-in from within the company ... and even more from the customers

## Innovation value chain framework

	IDEA GENERATION			CONVERSION		DIFFUSION
	IN-HOUSE Creation within a unit	CROSS-POLLINATION Collaboration across units	EXTERNAL Collaboration with parties outside the firm	SELECTION Screening and initial funding	DEVELOPMENT Movement from idea to first result	SPREAD Dissemination across the organization
KEY QUESTIONS	Do people in our unit create good ideas on their own?	Do we create good ideas by working across the company?	Do we source enough good ideas from outside the firm?	Are we good at screening and funding new ideas?	Are we good at turning ideas into viable products, businesses, and best practices?	Are we good at diffusing developed ideas across the company?
KEY PERFORMANCE INDICATORS	Number of high-quality ideas generated within a unit.	Number of high-quality ideas generated across units.	Number of high-quality ideas generated from outside the firm.	Percentage of all ideas generated that end up being selected and funded.	Percentage of funded ideas that lead to revenues; number of months to first sale.	Percentage of penetration in desired markets, channels, customer groups; number of months to full diffusion.

**The weakest link in the chain is where companies should improve the most!**



Ideas GENERATION poor companies are unable to develop new ideas because of lack of creativity. Therefore they should strengthen this phase by:

- **External solution network**
- **External discovery networks**
- **Cross-units networks**

The key metric for them is the diversity of contacts not only number of contacts

It is critical to develop weak ties as well as strong ties with suppliers. Open Innovation is often looked at!



Ideas CONVERSION poor companies are overwhelmed by risk-adverse and bureaucratic processes that slow down/stop high-potential projects. Therefore they should strengthen this phase by:

- **Multichannel funding**, with an internal “venture fund” in parallel to ordinary investment/R&D budgets
- **Safe havens**, with different organizational procedures, often different location

The key goal is shielding these ideas from short-term thinking and normal budgeting constraints, overcoming “management tools that kills innovation”.

However, often it is critical to maintain the new business close to the mainstream ones (unless they are going to become spin-offs)

Ideas DIFFUSION poor companies are unable/slow in bringing across the organization into the market the new products and services. This might be particular critical in the large decentralized multinationals where each regional/national organization is in charge of marketing & sales strategies. Therefore they should strengthen this phase by:

- Idea evangelists

The key objective is often reaching success in a given market and then expand it across several markets.

Very critical when the product/service needs to go directly global and when strong/fast “scale-up” capabilities are required!

## Summary

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-We've seen that the **scope for innovation** is wide, in terms of overall innovation space and in the many different ways this can be populated, with both **incremental** and more **radical** options.

-At the limit we have the challenges posed when innovation moves into the territory of **discontinuous change** and a whole new game begins.

-We've also looked briefly at concepts like **component** and **architecture innovation** and the critical role which knowledge plays in managing these different forms.

-Finally we've looked at the issue of **timing** and of understanding the nature of **different innovation types at different stages**. All that gives us a feel for what innovation is and why it matters.