1 What are Innovation, Creativity and Design?

This chapter provides an introduction to innovation, design and creativity. It sets out the meaning of these words in the context of this book, how they fit together, and introduces some useful frameworks for the subjects.

INNOVATION

New opinions are always suspected and usually opposed, without any other reason but because they are not already common.

John Locke

Innovation, just as many other things in management and life, means different things to different people. What does innovation mean in the context of this book?

Often 'creativity' and 'innovation' are used interchangeably. However, there are fundamental differences. In fact, creativity is an essential building block for innovation. This is reflected in the now widely accepted definition of innovation equalling creativity plus (successful) implementation. Creativity alone, to come up with ideas, is not enough. To reap the benefits one needs to do something with it – history tells many tales of great inventors who were not able to reap the benefits of their labour, think of the x-ray scanner, invented by EMI but made a commercial success by General Electric, or VCRs invented by Ampex/Sony but successfully commercialized by Matsushita. Why might that be? Let's take a closer look at the two components of innovation: creativity and implementation.

Implementation – putting ideas into practice – is made up of three aspects: idea selection, development, and commercialization, and of course creativity is needed here too. What do organizations need to achieve implementation? They need processes, procedures and structures that allow the timely and effective execution of projects; implementation is about team effort. But even companies that have all the right processes, procedures and structures in place are often unable to be innovative.

> **Xerox's Palo Alto Research Center (PARC)**
>
> In the flagship research division of the Xerox Corporation, set up in 1970, many aspects of modern computing were invented, including the Graphical User Interface (GUI), the mouse, the laser printer and the desk top computer. Invented but not commercialized. For example, both the GUI and the mouse were commercialized first by Apple then by Microsoft. It seems that senior management's narrow focus on Xerox's core business – photocopiers – prevented them from having the vision to pursue anything that was not directly related to copiers, leaving it to others to commercialize the great inventions coming out of PARC, and gain the benefits.

Taking a closer look at creativity might help to explain why that might be. If implementation is putting an idea into practice, creativity is coming up with the idea in the first place. Creativity is an essential part of innovation, it is the point of departure. One of the big concerns for many companies is therefore how to generate more and better ideas – how to become more creative. Consider a few things about creativity:

- As opposed to commonly held opinion, creativity, the act of coming up with an idea, is an inherently individual act – it is the development of an idea and the implementation where the team is needed.

- Creativity has little to do with the 'flash of inspiration out of the blue'. To quote John Hunt, Visiting Professor for Organizational Behaviour at London Business School, 'Creativity is not something where someone who has never worked in that field suddenly gets this marvellous idea. Creativity is relating a concept to a particular body of knowledge. The existing body of knowledge is as vital as the novel idea and really creative people spend years and years acquiring and refining their knowledge base – be it music, mathematics, arts, sculpture or design.'[1]

- While there is generally some debate as to whether creativity is for the selected few or everyone, while certain people are more creative on their own accord than others, creativity can be stimulated and supported through training, and by creating the right work environment and atmosphere. In her research Harvard Business School Professor Teresa Amabile has identified certain characteristics that support creativity in the workplace (see Figure 1.1).

- However, creativity cannot be ordered, it relies much more on intrinsic motivation, on people being enthusiastic, inspired and knowledgeable.
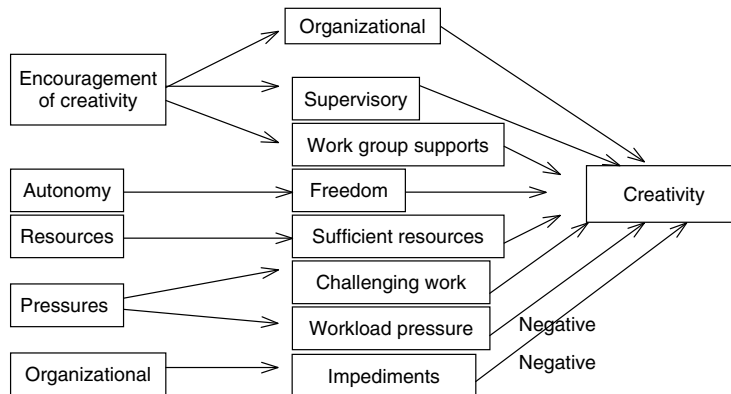
In her model Amabile has identified five environmental components that affect creativity:

- Encouragement of creativity (which encompasses open information flow and support for new ideas at all levels of the organization, from top management, through immediate supervisors, to work groups);
- Autonomy or freedom (autonomy in the day-to-day conduct of work; a sense of individual ownership of and control over work);
- Resources (the materials, information, and general resources available for work);
- Pressures (including both positive challenge and negative workload pressure);
- Organizational impediments to creativity (including conservatism and internal strife).

The components fall into two categories, they are either stimulants to creativity (tapped by scales assessing organizational and supervisory encouragement, work group support, sufficient resources, and challenging work), or obstacles to creativity (tapped by scales assessing organizational impediments and workload pressure).

Figure 1.1   Model for Assessing the Climate for Creativity (KEYS) (Amabile *et al.* 1996) (reproduced by permission of Academy of Management Journal)

- Finally, companies tend to require hard facts but creativity and innovation are often based on intuition. And by the way, as early as the mid-80s authors such as Peters and Waterman (*In Search of Excellence*) suggested that the modern American manager's over-dependence on analytic thought and quantitative analysis was a principal cause for the loss of its worldwide pre-eminence (as reflected in stagnating productivity, ageing and obsolete machinery, and inferior but more expensive products).

So implementation is about being organized and about using the methodological and systematic approach of a 'hare brain' (see Box 1.1). It needs to be structured and cannot be left to chance. Time is of the essence – you need to be fast. Creativity is less straightforward than implementation, it is not about a new process or establishing a new structure. To be creative people have to think differently. To be innovative people have to behave differently. And to be successful organizations have to employ people that think and behave differently. This is why I often define innovation as 'a frame of mind'. Creativity is about being different, thinking laterally, making new connections. It is about allowing the 'tortoise mind' to work. Creativity can be encouraged, not forced. Time is of the essence too, but in as much as creativity cannot be rushed, you need to allow it. Organizations that want to embrace innovation therefore need to find ways of reconciling the tension that lies in the juxtaposition of creativity and implementation.

BOX 1.1   Summary extracts from Claxton's *Hare Brain, Tortoise Mind*

In his book *Hare Brain, Tortoise Mind*, Guy Claxton makes some interesting observations about the way we think that are relevant to understanding creativity and innovation. The first concerns different modes of responding to a situation. Whereas most of the other models aim to put people in boxes, Claxton goes a step back and suggests that we all are capable of two different ways of responding to a situation. The second explains how people's unconscious exerts an influence in the classification of a new situation.

Modes of response

Claxton describes three different modes of how people respond to a situation. The first is spontaneous and immediate. The person does not think consciously about the situation and a possible response. Claxton classifies such a response as 'instinct'. An example would be removing your hand when it is put accidentally on a hot hob. No one would think whether the sensation is pleasant or not, the hand would be removed as quickly as possible. Instinctive reactions can generally be observed when reacting to a threat where there might not be sufficient time to assess the situation if it is to be survived.

The second mode is based on 'conscious, deliberate, purposeful thinking'. Claxton calls this the 'd-mode' or the 'hare mode'.[1] The following is an extract from the traits he has identified for the d-mode:

- D-mode is much more interested in finding answers and solutions than in examining the question.
- D-mode treats perception as unproblematic.
- D-mode values explanation over observation.
- D-mode seeks and prefers clarity, and neither likes nor values confusion.
- D-mode relies on language that appears to be literal and explicit.
- D-mode works with concepts and generalizations.

It seems that one could replace 'd-mode' with 'management'. . .

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[1]'D' stands for default because he feels that that is the mode we use normally.

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However, traits of the d-mode are important and necessary for completing a task: a preference for structure, the ability to plan and organize, to be in control. Structuring and planning help within keeping to a set time frame. Hence, the d-mode is efficient and effective when the problem is clear-cut and when there is one possible, straightforward solution. The d-mode is less appropriate when the situation is intricate, ill defined or complex – and it seems that most product development tasks fall into the last category, rather than into the first.

If a task is complex and fuzzy Claxton suggests that a third mode of response, the 'tortoise mode', is more likely to yield satisfactory results. This mode of responding is slower, less conscious and less 'provable'. Here a person is more concerned with understanding the questions than with providing an answer fast. This might just be exactly what I suggest organizations need to do to improve their new product development. The process of processing the information is less conscious and people often feel that the answer has come 'out of the blue' and Claxton argues that there is a significant advantage in allowing the process of 'slow thinking' when assessing a situation. However, today people are often not 'allowed' to let 'things sink in'. The emphasis, particularly in new product development, is on speed. Claxton remarks on this particular aspect by pointing out that 'time pressure increases the likelihood to rely on existing habits and knowledge'.

This first insight from Claxton's book provided a better understanding of different modes of thinking. It helps to appreciate different approaches – and speeds – of finding solutions. The second insight from Claxton's book I would like to refer to here concerns how we classify new situations as it might help to shed some light on what feeds our habits and assumptions.

Assessing situations

Claxton's work provides insight into how we come to rely on habits and assumptions. Assessments are often based on familiar seeming patterns the accuracy of which was not questioned. New patterns are fitted to match known patterns rather than being acknowledged as different. With the benefit of hindsight, it seems obvious that people have been relying on past experience, on the seemingly obvious. This is related to the issue of prior knowledge. An established mindset, or a dominant logic, can prevent us from seeing things as they are but make us see them as we think they should be.

According to Claxton this is because our mind tends to recognize patterns without us being consciously aware of it. This can lead to something being identified as a familiar pattern while, upon closer investigation, it is not.[2] Therefore, one has to be aware of the 'pattern recognition process' which happens in what Claxton calls the 'undermind'. An awareness of this process can help to keep an open mind when approaching a new problem. Once an initial assessment of the problem has been made, it should then be asked whether it actually can be taken at face value or whether there are hidden layers of complexity which need to be understood and acknowledged.

However, again human nature does not seem in favour of revising a once made assessment, as Claxton points out, 'What seems to happen is that we build up an intuitive picture of the situation as we go along, and it takes work to "dismantle" the picture and start again.' So if later information seems to be at odds with the picture so far, we may unconsciously decide to reinterpret the dissonant information, rather than radically reorganize the picture. And the more we feel under pressure, the less likely we are to make the investment of 'starting from scratch'.

The last observation is particularly relevant in new product development. To illustrate how our mind responds to seemingly similar tasks I would like to cite from Claxton's book where he relates an experiment, undertaken by Abraham and Edith Luchins in the 1950s.

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[2]Please refer to Claxton's book for examples and research supporting his proposition.

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They [the Luchins] set puzzles of the following sort. 'Imagine that you are standing beside a lake, and that you are given three empty jars of different sizes. The first jar holds 17 pints of water; the second holds 37 pints; and the third jar holds 6 pints. Your job is to see whether, using these three jars, you can measure out exactly 8 pints.' After some thought (which may, to start with, be quite logical), most people are able to end up with 8 pints in the largest jar. Then they are set another problem of the same type, except this time the jars hold respectively 31, 61 and 4 pints, and the target is to get 22 pints. And then another, with jar holding 10, 39 and 4 pints where the target is 21 pints. You will find that the same strategy will work for all three problems. But now comes the critical shift. You are next given jars of capacity 23, 39 and 3 pints, and asked to make 20 pints. If you have stopped thinking, and are now applying your new-found rule mindlessly, you will solve the problem – but you will not spot that there is now a much simpler solution. The problem looks the same, but this particular one admits of two solutions, one of which is more elegant and economical than the other. [insert added by author]

While there is generally agreement on the components of innovation (i.e. creativity and implementation), there is often disagreement on what deserves the title 'innovation'. Today it seems to be fashionable to call everything 'innovation', from the redesign of packaging to the introduction of hydrogen powered cars, basically everything that used to be called 'new product development' in the past. The literature is full of attempts to categorize different levels and types of innovation and we will have a look at several below. Olson *et al.* (1995) for example suggest the following four levels:

- New-to-the-world products (products that are new both to the company developing them and to the marketplace using them)

- Line extensions (products that are new to the marketplace but not to the company)

- Me-too-products (those that are new to the company but not to the marketplace)

- Product modifications (existing products that have been simply modified, i.e. they are new neither to the company nor to the marketplace)

As early as 1942, Schumpeter made some observations regarding different types of innovation, which he referred to as 'discontinuities'. The two types of discontinuity he identified are, first, a competence-destroying discontinuity, which renders obsolete the expertise required to master the technology that it replaces, and second, a competence-enhancing discontinuity, which builds on existing know-how embodied in the technology that it replaces.

While building on Schumpeter, more recent literature, with minor variations, refers to four types of innovation. They are architectural innovation, market niche innovation, regular innovation and revolutionary innovation (Abernathy and Clark 1985; similar, Tidd 1993):

> *Architectural innovation* – Innovation of this sort defines the basic configuration of product and process and establishes the technical and marketing agendas that will guide subsequent development.

> *Market niche innovation* – Innovation of this sort is opening new market opportunities through the use of existing technology, the effect on production and technical systems being to conserve and strengthen established designs.

> *Regular innovation* – Innovation of this sort involves change that builds on established technical and production competence and that is applied to existing markets and customers. The effect of these changes is to entrench existing skills and resources.

Revolutionary innovation – Innovation of this sort disrupts and renders established technical and production competence obsolete, yet is applied to existing markets and customers.

The categories of innovation seem closely related to the categories of design devised by Morley and Pugh (1987) and Slusher and Ebert (1992). Heany's (1983) categories of innovation (style change, product line extension, product improvement, new product, start-up business, major innovation) are also similar to the different product categories introduced earlier. Heany provides a check list for the categorization of innovations, based on six different categories, which is shown in Table 1.1.

Looking at Abernathy and Clark's definitions of innovation, one could equate their first three categories with a competence-enhancing discontinuity and the fourth category, revolutionary innovation, with Schumpeter's a competence-destroying discontinuity. A common categorization of innovation is to differentiate between (a) product innovation, the things an organization offers, and (b) process innovation, the ways in which they are created and delivered (e.g. Tidd *et al.* (1997)). Combining levels of innovation with different categories we arrive at the following matrix (see Box 1.2).

Table 1.1   Degrees of Innovation (reproduced from (Heany 1983))

Is the market for product established?	Is the business already serving the market?	Do customers know functions and features?	What is the design effort? Product	What is the design effort? Process	Then innovation is a
yes	yes	yes	minor	nil	Style change
yes	yes	yes	minor	minor	Product line extension
yes	yes	yes	significant	minor	Product improvement
yes	yes	yes	major	major	New product
yes	no	yes	major	major	Start-up business
no	no	no	major	major	Major innovation

BOX 1.2   Levels and categories of Innovation (based on Tidd *et al.* 2001)

Transformation	Cars instead of horses	Internet banking	Pilkington's floating glass	Internet
Radical	Hydrogen powered cars	A new kind of mortgage	Gas-filled thermo glass panes	Online sales and distribution of computers
Incremental	New car model	Different mortgage feature	Differently coloured glass	Selling in business parks instead of town centres
	Product	Service	Process	Business model

I have taken the liberty to provide examples, and added 'business model' though it could be argued that some of this would be covered under 'process'.[2]

It is important to understand varying degrees of innovativeness as they flourish within different processes and structures and we will come back to that in Chapter 3.

However, most of these categorizations tend to focus on the outcome (i.e. the product or service), but say little about the process, and the context which is necessary to enable innovation. An approach that focuses too strongly on process is not likely to succeed in creating a continuously innovative organization. To achieve that, existing behaviours, beliefs and mental frameworks need to be understood and shifted. It is often our expertise and experience – the things that we know to be right and that work – that prevent us from coming up with something truly new. Processes can support this shift, but on their own will not achieve it. That is why I define innovation as a frame of mind. Innovation is the art of making new connections, and continuously challenging the status quo – without changing things for change's sake.

CREATIVITY

The uncreative mind can spot wrong answers, but it takes a very creative mind to spot wrong questions.

Anthony Jay

In the previous section, we talked about some characteristics of creativity. In this section we take a brief look at the origins of creativity, what kind of characteristics tend to be associated with creative people, and the creative process.

In her article 'Making sense of creativity', Jane Henry (1991) summarizes different views on the origin of creativity, identifying five sources:

- Grace – this is the view that creativity comes through divine inspiration, it is something that comes to us, or not, something magic which is out of our control; it is this view that believes 'you either have it or you don't', and companies subscribing to this particular view could only enhance their creativity by hiring people who are graced with divine inspiration.

- Accident – under this view creativity arises by serendipitous good fortune and various scientific discoveries have been attributed to this kind of creativity (e.g. Penicillin) – a view that is not particularly helpful to an organization striving to become more creative!

- Association – under this theory creativity occurs through the application of procedures from one area to another. Lateral thinking and brainstorming are methods supporting this approach to creativity. Henry points out that we often miss such opportunities, quoting as an example Sigmund Freud's insight that a side effect of cocaine is numbing of the mouth without realizing the resulting potential as a dental anaesthetic. Following this view, companies would provide training for their staff with the aim to improve levels of creativity.

- Cognitive – here the belief is that creativity is nothing special but that it relies on normal cognitive process such as recognition, reasoning and understanding. Under this view the role of 'application' is crucial, and examples given include the wide range of different filaments Edison used before coming up with a functioning light bulb. The emphasis here is on hard work and productivity, and proponents of this theory such as

Weisburg (1986) point out that ten years of intense preparation tend to be necessary to lead to a creative act. As Henry puts it, 'The logic of the cognitive position is that deep thinking about an area over a long period leaves the discoverer informed enough to notice anomalies that might be significant.' Companies might like this view best – just make people work harder and the result will be creative solutions. However, the research by Amabile suggests that while a challenge is conducive to creativity, demanding too much can be counterproductive. This approach also works only if the problem has been clearly identified and it is about finding the solution. This approach is less likely to result in identifying the right questions, so it could be argued that the cognitive approach is about implementation, not creativity.

- Personality – here creativity is seen as a particular human ability, an intrinsic part of life and growth and Henry points out, 'Viewing creativity as a natural talent directs attention towards removing mental barriers to creativity to allow an innate spontaneity to flourish.' Given this explanation, I would find the title 'skill' much more appropriate for this view than 'personality' as the latter seems to suggest that creativity is something that we are born with.

To a certain degree, the different views as to what lies at the origin of creativity are also time dependent. For example, the view that creativity is based on 'grace' has dominated human thinking until the beginning of the last century. Only since the late 19th and early 20th centuries people have begun to entertain the thought that creativity could be encouraged and trained. It probably started in 1880 when the American psychologist William James declared, 'The only difference between a muddle-head and a genius is that between extracting wrong characters and right ones. In other words, a muddle-headed person is a genius spoiled in the making.'

And most other suggested origins of creativity make some assumption that creativity is not just something that happens to us, but that it is something that can be encouraged and perhaps even trained. But even when accepting that creativity can be learned, there are some people who are just more creative than others, and much research has been undertaken to identify what their characteristics are. The report entitled *The Creative Age*, published in 1999 by the government think-tank Demos, has a rather short list:

- Creative people have the ability to formulate new problems rather than depending on others to define them.
- They have the ability to transfer what they learn across different contexts.

While these characteristics certainly make for a creative person, to be an innovative person it would, as a minimum, be necessary to add persistence and the willingness to take risk. To make things happen you often have to overcome high levels of resistance – often for no other reason than that your path has not been trodden before, as emphasized in John Locke's introductory quote to this chapter.

> **Persistence. . .**
>
> Charles Goodyear, discover and inventor of vulcanized rubber, as well as Chester Carlson, inventor of electrostatic copying, the Xerox process: xerography, worked for over 30 years trying to find a solution that would work.

The most extensive list of habits of creative people I have found was developed by 1990 Robert Alan Black.[3] While it is titled '32 traits of creative people', I would rather credit innovative people with these characteristics: some of these characteristics are not necessarily important to come up with ideas, however, they are essential for their implementation (see Box 1.3).

The fact that it might be quite difficult to find all these characteristics in one person makes teamwork such an important aspect of innovation.

BOX 1.3   32 Traits of Creative People (Black 1990) (reproduced by Permission of Black, A.)

1. Sensitive

2. Not motivated by money

3. Sense of destiny (believe that you have a special mission or purpose in life you plan or hope to fulfil)

4. Adaptable

5. Tolerant of ambiguity (accept multiple answers or causes to a single problem or challenge)

6. Observant

7. Perceive world differently

8. See possibilities

9. Question asker

10. Can synthesize (see the big picture) correctly, often intuitively

11. Able to fantasize

12. Flexible (willing to try things in many different ways)

13. Fluent (produce lots of ideas or possibilities when working on a challenge or simply choosing a restaurant to go to)

14. Imaginative

15. Intuitive

16. Original

17. Ingenious

18. Energetic

19. Sense of humour

20. Self-actualizing (focus on developing yourself to the best you can be and to discover your specific unique talents)

21. Self-disciplined

22. Self-knowledgeable

23. Specific interests

24. Divergent thinker (looks at things in many different ways at the same time)

25. Curious

26. Open-ended (don't fix on a single idea, keep looking for many different ideas or ways to do things)

27. Independent

28. Severely critical

29. Non-conforming

30. Confident

31. Risk taker

32. Persistent

I would like to conclude the exploration of traits of creative people with a final list, mainly because I like the fact that it highlights one of the underlying reasons for the difficulties that companies have in the realization of innovation: their paradoxical nature. When exploring the questions in their research, what kind of people are creative, and what kind of traits lead to creativity, Csikszentmihalyi came to the following conclusions:[4] 'There may be certain neurological physiologies that predispose you to one or another type of creativity, but it doesn't seem to take a particular talent or genius to be very creative.' He continues, 'However, we do find typically creative individuals have curiosity and interest, and also a certain blend of characteristics often thought of as opposites':

- Divergent and convergent thinking – can think 'outside the box', while also being good at synthesizing a number of ideas into a single concept

- Energy and idleness – high levels of energy, even at a great age (though they may have been sickly as children), but at the same time almost all of them are sometimes seen as being lazy as they don't let themselves be

pushed, or keep routines (this is related to incubation, and they feel guilty about it, but they also feel that it's necessary)

- Introversion and extroversion – often being caught up in themselves, but also being interested in a wide range of things, interacting with others and seeking stimulation

- Masculine and feminine – creative people tend to be psychologically androgynous (men who are shy, less aggressive, sensitive; women who are feminine but also dominant)

- Passionate and detached – highly intrinsically motivated, loving what they do but at the same time able to stand back, especially when it comes to evaluation

- Rebellious and traditional – confronting and challenging the existing but at the same time building on the past. As Isaac Newton pointed out: 'If I can see farther than other men, it is because I stand on the shoulders of giants.'

These lists can be used as starting points for designing training and development programmes by managers who want to improve their employees' creativity (and innovativeness).

De Pree (2001) makes suggestions for how to manage creative people. The first point he makes is that leaders should be open towards creative people and acknowledge the contribution they can make. He further suggest that it might be a good idea to protect such people from bureaucracy and legalism and help protect great ideas from being watered down – certainly a problem mentioned in interviews conducted with members of the Innovation Exchange (von Stamm 2001). De Pree quotes Peter Drucker as saying, 'When you have a real innovation, don't compromise.' However, at the same time he emphasizes that this does not mean giving creative people carte blanche. He points out that 'Creative people, like the rest of us, need constraints,' and continues, 'One of the most striking characteristics of the creative person I know is their ability to renew themselves through constraints.'

Once people realized that creativity might not just be a god-given, but that it could be taught, research into the creativity process started. In 1926 Wallas summarized his own and other people's research into the creativity process in *The Art of Thought*, concluding that there were the following four steps:

- Preparation – identification and definition of an issue or problem, based on observation and study

- Incubation – this often involves laying the issue aside for a time, what was seen to be the 'magic' bit at the time and which in Claxton's terms would be associated with the tortoise mind

- Illumination – the moment when a new solution or concept is finally emerging, often associated with 'the flash of inspiration, out of nowhere', but more likely a result of the ability to make a new connection between extensive and varied bodies of knowledge

- Verification – checking out the applicability and appropriateness of the solution for the originally observed problem

Comparing the various models of the creative process that have developed since, Paul E. Plsek (1996) has drawn the following conclusions:

- The creative process involves purposeful analysis, imaginative idea generation, and critical evaluation – the total creative process is a balance of imagination and analysis.
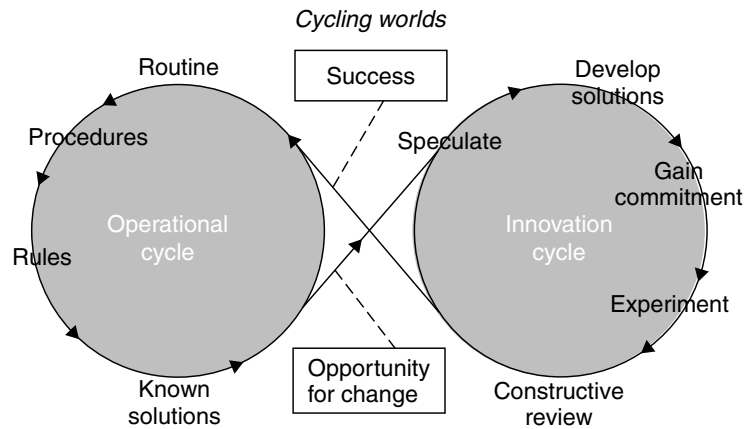
Figure 1.2   Cycling Worlds, Synectics (reproduced by permission of Kogan Page)

- Older models tend to imply that creative ideas result from subconscious processes, largely outside the control of the thinker. Modern models tend to imply purposeful generation of new ideas, under the direct control of the thinker.

- The total creative process requires a drive to action and the implementation of ideas. We must do more than simply imagine new things, we must work to make them concrete realities.

Again, it is obvious that creativity and innovation have been used interchangeably, which I believe contributes to the confusion that exists around creativity and innovation, and the problems that exist in establishing an innovative organization.

To clarify, during the creative process intuition and thought are required – as well as for the implementation, analysis and action. However, each of the two processes requires different skills and is successful under different conditions. This has been expressed in the model of 'cycling worlds' by creativity consultants Synectics, whereby I would read what they call 'innovation cycle' to be the creative process, and what they call 'operational cycle' to be the implementation cycle (see Figure 1.2).[5]

Successful innovative organizations manage to balance the tension between the two cycles without compromising either.

DESIGN

Good design is about looking at everyday things with new eyes and working out how they can be made better. It is about challenging existing technology.

James Dyson, Ford Magazine, *summer 1999*

In the last section of the chapter I take a closer look at what design actually means, explore different approaches companies take towards design, and suggest what why it might be worth considering design and designers in the context of innovation and creativity. A brief overview of the history of design as well as an introduction to different categories of design can be found in Appendix II.

Looking up the work 'design' in any dictionary provides a long list of entries. The *Concise Oxford Dictionary* offers 11 different meanings, and in the *British Encyclopaedia* we even find 33 different entries. In addition to a wide range of options of what 'design' refers to, there is also potential for further confusion due to national differences. Even though 'design' is a word used in many countries, its meaning varies. For example, according to a German dictionary, it only means to 'sketch' or 'pattern'.

In the context of innovation, three relevant interpretations of design can be found:

- Design is the tangible outcome, i.e. the end product of design such as cameras, cars, etc.

- Design is a creative activity.

- Design is the process by which information is transformed into a tangible outcome.

It seems that the last, design as process, is the most commonly used, and it is how I understand the word. For me design is the act of conscious decision making so I would vary the definition slightly and add the word 'conscious'. So my definition reads:

> **Design** is the conscious decision-making process by which information (an idea) is transformed into an outcome, be it tangible (product) or intangible (service).

Design is about doing things consciously, and not because they have always done in a certain way, it is about comparing alternatives to select the best possible solution, it is about exploring and experimenting.

Whereas earlier literature on the subject has looked at design primarily from a designer's perspective, it seems that more recent books on design and design management invariably make a strong link to new product development (e.g. Oakley 1984; Pilditch 1987; Walsh *et al.* 1992; Bruce and Biemans 1995). This seems to be correlated with the growing awareness of the importance of design for a company's success, and a call for a wider use of designers in the new product development process. For example, latest research by the British Design Council (2002) found that 75% of small and medium-sized businesses (50–249 employees) declared that design was

Three meanings of design can also be found in the British Standard BS 7000, *A Guide to Managing Product Design*. The Standard refers to design as verb (to generate information from which a required product can become reality), as noun (a set of instructions necessary to construct a product), and as process. Three different types of design process are distinguished:

1. Conceptual design – the process in which concepts are generated with a view to fulfilling the objective.

2. Embodiment design – the process in which a structured development of the preferred concept is carried out.

3. Detail design – in which the precise shape, dimension and tolerances are specified, the material selection is confirmed and the method of manufacture is considered for every individual part of the product.

Evolution of 'Design'

In the traditional understanding, 'design' is often associated with a person who is involved in both the design and production of an object. This concept began to change with the outset of the Industrial Revolution, which initiated the division of work and the need for specialization. Resulting from this, two strands of design evolved, 'design as art' and 'design as engineering', each with a different meaning and different emphasis in education. Part and consequence of the development into specialization was the separation of industrial and engineering design about which Ivor Owen (1990), a former director of the Design Council, says, 'I strongly believe that the schism between engineering design and industrial design has been one of the most damaging issues in manufacturing industry imaginable.' Sir William Barlow (1988), a former chairman of the Design Council, asserts this by pointing out that almost every product requires an appropriate balance of both.

'integral' or 'significant' to them, up from 54% in the previous year. As early as the mid-80s, Kotler and Rath (1984) have heralded the coming of design as necessary organizational competence, declaring in their article 'Design, a powerful but neglected strategic tool' that 'Design is a potent strategic tool that companies can use to gain a sustainable competitive advantage yet most companies neglect design as a strategic tool. What they don't realize is that good design can enhance products, environment, communications, and corporate identity.' However, though other management gurus such as Tom Peters (e.g. 1994) too are great proponents of design, ten years later Davies and Hom (1993) still observed a lack of a strategic use of design.

One of the reasons might be that the close association and overlap of design management, new product development and innovation has caused confusion about the boundaries between the three areas. A further contributor to the confusion around design is that, while it is commonly understood that design is undertaken by designers, research has revealed that a significant part of design or decisions influencing design are not made by designers but by other people in the organization such as engineers, programmers and managers (Hales 1986; Norman 1988). These non-designers who have such a significant impact on the design outcome without being aware of it have been titled 'silent designers' (Gorb and Dumas 1987).

Another reason is the differences between designers and managers on a number of issues, and a widespread belief that designers – or creative people in general – cannot be managed. However, David Walker (1990) quotes from a letter of Geoffrey Constable, Head of Industrial Division, Design Council, of 17th March 1987, in which Constable states, 'It is important to argue that design must be managed and can be managed. There is considerable misunderstanding on both points. Some managers believe that design is something outside normal business practice and does not benefit from being managed but due to creativity and other uncertainties is regrettably unmanageable. In fact design has to be managed just as much as anything else and the uncertainties that are involved are no more serious or disruptive than the uncertainties inherent in any other task within industry that has to be managed, for example, commissioning a new factory or exploiting a new market.'

Walker blames the educational gap for the problem. Whereas managers' education and training tends to focus on analytical studies such as accounting and finance, designers are educated and trained to deal with projects that involve unfamiliar concepts, are predominantly visual rather than verbal, involve fuzzy problems and high levels of ambiguity, and assessments which are 'Variously, subjective, personal, emotional and outside quantification.' He comes to the conclusions that 'The divergence between managers and designers can be detected in personality traits, in habits of thought and work, as well as in educational background.' A comparison between managers and designers is shown in Table 1.2.

Whether or not design actually contributes to the success of a product and a company's performance is critically influenced by management's attitude towards it (Hart and Service 1988; Hart *et al.* 1989). To provide managers with insights into the implications of different approaches to the management of design, Dumas and Mintzberg (1991) have described five different ways and an evaluation of each option (see Table 1.3). In their view the fifth style, infusion, is the one most likely to lead to the most successful and comprehensive employment of design. However, while the suggested categories give a description of what has been found in companies and are important for understanding different levels of commitment of a company to design, the article does not give any indications as to how or what to do to achieve a particular level of design awareness, nor does it help a company choose the approach to design management most suitable for their situation.

The categories devised by Dumas and Mintzberg are not dissimilar to a differentiation between different levels of understanding of design given by Fairhead (1988) (Figure 1.3).

Table 1.2 Differences between Designers and Managers (reproduced from (Walker 1990))

Characteristics	Managers	Designers
Aims	Long term profits/return	Short term product/service quality
	Survival	Reform
	Growth	Prestige
	Organizational durability	Career building
Focus	People	Things
	Systems	Environment
Education	Accountancy	Crafts
	Engineering	Art
	Verbal	Visual
	Numerical	Geometric
Thinking styles	Serialist	Holist
	Linear	Lateral
	Analysis	Synthesis
	Problem oriented	Solution led
Behaviour	Pessimistic	Optimistic
	Adaptive	Innovative
Culture	Conformity	Diversity
	Cautious	Experimental

Table 1.3 Styles of Design Management (based on Dumas and Mintzberg 1991)

Style	Critique
1. Design champion	Whether patron, crusader, team or consultant, may not be sufficient condition for the full realization of design in an organization, but he/she or it may constitute a necessary first step
2. Design policy	Is fine as long as it clarifies the beliefs that already exist in a company; by itself a design policy is of little consequence
3. Design programme	Sometimes causes a specific change in an organization and even has a lasting effect when that change serves as a model for other initiatives. But these follow-up initiatives must be implemented and that is commonly considered to require the next approach
4. Design as a function	For the vast majority of companies, the influence of design is as likely to be measured by the performance of marketing or production as by its own independent efforts
5. Design as infusion	The permeation of design throughout the organization. Infusion is informal; the ultimate intention is to have everyone concerned with design (silent design)

So we have already heard that design is an important strategic tool, but why think about it in particular in the context of innovation? Look at the 32 traits of creative (innovative) people and consider what we have heard about innovation.

In Table 1.4 I have highlighted the traits that are often associated with designers too and we find that they share many characteristics of creative people (perhaps not surprising as the design profession is considered to be part of
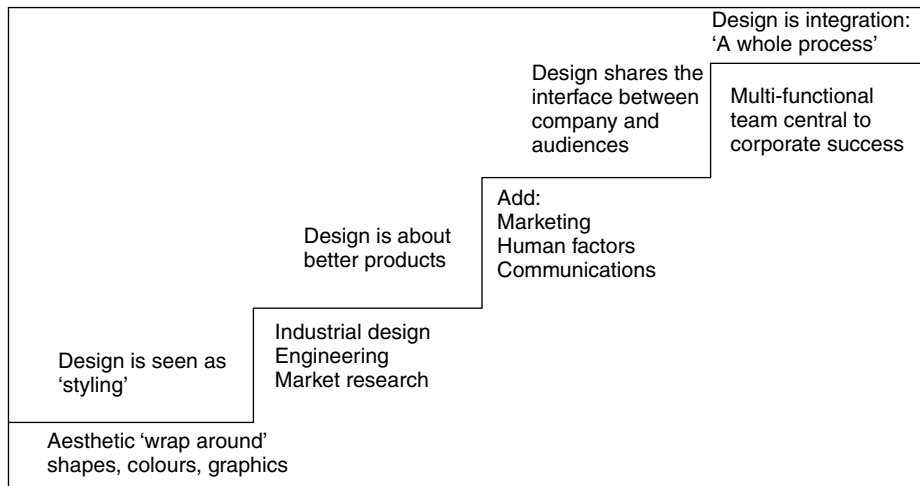
Figure 1.3 Design – The World is Growing (Fairhead 1988) (reproduced by permission of HMSO)

Table 1.4 Creative Traits and Designers

1.	Sensitive	12.	**Flexible**	23.	**Specific interests**
2.	Not motivated by money	13.	**Fluent**	24.	**Divergent thinker**
3.	**Sense of destiny**	14.	**Imaginative**	25.	**Curious**
4.	Adaptable	15.	**Intuitive**	26.	**Open-ended**
5.	**Tolerant of ambiguity**	16.	**Original**	27.	**Independent**
6.	**Observant**	17.	**Ingenious**	28.	**Severely critical**
7.	**Perceive world differently**	18.	**Energetic**	29.	**Non-conforming**
8.	**See possibilities**	19.	Sense of humour	30.	**Confident**
9.	**Question asker**	20.	Self-actualizing	31.	**Risk taker**
10.	**Can synthesize**	21.	Self-disciplined	32.	**Persistent**
11.	**Able to fantasize**	22.	Self-knowledgeable		

the 'creative industry'). This does not mean that innovation should be left to the designers, only that designers might have an important contribution to make to the innovation process, and that they might be valuable members of innovation teams. Even though the link between skills and abilities of members of the creative industries and the skills and abilities required for innovation seems quite obvious, not many organizations seem to employ it to their benefit. As the UK Government White Paper on Competitiveness (1995) states, 'The effective use of design is fundamental to the creation of innovative products, processes and services. Good design can significantly add value to products, lead to growth in sales and enable both the exploitation of new markets and the consolidation of existing ones.' It continues, 'The benefits of good design can be seen as:

- Processes improved by gradual innovation
- Redesign of existing products in response to user needs, new markets and competitor products
- Development of new products by anticipating new market opportunities.'

The case study presented in Chapter 2 gives an illustration of the interplay of innovation, creativity and design in a 'real world' situation.

READING SUGGESTIONS

ON INNOVATION

Tidd, Joe, Bessant, John and Pavitt, Keith (2001) *Managing Innovation; Integrating Technological, Market and Organizational Change*. 2nd edn. Chichester, UK: John Wiley & Sons

Comment: A very comprehensive overview of issues around innovation, slightly biased towards technology

ON CREATIVITY

Henry, Jane (ed.) (2001) *Creative Management*. 2nd edn. London: Sage

Comment: A good collection of articles around creativity, authors include Theresa Amabile, Henry Mintzberg, Daniel Goleman, Michael Kirton, Charles Handy and Rosabeth Moss Kanter

ON DESIGN

Cooper, Rachel and Press, Michael (1995) *The Design Agenda, A Guide to Successful Design Management*. Chichester, UK: John Wiley & Sons

Comment: Nothing earth shattering but a good introduction to design and its place in business

SOME USEFUL WEBSITES

ON INNOVATION

www.innovation.gov.uk

Comment: The UK's government website set up with the aim to help organizations become more innovative, much of it is still under development; it also offers an electronic version of the Design Council's (*www.designcouncil.org*) tool for the assessment of an organization's innovativeness (click on 'managing successful innovation')

www.thinksmart.com

Comment: The website of the US-based Innovation Network, a rich source of articles, book recommendations, a great tool for understanding innovation called *Innovation DNA* and much more

www.fastcompany.com

Comment: The website of the magazine with the same title, loads of interesting articles on and around innovation, well worth a visit

ON CREATIVITY

http://creativeideas.20m.com/articles.htm#General

Comment: Website with lots of links to interesting articles and other information relevant to creativity
                and also innovation

ON DESIGN

www.designcouncil.org

Comment: The Design Council get increasingly involved in design's role in innovation, and innovation
                more generally. They have developed a number of tools, and also provide a wide range of
                case studies and stories on their website

www.dmi.org

Comment: This is the website of the Design Management Institute, some aspects of the website are
                only available to DMI members

NOTES ON CHAPTER 1

[1] Interview for the Innovation Exchange, 1999 (for a full interview, see http://iexchange.london.edu).

[2] In his book *All the Right Moves* (Harvard Business School Press, 1999), Costas Markides expands on how to pursue innovation at the strategic level (business model innovation).

[3] See http://www.cre8ng.com/newsletter/news2.html or http://creativeideas.org.uk/

[4] Extracted from *Student Colloquium: Problem Finding and the Creative Process*, Dr. Mihaly Csikszentmihalyi, Thursday, 11th November, 1999, notes by Anne K. Gay; see http://www.eng.uwaterloo.ca/~akgay/creative.html

[5] See Jonne Cesevani (2003) *Big Ideas – Putting the Zest into Creativity and Innovation at Work*. London: Kogan Page; or http://www.synecticsworld.com/helpdesk/fill-me-in.htm