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1

Prologue About Innovation and Innovating

1.1 Introduction

The Delft Innovation Method includes five constituting elements, which work closely together. You need the one to effectively apply the other and vice versa. The five elements are:

1. a general model of the corporate innovation process, the so-called *Delft Innovation Model*;
2. a facilitative leadership style;
3. a diversely composed innovation team;
4. the use of creativity techniques;
5. the connection of the company to the external world.

The innovation model offers a kind of mental image of the innovation field. The team and its facilitative leadership is necessary for executing the innovation process. Creativity techniques are useful tools and the external orientation is an attitude to help the company to perform its innovative tasks. All five are important; it is difficult to come up with a ranking. You need all five of them, jointly together.

The core message of *The Delft Innovation Method* is based on the original consulting method for innovating which was described and tested in the *Project Industrial Innovation* (Buijs 1984). A follow-up study proved the lasting long-term effects of this method (Buijs 1987b). Together with Rianne Valkenburg I produced the book *Integrated New Product Development* in which we further detailed the method (only available in Dutch). That book has been improved over the years (Buijs & Valkenburg 1996, 2000 and 2005) and became the basic text on new product development for Dutch universities as well as for schools of applied sciences. The present *Delft Innovation Method* book includes the latest insights and ideas of the research we have done over the last couple of years.

The metaphor of going on an ‘innovation discovery tour’ is used for the structure of this book. Chapter 1 offers a general description of the innovation country you are going to visit. Chapter 2 offers you a detailed roadmap of that country; an easy way to get acquainted before you really enter this unknown territory. Finally in chapter 3 details are given about how to organize for this trip, how to find fellow travelers and how to deal with other stakeholders in this trip. It will include also some handy tips and tricks to overcome the most common hurdles during such an innovation discovery tour. Enjoy a happy journey.

All three chapters together show the overall view of *The Delft Innovation Method*: a structured way to innovate products and services from within a company.

1.2 Why Would One Innovate at All?

Innovating is considered to be the main engine for societal, cultural and economic prosperity. Most processes in society and companies are about maintaining the status quo as well, ensuring that important issues can be continued. Innovating is an exceptional process. It is a rare phenomenon. It is about introducing new elements in the overall system, which can and will change the system itself. Without innovating the overall system will come to a standstill. This is the crucial challenge for society and its actors: on the one hand keeping the continuance of the system, and on the other hand introducing new ideas to keep the system alive in the long run.

By introducing new ideas and new procedures the present ideas or procedures are being challenged. Users of the present ideas or procedures are being exposed to this new idea or procedure. Users may see new options for a better situation and will probably adopt them for their future daily use. Hopefully they will get better or more appreciated experiences than with the older ideas or procedures and will change over to buying and using the new ones.

Joseph Schumpeter (1883-1950) calls this continuous innovation process the process of *creative destruction*. Introducing innovations in a certain field is challenging the present offerings. This challenge will lead to new entrants in this field, to changes in the offerings of the present parties, but also to withdrawals or, more dramatically, to bankruptcy of some of the present contenders in the field. This innovation process will shake up the present situation and system and, hopefully, will take society to a next higher level of quality.

The adoption or diffusion of innovations is not easy. According to Everett Rogers (1931-2004) this adoption process has several intermediate stages, before the innovation is accepted by a wider audience. He distinguishes five different categories of people in this adoption or diffusion process, which grow in size over time. A very small group of people like or need innovations right from the beginning. He calls them the '*innovators*'; only about 2.5% of the targeted population. Targeted means people for whom this innovation was intended. The next group follows or imitates the innovators and they are called the '*early adopters*' (about 13.5%). Then a much bigger group of people starts buying and using the innovation: the '*early majority*' (34%). Half of the population has now adopted the innovation. Then the '*late majority*' (also 34%) joins in and finally the '*laggards*' (16%) start using the innovation. His description does not mean that at the end everybody will have adopted the innovation. See figure 1.1.

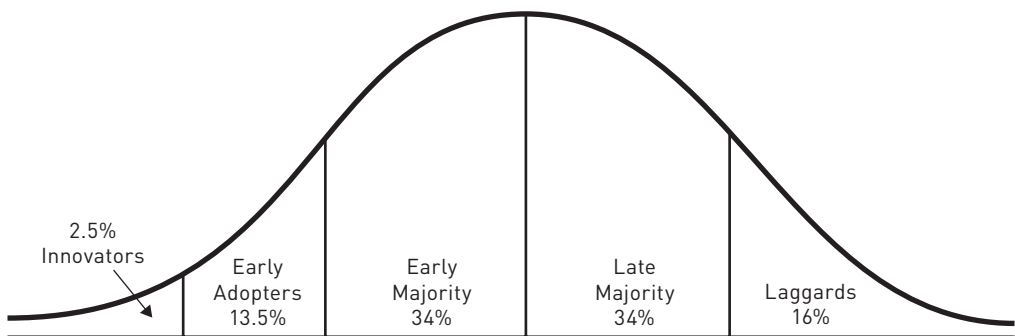


Figure 1.1
The Innovation
adoption curve
according to Everett
Rogers (1995).

Innovating is necessary to keep the system alive but at the same time, due to this shaking up of the system, will cause resistance and protest. Innovating is challenging the status quo. Innovating, introducing something new, looks like an easy concept, but it is not, either for generating innovations or for adopting innovations. What is new for the one could be a tradition for the other. Even within the same situation it can have two meanings. For instance when SAAB, the Swedish car company, introduced cars with diesel engines in the mid-1990s, it was an innovation for SAAB as a car company. For car owners it was a well-known type of car. Mercedes and Peugeot had been offering cars with diesel engines for years. In this case the user of the innovation was not innovating, while the producer of the innovation was innovating indeed. The fifteen millionth sold *iPad* in March 2011 after 11 months of sales was a nice moment of celebration for *Apple*, but the thing itself was by

that time almost a tradition. But for the buyer of that fifteen millionth *iPad* it could be her or his first experience with an *iPad* or even with an *Apple* product. So for her or him that was really new. So in many innovation processes old and new come together and collide. An 'innovator' in one situation, say food, can be a 'laggard' in another situation, for instance mobile phones. That is probably one of the main reasons why innovating is so complex; complex as a concept, complex to manage and complex to execute.

1.3 What Is an Innovation?

The first academic ideas about innovating were published by the earlier mentioned Joseph Schumpeter in the early 20th century. In his book *Theorie der Wirtschaftlichen Entwicklungen* (1911/1926) [Theory of Economic Developments] he introduces innovating as '*Durchsetzung Neuer Kombinationen*', literally translated as 'carrying through of new combinations'. In his opinion these new combinations could be:

1. the introduction of a new good;
2. the introduction of a new method of production;
3. the opening of a new market;
4. the conquest of a new source of supply of raw materials or half-manufactured goods; and
5. carrying out a new organization of industry.

(Schumpeter 1949, p. 66)

Nowadays the first combination would be called a product innovation, the second a process innovation, the third one a market innovation, type four again a process innovation or a production innovation and finally number five an organizational innovation. The person, the actor who would get these ideas of new combinations, is according to Schumpeter the entrepreneur. By doing so, he or she will achieve a temporary monopoly, which enables the entrepreneur to establish his or her own market price for this new combination. After a while the competition will start challenging this comfortable financial position and the prices will go down and the entrepreneur will probably have to look for a next 'new combination' to remain profitable. As said before, Schumpeter calls this process '*creative destruction*'. It is in his view the general engine for economic growth. The main reason why 'we' have to innovate!

The consequence of innovating as this continuous process of creative destruction is that it will always challenge the status quo of the present market leaders and/or all others who benefit from the present situa-

tion. This was already noticed by Niccolò Machiavelli (1469-1527) nearly 500 years ago (*Il Principe* [The Prince], published in 1532). It was also used as an argument by two Dutch economists (Jacobs & Theeuwes 2004) as to why both political left-wing and right-wing thinkers do not really embrace the notion of innovation: the left-wing because it destroys societal wealth (kills jobs in the non-innovating companies), and the right-wing because it harms the positions of the present leaders.

There are many books on innovating, for example: Berkum 2007, Bessant & Tidd 2007, Botkin, Dimancescu & Stata 1984, Burns & Stalker 1977, Cagan & Vogel 2002, Drucker 1985, Edgerton 2007, Foster 1986, Himmelfarb 1992, Kanter 1983, Kelly 2001, Nyström 1990, Rogers 1995, Rothwell & Zegveld 1982, Tidd, Bessant & Pavit 1997 & 2001, Twiss 1980, Utterback 1994, Van de Ven, Polley, Garud & Venkataraman 1999, Von Hippel 1988. Together with my own experiences as an innovation researcher, innovation consultant and academic scholar about the process of innovating, a view comes up of innovating as a phenomenon that is difficult to grasp.

Rationally the Schumpeterian notions are easy to understand, summarized in the slogan of the chief designer at *Specialized*, the American bike company '*Innovate or Die*'. But being part of or partner in an innovation process is a very emotional experience. You have to give up the things you know and trust. To give a better understanding of this complex experience I will give some dichotomies, contrasting and even provocative pairs of words which describe the differences between normal work (*Traditio*) and innovative work (*Innovatio*). I am grateful to my former colleague J.W. Drukker, a professor in design history, for this distinction between *Traditio* and *Innovatio*.

The dichotomies themselves are chosen deliberately, the order of appearance in this table is random. The list of contrasting pairs of words describes on the one hand the present daily activities (left column *Traditio*) and on the other hand the future new activities (right column *Innovatio*). See Table 1.

Traditio	Innovatio
Routine	New
Incremental	Radical
Small changes	Big changes
Exploitation	Exploration
Normal	Different
Efficiency	Effectiveness
Past & present	Future & more
Obey rules	Change rules
Control	Chaos
Operation	Strategy
Structured	Fuzzy
Mechanistic	Organic
Prediction	Serendipity
Stable	Dynamic
Certainty	Risk
Management	Leadership
Short-term	Long-term
Closed	Open
Standard	Exception
Dull	Excitement
Straightforward	Schizophrenic
Nth time	1st time
Safe	Dangerous
Inside paradigm	Breaking the paradigm
Peace	War
Connected	Separated
Continuous	Disrupted
Earning money	Spending money
Step	Leap
Old	New

Table 1
Thirty contrasting
notions between
tradition (left) and
innovation (right).

I have explicitly chosen this impressionist view to demonstrate as clearly as possible the conflicts which coincide within innovating.

Summarizing Table 1 in using a product-producing company as a metaphor would suggest that the '*Traditio-Corporation*' is producing equally shaped grey boxes. Their challenge is to do that year after year with always exactly the same shape and the same grey color within a pre-defined set of tolerances as efficiently as possible. The '*Innovatio-Corporation*' is producing differently shaped red 'thingies'. Their challenge is that the shape is always different from all previous ones and that the color red is also different for all new shapes, it could even be blue or yellow, and doing this as effectively as possible!

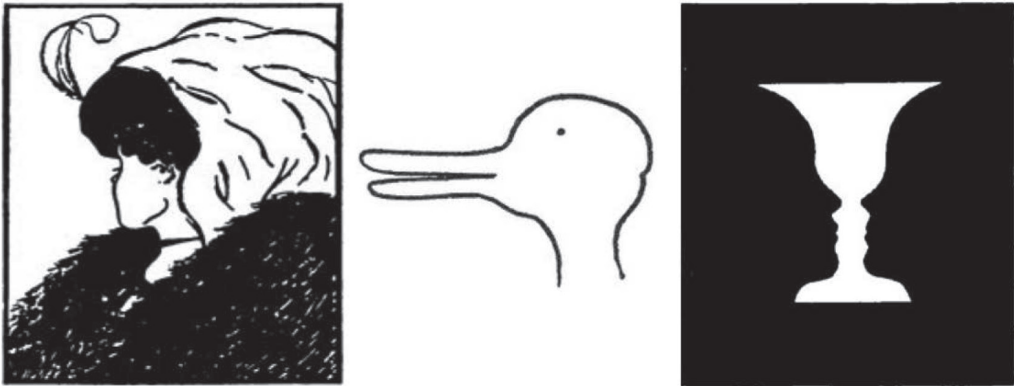
To be honest, in the real world there are no '*Traditio*'-only corporations, neither do '*Innovatio*'-only corporations exist. All corporations have to balance the importance of the present operations (= exploitation) with the importance of finding new activities for the future (= exploration). Companies who are excellent in maintaining this dynamic balance are called 'ambidextrous' organizations (see for instance, Sfirtsis 2011, and Tushman, Smith & Binns 2011).

Due to the complexity and risk of innovating, many companies have a tendency to over-emphasize operations. That is the part of the organization with the largest budgets, also the part where the money is being earned. They under-emphasize innovation, that is the smaller part of the organization which will secure the future, that will at the same time also challenge the present money-makers. This book *The Delft Innovation Method* is oriented towards helping companies to become more innovative, to helping that small and ambitious group of people shaking up the company, not primarily oriented for becoming an overall ambidextrous organization.

1.4 Innovating Means Making Mental Leaps

Being active and involved in many innovation processes myself, one type of experience is common to nearly all innovation processes: the moment a participant in the innovation process has experienced and adopted the innovation. In that moment he or she makes a mental leap and all the pain in getting there is forgotten. The perspective on top of the mountain, which is after innovating, is completely different from the perspective of standing in front of this huge mountain, which is before innovating. Especially leaders who have made the innovative leap often forget that their followers still have to make that leap. It is easy to say '*It is a nice view here from the top; so don't be afraid, come and watch*', but that does not make the overwhelming mountain face less intimidating!

Compare it to looking at those famous Gestalt pictures. If you have made the switch between the old woman and the young woman, or the duck and the rabbit, you cannot even remember why it was so difficult when you started to look at those pictures to see the one or the other. See figure 1.2.

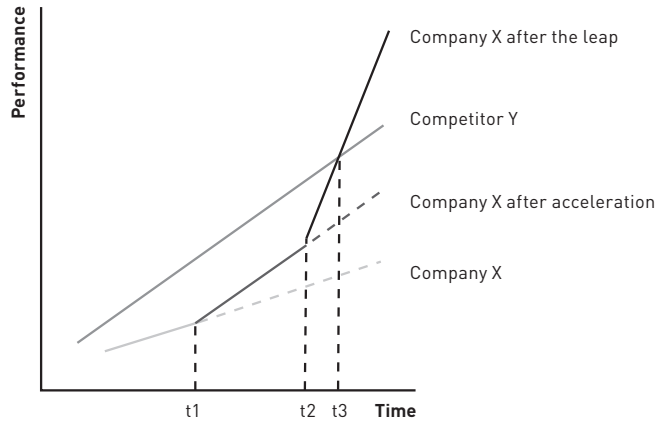


Experiencing this mental leap, the 'Eureka' moment, experiencing the change from not knowing what to do, to having a clear picture of the possible future, is one of the biggest emotional moments of innovating.

Besides this mental leap there is also always a rational leap involved in innovating. We can see this leap if we compare the behavior of two competing companies. Company X compares its behavior with competitor Y and notices that X is lagging behind (see T1 in figure 1.3). If they do nothing, their future performance will follow more or less the dotted line in the figure. That will not lead to a prosperous situation. They can decide to start working as hard or as good as competitor Y. After a while at T2 they see they have really improved: now they are on a par with company Y. But also they note that the gap is still not closed. So on T2 they have to make a tough decision to start running faster than competitor Y. Finally on T3 they have surpassed the competition. Figure 1.3 clearly shows the leap the company has to make before they are better than the competition.

Figure 1.2
Three Gestalt
pictures (what is the
one furthest right
showing?)

Figure 1.3
Innovating as a
leap-like change.



We can also see this leap in just looking at the actual 'thing' they are innovating. A product is something that is designed in a certain way, is produced with specific technologies and is implemented on a targeted market. Innovating this so-called Product-Market-Technology combination (PMT-combination) will lead to changes in at least one of the constituent elements: either the P, or the M or the T, but sometimes in changing all three together; remember the '*Neue Kombinationen*' from Schumpeter. Most PMT-innovations are observable from the outside. Some are not clearly visible, because the innovation is located in one of the internal components of the PMT-combination. For instance, if they innovate the manufacturing process (= a process innovation) to lower the cost price. The company will definitely enjoy the higher margins, but we as external observers are not able to see the roots of this innovation.

There is a much more hidden leap as well. People inside companies make careers based on the excellent way they deal with the present procedures and rules, or master the current technologies within the company. The innovation however is changing the rules of this company game. Present careers are broken because of the innovation, and new careers arise due to the innovation. Remember Machiavelli's book from 1532, where it is said that by maintaining the status quo one generates conflicts. This is one of the important reasons why there is resistance to accepting innovations inside as well as outside companies. Top management should give a lot of attention to tackling this problem. One of the solutions that will be talked about later in chapter 3 is the

early involvement of key players from the company in the innovation process. Innovating is indeed a team process.

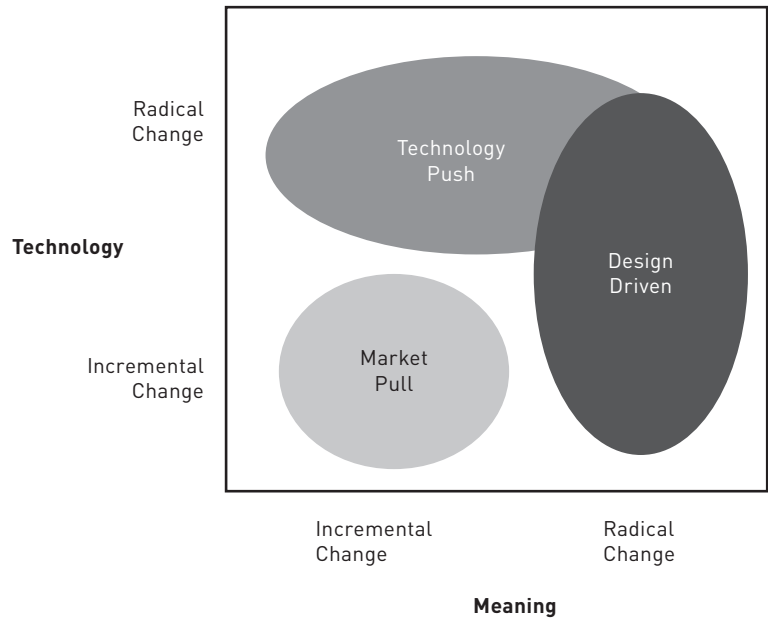
The leaps which coincide with corporate innovating are psychological and economic as well as technological; during the diffusion and adoption process in society, probably cultural as well.

Some academics like to bridge the huge gap between *Traditio* and *Innovatio* by introducing words like 'incremental' innovation versus 'radical' innovations. Then the 'incremental' innovation is seen as a kind of in-between result between the non-innovating behavior of *Traditio* and the 'real' innovations *Innovatio* is producing. As explained in paragraph 1.1 the perception of innovating is relative to the actors involved. What is radical for the one can be traditional for the other. Categorizing innovations into different groups or types of innovations is nice for the academic debate, but the categorizing of innovations up front does not in itself help the managing of the innovation process. That is the reason I do not think this differentiation in radical or incremental innovations will help to ease the management of innovating.

There is, however, another categorization I find interesting, because it introduces an extra dimension about what an innovation could be. Roberto Verganti (2009) introduced this new innovation dimension. The normal axes scholars use to describe innovations are product, market, technology and sometimes organization. Verganti uses '*meaning*' as well. He noticed that certain innovations were not technologically advanced, but were still perceived as very radical by the users. For instance the first Bondi Beach translucent blue softly shaped *Apple iMac*, introduced in 1998, was for computer specialists, technologically speaking old technology. The translucent blue plastic body was a normal technology in the toys and candies industry. The basis for this innovation was that it was the first personal computer which left the grey colored boxy shaped office machine stereotype and turned it into a nice looking home appliance.

Verganti calls this way of innovating: *design-driven innovation*. He compares it with two other ways of looking at innovations. On the one hand innovation coming from the market, the users: the so-called Market Pull innovations. Usually only incremental innovation will be the result. On the other hand there are Technology Push innovations: new breakthrough technologies looking for a market opportunity. Usually these can lead to radical innovations. Verganti's design driven innovations are in his opinion a third category: radical innovations based on the introduction of a new meaning for the product or service. See figure 1.4.

Figure 1.4
Verganti's view on
innovations.



An interesting aspect Verganti raises is that users are probably not the best sources for radical innovations, which contradicts the notion of user-centered design. Indeed, users do not know in what direction the technology will evolve. Neither do they know much about their own future needs in five years time. They do know what they need now, and they know how to respond to testing prototypes or beta-tests. Including users as much as possible in the innovation process is important, although we know their limitations. In chapter 2 the stage of *Product Use* will be introduced as one of the stages of the overall innovation process; emphasizing that the changes of use and usage of products and services is more important than changes in the users themselves.

Verganti's concept of changes in meaning at the core of design-driven innovation is also a nice example of how definitions play an important role in the academic discourse. The case of the *Apple iMac* could easily also be seen as a market innovation instead of a design driven innovation. The market innovation is that most personal computers in those days were offered as professional equipment for office workers, and now *Apple* was introducing a personal computer for consumers to be used in the home. As a consequence they had to look to other household appliances for sources of colors and shapes. So was it a change in meaning or a change in market?

Although Verganti considers *Apple* to be of the most prominent design-driven companies there are good arguments that the organization of the manufacturing process including all suppliers is contributing as much or even more to the overall success of *Apple* (Satoriano & Burrows 2011).

1.5 How to Measure the Results of Innovating

Most innovation studies embrace the Schumpeterian view and look at development of individual innovations; which is good to learn the best practices, but on the other hand is also somehow misleading because most innovation processes will fail! The estimates of the innovation success rate vary between 50% and 1%; which is not such a good track record for innovators.

An important aspect is that there is not a general agreement in academia on how to define success (see for instance Hultink 1997): is it just the introduction of the new thing on the market, is it OK when reaching the forecasted market share, is it the profit the new product is making, is it the appreciation in the market or from the technology field? Especially during case studies participants in an innovation process have difficulties admitting that their innovation process has failed. So they can answer about the success: *'Yeah, it was not a commercial success, but it was way ahead in the technological domain'* or *'Yes we had to withdraw it from the market place after a year, but we have learned a lot, and based on that our next innovation project was a big success!'* Currently in most case studies on innovating the definition of success is left over to the personal opinions of the interviewees.

Comparing the innovation process with nature, an intriguing analogy comes up. Is the innovation the seed that falls from a tree, is it the popping up out of the soil of the new tree, or is it the next grown up tree producing new seeds itself? Coming back to one of the dichotomies in Table 1, efficiency versus effectiveness, we know from nature that its mechanism for getting new offspring generally is producing huge numbers of seeds, which is not efficient at all. But it is effective, because the tree 'knows' that most of the seed will be eaten by animals, will be blown away to the sea or to a dry desert. So this abundance of seeds is necessary to get one or two seeds in fertile soils, of which hopefully at least one of those two will survive.

Using a Darwinian perspective on innovation Steven Johnson (2010) comes with some interesting insights. Darwin was not studying the individual plant or animal, but was looking at the origin of species. John-

son had to find a trick to cluster individual innovations into groups of comparable innovations, which he did by taking a zooming-out perspective in a historical way. He studies innovations from 1400 till the year 2000. Starting with innovations like *Double-entry Accounting* and the *Printing Press* till more recent ones like the *Personal Computer* and the *World Wide Web*. Using this historical perspective he wanted to leave behind the romantic Schumpeterian view of the lonely inventor and entrepreneur which are the rare exceptions and started to concentrate on the more general view on innovating by looking at many anecdotes, from all different angles and contexts and from different historical periods. Of course, then you miss the juicy details of the nice story, but then probably appear the underlying patterns and circumstances which favor or kill innovations. His overall conclusions about the circumstances which favor the fittest innovations to survive are: *'Go for a walk; cultivate hunches; write everything down, but keep your folders messy; embrace serendipity; make generative mistakes; take on multiple hobbies; frequent coffeehouses and other liquid networks; follow the links; let others build on your ideas; borrow, recycle, reinvent. Build a tangled bank.'*

(Johnson 2010, p. 246).

His conclusions are much more oriented towards building and maintaining the climate and culture that cultivates innovation, than on the innovation itself. To put it more bluntly: if you build the right organizational culture (his tangled bank) and assure the right organizational climate (attracting the right fish and plants in the sea around that bank) the innovations will blossom in the end!

Now it becomes clear why most managers have problems with innovating, because they have to give up control, which is in essence their only base for power. They have to let it go; give the 'innovation glass house' the right treatment such as water, nutrition, light, heat, birds and insects, spread the seeds and wait, wait and wait even longer...

This attitude of letting it go is the basic attitude on which *The Delft Innovation Method* can blossom. This book will offer a systematic approach for innovating, but it will only be successful if this attitude, culture and climate are fully installed, assured and maintained: balancing left-brain and right-brain thinking as well as rational behavior with emotional behavior. When emphasizing the more systematic elements of the *Delft Innovation Model* in chapter 2 it is sometimes forgotten to express the need for this other underlying attitude. But without emotion and passion the innovation seeds will always fall on rocks. I will come back to this issue in chapter 3.

1.6 Product or Product+?

In the academic domain of Product Innovation the two main objects of study are, on the one hand the product itself, and on the other hand the process of designing and developing the product. Let us first concentrate on the product. In the following paragraph we will deal with the process.

When I talk about 'product' I mean this word in a broad sense. Most products do not exist alone. Often they need an accompanying service for their functioning. A mobile phone is useless without a telecom provider; an *iPod* is useless without *iTunes*. So, products and services are intertwined. This can change over time: some users of mobile phones will switch over to other providers or keep the provider the same, but change the mobile phone brand.

A lot of products need networked environments. For your dishwasher you need besides the machine itself electricity, water and sewage connections. Your desktop computer needs electricity, WiFi, a desk and maybe a back-up system. But also simple products like tables are usually accompanied by other related products like chairs, tablecloths or lighting. Products are part of a system. When we talk about products in this book we mean it in this broad sense as being part of a so-called Product-Service-System (PSS) (Cooka, Bhamrab & Lemonc 2006). Nowadays we should see this even in a dynamic way: some products and services are connected through the web and are part of a networked system which is actively using information of the users to perform better (Cordoba, Hazenberg & Huisman 2011).

In 2012 we are witnessing the starting point of the large-scale application of electric vehicles. All relevant parties in the innovation process are looking to each other, because the product, the related services and the overarching system(s) for electric mobility are still in their infancy. Once the dominant design of one of the components of the total system is frozen, the other parts of the system have to adapt their functioning to this dominant design. In the beginning all components are more or less free to design, but after one of the leading components has become the dominant design or the total product architecture is turned into a dominant version, it will function as a fixed context for the design of all the other components.

For instance, if 'we' (= the market) decide on exchanging the batteries as the dominant way of 'refueling' our electric cars, then all cars

should have the same exchange system, because all the exchanged batteries of all cars have to be recharged in a kind of 'universal' power plant. But if 'we' decide on a kind of plug-in system, the batteries can all be different, but then the plug-in system should be universal for all cars. So if one design decision in one component of the total system becomes the dominant design, then it will influence all the other future design choices.

Usually the dominant design will be decided following the forces in the marketplace or in the technology, but sometimes governments take a leading role. Think about the decision of the European Commission to force all mobile phone manufacturers to come up with one universal adaptor for recharging all mobile phones.

Inside one product manufactured by a company, say Daimler Benz, other products manufactured by companies like Bosch and Varta can be essential components for the functioning of a Mercedes car. Think about the fuel pump for the engine, or the battery or lighting system. This interconnectedness does not make innovating in one of the components easy.

Two other terms that come to mind in this broad product definition are the '*augmented product*' and the already introduced term '*Product-Market-Technology combination*' (PMT-combination). It is not only the single concrete product itself, but the augmented product that includes issues like packaging, manuals, warranties, financial services, and even the advertisements and availability in the shops, adding to the appraisal and use of the product. A new product should fit the brand image the target group is familiar with. Including all its touch points, that is, all those situations and circumstances where a consumer can have contact with elements of the company and the new product, including websites, help desks, brochures, brand image or company outfit. It should also be consistent and must offer backwards compatibility, especially if software is important.

By the term *PMT-combination* it is emphasized that a product is nothing without a market and cannot be produced without technology. Playing with these three elements (P, M & T) the '*Neue Kombinationen*' of Schumpeter is easy to understand. Nowadays we should add a fourth element to this PMT-combination: the generation of new business models (Ostwalder & Pigneur 2010), which leads to PMTB-combinations.

With the business model is meant the way companies earn their money. *Nokia* can sell its products directly to its clients, in which case the con-

sumers have to find a relevant telecom provider, or *Nokia* can sell its products to the telecom providers, and the consumer gets the product for 'free'. But only if this consumer takes for instance a two year subscription with this telecom company! These 'free' products, for example the *Metro* newspaper or *Google* products are challenging the traditional business models. Of course there are no products or services for free; they will always have involved costs for the producer. In one way or another, these costs will have to be paid back (Anderson 2009).

This broad use of a simple term such as product also applies for terms such as market, competition and company. A market can be the physical thing on a square in town, it can be a shop, it can be a shopping mall, but it can also be the internet. Sometimes these are also called sales channels. A market can mean the commercial entity, but a demographic or geographic entity as well. Competition can be direct competition on product level: an *Apple* computer versus a *Dell* computer, but it can also be between this same *Apple* computer and going on a holiday to China or Australia. Now we are competing on the budget level. One can use a car to travel, it could be one's own car, a rented car, a *Greenwheels* car or another shared-use system, but one can also go by foot, bike or train.

The term company suggests a single company, but in most cases companies are also networked and intertwined. Companies outsource all kinds of activities, from simple accounting tasks to an external accountant, to completely outsourcing the manufacturing and selling of products. Sometimes suppliers deliver the same components to different client companies, and they brand them differently. Or two companies work so closely together that they cannot live without each other. Think about the *Senseo* coffee machine, a co-branded and co-developed product-service system of *Philips* and *Sara Lee* (*Douwe Egberts*).

This intertwined and integrated concept of products, markets, and technologies offered by companies, working together to satisfy customer needs, is very complicated, and usually this complexity gets lost when we just talk product or PSS. Most concepts in this book should be understood in this broad sense.

1.7 The Innovation Process

This book is about helping one to become a serial innovator; about being innovative over a longer period of time. It is about sustainable innovation.

Innovating is as old as mankind. Think about the introduction of fire to cook food to stay healthy, to gain time and to heat the cave to stay warm in the cold nights or seasons; or about the introduction of the wheel or the sleigh or the first bricks to build houses. Seen against this background of tens of thousands of years of innovations, it is strange that our academic knowledge about innovating is just only over one hundred years old. Schumpeter made an interesting distinction, which is still relevant today. It is the difference between generating the idea (= inventing), and the successful commercial application of this idea on the market (= innovating). Other scholars label this first part as exploring the idea and the second part as exploiting the idea.

Going back to the discovery of fire by mankind one can see even more stages in the innovation process: fire is a natural phenomenon. Lightning and/or volcanoes have been the causes of all fires in the ancient past, so mankind knew of the existence of this phenomenon. The innovative idea was to do something themselves which allowed them to produce fire at their own will, for instance by rubbing certain types of stone against each other. Then came the need to produce the fire at the time and place it was needed, so they had to discover which type of stones to rub against each other, where to find or dig for those stones, how to keep them available during their long nomadic trips, and/or to find other ways to produce fire, like rotating small sticks on dry leaves, and finally they have to tell this fire-making story to their children or to other relevant stakeholders. Writing was not invented in those days. They also had to think about a major side-effect of fire: how to put it out again!

Seeing this, some more stages in the innovation process could be distinguished:

1. An external event which could be turned into something useful (fire by lightning).
2. An idea generation process to think about a kind of application (the need for heating the cave or processing food).
3. The development of some concepts on tools plus its handling which could produce the wanted effect (rotating sticks or rubbing stones).
4. A (kind of manufacturing) process to reproduce these concepts so others could use it too.
5. An explication for those other stakeholders (the process of storytelling or making narratives) of how to use and to reproduce this fire-making thing in other circumstances, and how to deal with the (negative) side-effects of making fire.

Based on these insights and translated into modern terminology the total product innovation process has a series of more or less logical and sequential steps, which looks as follows:

1. The Fuzzy Front End in which the need for something new is coming to the front.
2. The design, development and feasibility testing of a new 'thing' or concept fulfilling this earlier discovered need.
3. Manufacturing of this new thing (product).
4. Delivering this new product at the targeted users.
5. Experiencing this new product by those users and finding out if it now really helps to fulfill the original need (from step 1), and learning how to deal with the unwanted side-effects.
6. Openness to see that targeted users by using this new 'thing' are influencing both the business context, new or other competition, the cultural context, this new 'thing' is now the latest hype and the technological context, designing and manufacturing this new 'thing' on a large scale will change the state of the art of the present technology, including unwanted side-effects which will cause a new Fuzzy Front End to start. Probably inside another company. A next innovation process is possible to emerge, but now on a higher and/or improved level!
7. Start this process over again.

The theoreticians and researchers in the academic domain of innovation suggest that if you follow this sequence of seven innovation process steps, the wanted result, the innovation or new product will come more or less automatically. This logical sequence suggests a linear process, but with step 7 a circular overall innovation process comes into view.

The product innovation process is usually visualized by the so-called *funnel model*, see figure 1.5.

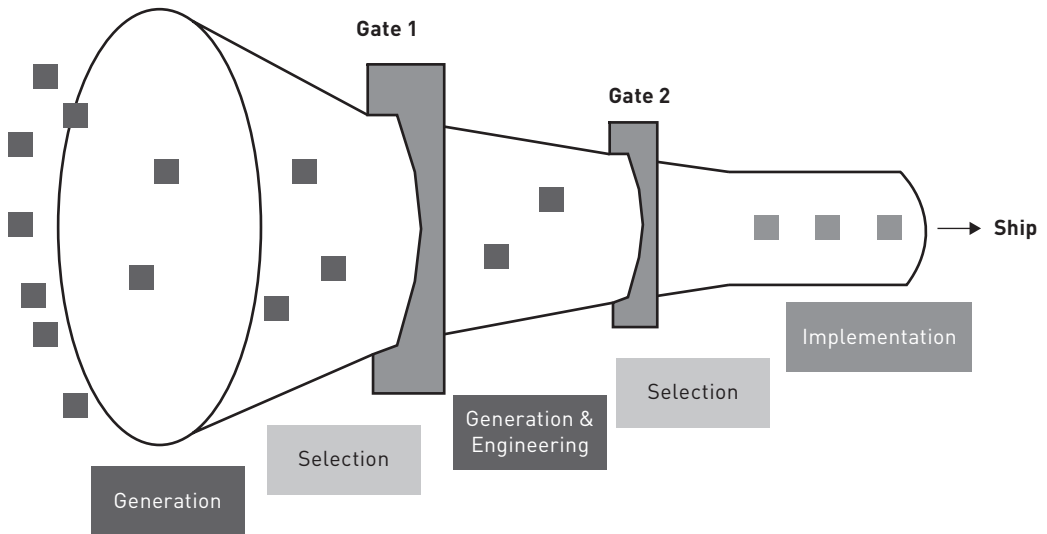


Figure 1.5
The innovation process as a funnel. The small squares symbolise how rough ideas from the left are being turned into concrete concepts in the middle and finally are transformed into new products on the market.

The basic idea behind this funnel image is that one needs a lot of different ideas at the start of the innovation process. The broad front part of the funnel; left in figure 1.5. An often used metaphor for innovating, as we used before, is that of a plant or a tree producing thousands of seeds to get only a few new offspring the next season. These ideas all go through a series of sieves (screens), with holes that narrow towards the end of the process, to select the best idea for the company to implement on the market (the right side of figure 1.5). This funnel image is the basis of all so-called stage-gate models of the innovation process (Cooper 2001). We come back to that in the next chapter. The gates are analogous to the sieves (screens). Some of gates are also known as milestones. The stages are the process steps in between the different gates.

There seems to be a direct relation between a 'logical' process (= innovating) and a wanted outcome (= innovation). 'Good' processes, that is, the right shaped funnel with its detailed sequential screens, lead automatically to good results. For some processes that may be true, but for innovation processes it is highly questionable. (Van der Ven c.s. 1999). The notion that good processes lead to good results is a typical idea coming from the *Total Quality Management* movement (TQM). This was developed in the 1960s and 1970s in Japan by *Toyota* for their 'lean' manufacturing processes. Due to the great economic success of Japan in that period, this led to many followers of this TQM-principle.

There is, however, a big difference between manufacturing processes (= exploitation) and innovation processes (=exploration). We are here referring to serial manufacturing and these processes should deliver the same products all over again. We as buyers and users want to re-buy the same thing with a consistent quality. To put it stronger we even demand that worn-out components, which should be replaced years later during maintenance of the product, fit neatly into the original product.

In contrast to manufacturing processes the results of innovation processes are completely different: companies want to introduce new products and services which make such an interesting new impression in the market place that users want to buy this new product or use this new service. By attracting both old and new customers the company wants to change its strategic position in comparison to the competition. They want to secure a more favorable and sustainable future for themselves. By doing so the innovating company is changing the competitive habitat or its surrounding ecosystem in such a way, culturally as well as technologically, that the competition is no longer fitting in this changing business context, and is losing its market position. Innovating is about changing the rules of the game!

Traditional, logical descriptions of any process with sequences of steps suggest that ending for instance step 20 will always and automatically lead to the start of step 21, without any trouble, and that step 21 will be executed according to plan and will lead to step 22, and so on. Real life however is completely different.

Smulders (2006) did intensive research on the transition from the exploration stages of the innovation processes, in which the new product is designed and all tooling and manufacturing procedures are addressed, to the exploitation stages, in which the new product has to be mass produced according to the specifications and is shipped to the targeted customers. This proved not to be an easy transition. Many in-between steps and iterations usually proved to be needed. Others investigated the transition between full-scale manufacturing and full-scale sales. They discovered that the present sales force of the innovating company is one of the biggest hurdles to surmount, because they have to learn a new story, a new narrative to convince the clients that this new product or service is better than the old ones (Hultink & Lebbink 1999, Hultink, Atuahene-Gima & Lebbink 2000, Hultink & Atuahene-Gima 2000).

An illustrative example that thinking according the lines of the manufacturing process when managing innovation processes proves to be wrong is the case of *3M*. *3M* was for many decades known to be one of the most innovative companies in the world (Gundling 2000 & 3M 2002). In 2001 they searched for a new external Chief Executive Officer (CEO) who would improve the financial track record of *3M*. They hired James McNerney, a former *General Electric* (GE) vice-president. He was one of the heirs-apparent to succeed GE's CEO Jack Welch, but was not chosen by the GE board. So he left to lead *3M* (Arndt 2004). Jack Welch had introduced in GE the now famous six sigma procedure; a management system that is excellent for manufacturing processes. Six sigma is a specific statistical procedure, measuring the numbers of mistakes made during manufacturing processes, in order to learn to avoid making these mistakes again. Once on the right level (= six sigma) only one mistake in 3.4 million possibilities occurs. If applied correctly it, for instance, ensures that replacing a component of a jet engine, say five years after the engine has been installed, will fit nicely into the 'old' engine! Because airplanes have an economic life span of about thirty years, this way of constant manufacturing quality over time will pay out.

McNerney tried to apply this GE six sigma thinking on *3M*. In 2005, after four years in office, he had to step down as CEO of *3M* because their innovativeness had gone down. In 2004 *3M* ranked # 1 on one of the most influential lists of innovative companies (the *Business Week/BCG* list); in 2005 it went down to # 2, in 2006 to # 3 and in 2007 it dropped down to # 7. A dramatic shift indeed!

The *3M* board decided to replace McNerney by experienced *3M* manager George Buckley in the hope of returning to the top innovation league (Hindo, 2007). The first figures show that positive innovative results are coming back again. But innovating is a long-term game.

Standardized processes with defined stages suggest a well-known starting point and a well-known point of ending the process. Once again this is not true for innovation processes. Due to the fact that we include product use as part of the total innovation process, this is the stage where new needs are born; we will never know exactly when the new need is experienced for the first time or when the last product has been dismissed. Of course manufacturing of a specific product will come to an end, but usually components will be available for a much longer period of time, sometimes manufactured by other companies than the original one, but the use can go on for years and years.

The most important music carrier of the 1960s and 1970s, the vinyl LP, is now replaced by the CD and the MP3 system. Still many professional DJs today want LPs to do their shows. So the term '*process*' sounds easy, standard and simple, but is not so simple and easy at all!

1.8 Characteristics of Successful Innovating Companies

Over the years many studies have been carried out to find the typical characteristics of innovating companies. As said before, studying innovation and innovating began nearly 100 years ago. The real influential empirical studies started in the 1970s. An important study was the SAPPHO-study, carried out in the UK (Robertson 1972). SAPPHO is an acronym for Science Activity Prediction from Patterns with Heuristic Origin. They compared pairs of innovations; one half of the pair was a failed innovation, the other half was a success. Interviews with participants revealed the history of the innovation processes; sometimes a pair even came from the same company.

Their main results for good innovating corporate practice are:

- Good insight into the market needs.
- Attention to marketing and promotion.
- Use of external knowledge and expertise.
- Product champions.
- A systematic way of innovating.

Interestingly, innovating starts with knowledge of some unsatisfied need in the marketplace. It means that users, consumers or customers constitute the base of all innovations. User- and usage-research to get user insights are important.

If the company is able to come up with a new product or service which can fulfill this need, this new PSS will not sell itself, but needs considerable attention to marketing and needs promotion.

It is interesting to note that external knowledge was already used fifty years ago. Open innovation (Chesbrough 2003) is much older than when the hype started.

One of the major contributions of this SAPPHO-study was the introduction of the term '*product champions*'. In all the interviews the interviewees were able to name a certain individual inside the company who was guarding and protecting the innovation. *Product champions*, as they were labeled, were relatively high-ranked people, usually not at the top level of the company who knew how to play the internal company game. Most innovations are met with a large amount of resistance inside a company. *Product champions* are not discouraged by a

'no' from upper management. They believe in the qualities of the innovation and carry on. They do not take no for an answer. Their perseverance is very important, as well as their communication skills.

The last conclusion of the SAPPHO-study that a systematic way helps with innovating is one of the reasons why this book was written.

Although this study was quite influential, it also introduced some heavy discussions among innovation scholars. Especially the research methodology was given some thought. One of the big issues then, but still today is how to define the success of an innovation. In the SAPPHO-study they defined an innovation successful as it was commercially available on the market; in short if one new product was sold. One of the successful innovations was an artificial leather introduced by the company *ICI*. A couple of years later *ICI* withdrew the product from the market with a loss of hundreds of millions of pounds. Looking back it proved to be a failure, but in the original study it was used as a success!

Even today we academics do not have an undisputable definition of innovation success (Hultink 1997). Nowadays a subjective judgment of the participants in an innovation process is used: which over different projects, periods and companies can be conflicting!

Two years after the SAPPHO-study a Dutch research group from TNO, a large national organization for applied scientific research, reported on their innovation study (Beckers 1974). They studied small- and medium sized companies which were able to innovate as organizations and not merely innovation projects within organizations as was done in the SAPPHO-study. Their definition of corporate innovation was simple, because they were looking at product innovations only. If 20% of the company's turnover during the year the research was carried out was caused by new product introductions of the last five years, it was considered to be an innovative company; if it was less it was a non-innovative company. For their study they only compared the best companies with the worst ones (less than 5% turnover from innovations).

The main conclusions about successful innovating companies are:

- Active corporate innovation policy and a set of coherent instruments to achieve the innovation goals.
- External orientation.
- Explicit learning attitude.
- Participative management style.
- Investment in training and development of the skills of the employees.

Clearly, innovating is not a gift from heaven, but the management of the company has to invest in an active and explicit corporate innovation policy, including all consequences it takes to achieve that innovation, like the availability of resources. They should facilitate innovating and keep resources available.

Similar to the UK-study was the importance of external orientation of the innovating companies. They not only know their customers and their unsatisfied needs, they also know what the competition is up to, know the state of the art of technology, know relevant legislation and they are connected to all kinds of external entities or parties, ranging from an active membership of their professional union, to board membership of local schools or hospitals, and to reading more than just the obvious journals and papers.

When this study was published the notion of organizational learning was not even invented, but here it was clear that innovation, risk taking and failure are closely connected. If the company learns from its mistakes – and failure is a very close relative of innovation – especially if they learn quicker and earlier than the competition, they can achieve a considerable competitive advantage.

The last two results show once again that innovating is a people's business. You cannot innovate top down; you have to activate the collaboration of most or preferably the entire company to be successful in this game.

In Canada Bob Cooper, the same person who coined the term *stage-gate-model*, executed a number of studies on product innovation. Success factors for introducing successful new products are:

- Offering a unique and superior product.
- Marketing knowledge and mastering the necessary marketing skills are essential.
- Knowledge of the new technology.
- Emphasizing the importance of the early phases of the innovation process, nowadays called the Fuzzy Front End of Innovation.
- Early and sharp product definition (see Cooper 2001).

An important remark Cooper made was about this unique and superior product. It does not matter if this superiority is real, but it is about the perception of the consumers. Once again, having this unique and superior product is not enough; the company has to communicate this to their targeted customers. That technology also matters is not a surprise. This study shows also the importance of good preparation mainly during the Fuzzy Front End of innovation.

Finally in this overview Jacobs and Snijders (2008) produced a kind of meta-study about different organizations who are innovating continuously. They used a paradoxical metaphor to summarize their findings: these organizations have developed routines to stay innovative.

They interviewed relevant stakeholders of 22 different organizations, ranging from multinational high-tech companies, to amusement parks, insurance companies, banks, museums and supermarkets. What these companies have in common are the following ten qualities:

- Having a convincing and coherent strategic concept.
- Society oriented.
- Customer oriented.
- Ambitious.
- Building on earlier results.
- Use objective metrics to control the innovation process.
- Hire the best talented people.
- An open-minded culture.
- Strong networks, both internal and external.
- Focus and commitment.

Again it is shown that top management can do much to organize an innovation strategy, that people are very important and that a wide and broad external orientation is crucial. All these studies make clear that innovating is possible, that innovating companies not only differ significantly from their non-innovating colleagues, but that they all share more or less the same typical traits.

Looking back on all these innovation studies covering different countries, different industry sectors and different sizes of companies and covering a long period of time, we can conclude that a general view of corporate innovation processes should include the following elements:

- Innovation processes are temporary: they allow competitive advantage for a short time only.
- Innovation processes can be organized in a number of separate stages, which rationally seem to have a logical sequence, but in practice the order will vary.
- Knowledge of the external competitive world plays an important role.
- Listening to and understanding users, buyers and customers is crucial. Discover changes in product use. Innovations are directed to give the future targeted audience the new products and services they are subconsciously waiting for.

- Management can only facilitate innovation processes. It is a people's business. Teamwork looks to be important.
- Getting new ideas is the core and kernel of innovating.
- Innovations differ in amount of change, effort and time, and each company has to find its own way out.

1.9 Concluding Remarks

This first chapter gives an overview of the most important aspects of innovating and innovations. It proved to be a complex phenomenon, with a variety of psychological, economic, technological and even cultural aspects. It is a process that changes rules and where people are the most important actors, both inside the company as well as people outside the company.

When I started to develop *The Delft Innovation Method* in the late 1970s, not all of what is summarized in this chapter was already available in the way it is expressed here. I have actualized and revitalized some of the earlier findings, but in essence most of the elements were already known in those days. Now the foundations for innovating are laid down. Chapter 2 will reveal my way of modeling the product innovation process. It will offer the roadmap of 'innovation country'. This innovation roadmap is synthesized in the *Delft Innovation Model*. It is one of the five constituting elements of *The Delft Innovation Method*. The other four elements, leadership, team, creativity and external orientation, will come to the fore in chapter 3, although I will also prelude them shortly in chapter 2.