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Research Report

OPEN INNOVATION IN SMEs:

How can small companies and start-ups
benefit from open innovation strategies?

Prof. Dr Wim **VANHAVERBEKE**

In collaboration with :

Ine **VERMEERSCH**

Stijn **DE ZUTTER**

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FLANDERS DISTRICT OF CREATIVITY

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- **Creativity Class** for young high-potentials
- **Flanders DC Fellows**, inspiring role models in business creativity
- **Creativity Talks**, monthly seminars on business creativity and innovation
- **Innovix**, online innovation management game
- **Flanders DC Academic Seminars**, research seminars on business creativity and innovation
- **TeamScan**, online tool
- **Web 2.0 Readiness Scan**
- **HR Toolbox**

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1 Why does open innovation in SMEs deserve more attention?

1.1. The urgent need to study open innovation in small firms

Today, many small companies are confronted with harsh market conditions. The current economic crisis has weakened the financial health of many small and medium-sized firms (SMEs), especially in industries in which foreign, low-cost producers have entered the market and are threatening the survival of the existing competitors. In addition, new government regulations can change a profitable SME niche business into a nightmare in just a few weeks or months. High-tech start-ups have cutting-edge technology in-house, but no manufacturing capabilities or distribution channels to turn the technology into a successful and profitable business. Changing market conditions thus force smaller firms to adapt or reinvent their business through new technologies or unique value propositions. At the same time, small firms face several constraints in differentiating their products and changing their business model. A major liability is that small firms lack the required internal financial resources and technical capabilities. They therefore must collaborate with external partners to innovate successfully, to develop new sources of income, and to reach more profitable positions in the competitive landscape. Open Innovation is thus a logical step for many SMEs to take.

Open Innovation has been defined as “...the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.”¹ In this research report, we investigate how SMEs can use external knowledge to develop new products and services or how they can generate income by licensing their technology to other companies.

Large-scale surveys have confirmed that SMEs are collaborating more frequently with external innovation partners than large companies. The last Community Innovation Survey in Belgium shows that large firms (> 250 employees) are collaborating on average with more external partners than small firms. Yet, smaller firms rely more on open innovation than their larger counterparts—when the number of collaborative deals is divided by the number of employees—thus measuring the open innovation intensity. This is the case for overall open innovation indicators, as well as for different open innovation dimensions such as external search, external research and development (R&D), or cooperative agreements with different types of partners. This evidence confirms that open innovation is even more important for SMEs than for larger companies².

Despite the fact that open innovation has developed rapidly as a new wave of research in innovation management, most insights are based on individual cases of large manufacturing firms. Open innovation has been studied mainly in large, multinational enterprises, of which most have large internal R&D departments or operate in technology intensive industries. Chesbrough defined the concept of open innovation using case studies of large, technology savvy firms³. Open innovation in small and medium-sized companies (SMEs) has received much less attention. Current research on open innovation in SMEs is still very limited and is not yet revealing the creative use of open innovation that many innovating SMEs around the globe are implementing⁴. SMEs in low-tech industries have proven to be very successful, however, in using and integrating knowledge from external partners to create new products or services. An urgent need exists, therefore, to study how collaboration or open innovation is managed and organized in small firms. The current report is one of the few attempts to take a broader perspective on open innovation by focusing on how these practices

are organized and managed in SMEs, in high-tech and low-tech industries. Open innovation in SMEs has been examined in a few studies based on large quantitative databases⁵. These pioneering articles have explored why SMEs engage in open innovation activities, what the major impediments are to reach success, and how SME management should organize open innovation activities to become successful. In contrast, in the current report we rely on in-depth interviews with SME managers who successfully developed open innovation strategies within their companies. Managing and organizing open innovation in SMEs is quite specific, and the lessons learned from open innovation in large firms are not readily transferable to the context of SMEs. These factors make the need for specific studies on open innovation in SMEs even more urgent.

1.2. The approach: The role of open innovation in value creation and value appropriation

The in-depth interviews with managers of small firms that have been engaging successfully in open innovation resulted in a range of fascinating and diverse insights how those companies benefit from open innovation and how they set up and managed partnerships with their innovation partners. These stories about applying open innovation in small firms successfully can barely be compared with the open innovation ventures of large manufacturing companies, such as Xerox, P&G, Philips, Lego, and IBM. The open innovation practices of these companies have been documented widely in the professional press. Large companies deliberately introduce open innovation practices and are consequently looking for benefits by switching from closed to open innovation. The interviews reported here, however, teach us that we cannot apply these benefits (e.g., sharing costs, sharing risks, faster product introduction, etc.) to small firms in low- and medium-tech industries. Most companies we interviewed were not interested in open innovation as such. Instead, small- and medium-sized companies engage in open innovation as a consequence of their search for major changes in their business model to seize new business opportunities and boost profitability. Their limited financial and human resources and the lack of technological capabilities force them to look for different types of innovation partners.

It is therefore impossible to consider open innovation in isolation from the strategic objectives of SMEs. In large companies, managers work out ways to overhaul their strategies from closed to open innovation without touching the company's overall strategic objectives. In contrast, all interviewees emphasized that a small firm first defines its overall strategic change and this, in turn, prompts the company to establish a long-term relationship with different innovation partners. Furthermore, the benefits of strategic change based on open innovation in small firms differ and are more interesting than the classic benefits of open innovation identified for large firms. In short, our findings call for a more rigorous analysis of the links between open innovation on the one hand and strategy or business modeling on the other hand.

Researchers and practitioners generally misunderstand, however, that open innovation is necessarily linked to technology and that the latter is the source of value creation. Chesbrough showed that business models are crucial for unlocking the latent value of new or existing technologies⁶. Technology per se has no economic value; indeed, the economic value of technology is realized when companies develop and commercialize it through a particular business model. In all our interviews, managers emphasized that business models play a primary role in SMEs in low- and medium-tech industries, not the technology. Most SMEs we examine in this report did not have internal technological competencies, but they set up new business models to leverage commercial value from technologies that existed in other organizations or that had been co-developed with partners. They developed an open innovation network with several partners and in this way created value for customers by leveraging their partners' or other organizations' different competencies. In other words,

open innovation creates new business opportunities for SMEs because they can develop business model innovations without having the required technologies in-house. Instead, SMEs can leverage external technologies by setting up a network with partners who have the required competencies or own assets to develop and commercialize a new offering.

A business model has two important functions: it must describe the way in which the company creates value but also how it captures part of that value⁷. Value creation and value appropriation can be analyzed using a business model framework. Despite the fact that the term “business model” is used widely in the business world, academic research is relatively sparse, and there is no consensus because researchers define business models in different ways⁸. Applying existing business model (innovation) frameworks to low-tech SMEs is not trivial because the open innovation network is at the core of the business model. The existing business model (innovation) frameworks do not pay attention to strategic partners or they incorporate them as a module in the model without analyzing interactions with other modules in the framework. We will examine in detail, therefore, how a business model framework must be adapted to fit business model innovations based on open innovation in low-tech SMEs. Examining which implications our findings have for the theoretical modeling of business model innovation, which has received significant attention among strategy scholars, is beyond the scope of this report.

Business model innovations based on an open innovation imply that there are cost-increasing effects of technology sourcing and technology co-development⁹. The new revenue streams resulting from business model innovation must be balanced against the costs of setting up and managing the external network of partners. Moreover, SMEs have limited financial means to seize new business opportunities. Accordingly, they may have to work in several consecutive steps, which in some cases look like a bootstrapping strategy.

Business models take thus a central place in analyzing open innovation in small firms. This has implications for the structure of this report. In Chapter 2, we analyze the business model innovations of the SMEs we interviewed. First, we pay attention to how small firms develop strategies to create value for customers. Several firms faced rapidly increasing commoditization in their product markets and had to find new ways to create value for existing or new customer groups. We also focus on the role of the experience economy as one way to create value. Besides value creation, we also examine how small firms can appropriate part of the value they create with the new business model. Appropriating value can be non-trivial for a small company, but most of the firms we examined were successful in crafting new ways to gain significantly more profits with the new business models. In Chapter 3, we enter the dynamics of business model innovation. The firms that have reached the most spectacular results with their business model innovation realized this in several consecutive steps. In SMEs, new businesses are developed stepwise using new product projects as tools to move forward. In Chapters 2 and 3, we do not explicitly talk about open innovation. This changes in Chapter 4, however, where we analyze how the companies set up partnerships and broader innovation networks to seize new business opportunities. Setting up and managing innovation partnerships for most SMEs is a new challenge. SMEs are not accustomed to sharing information, to co-aligning objectives, and managing networks of partners that might be several times larger in sales volume than themselves. Managing open innovation is challenging. In our view, this report’s most valuable contribution is that we explore several best practices for how SMEs can manage innovation partnerships and boarder innovation networks. Managing partnerships and networks among large companies has been analyzed in detail in the literature. SMEs collaborate in a completely different way: personal relationships play a crucial role, collaboration rules are usually informal, and trust oils the cooperation. As a result, we cannot rely on the insights of best practices from large companies, but instead must develop a different set of guidelines that are specific for small innovative firms.

In Chapter 5, we shift focus to collaboration between SMEs and large firms. Increasingly, small companies are becoming the innovation partners of large partners. We have two examples. One

illustrates how an experienced entrepreneur can set up a business, license the technology of a large company, and build a highly profitable business. In this case, we focus on how fostering a good relationship between the new venture and the company that developed the technology is instrumental in producing a commercially successful venture. The second example illustrates the opposite case: A small engineering company licensed its technology to a large company to develop a new product for the large company. In this case, we examine how both parties can negotiate a deal that provides each with ample opportunities to benefit from the new technology. In Chapter 6 we summarize this report's main findings and draw conclusions. We also offer some recommendations for entrepreneurs who intend to develop a new business using an open innovation network.

We chose to distinguish between a more descriptive story about companies' open innovation initiatives and analyzing different research topics in open innovation. The research topics are analyzed in different chapters. Each story has been nicely packed into a text box. In most cases, links and pictures of companies' products are included. We refer systematically to the different case studies (text boxes) each time we illustrate a particular research topic with an example of a case. In the report's main text, we move from one topic to another, and you can find more information about the small companies in the text boxes if necessary. At the end of Chapters 2 to 6, we include key learning points. These lists of learning points can be consulted as a checklist when you are setting up a new business with your innovation partners. These learning points are gathered at the end of each chapter so you can easily check them whenever you want a quick review of what you have learned.

1.3. Research method

To explore the link between open innovation and market success of SMEs, we conducted a multiple-case study using in-depth interviews with representatives of SMEs to find commonalities and success factors. Open innovation is a relatively young economic phenomenon, and case-based research is an appropriate research method to analyze this explorative research topic. Although the main implications of this project are related to management practices, it is also possible to build theory from these cases¹⁰.

For each company, we called the contact person in each company—in most cases, this was the CEO—and sent an additional email with detailed information about the study. In total, we contacted 18 companies that have been mentioned as having been involved in open innovation activities. Some of them we found through publications, others by contacting a large European network of open innovation experts. Some cases were not useful to illustrate open innovation in SMEs. Other companies were just acquired or had other good management reasons not to participate in this study. Ultimately, ten companies were willing to participate. Seven of them are Belgian companies, two are Dutch, and one company is Danish: Curana (bike accessories), Patient Room of the Future (interior and decoration), Quilts of Denmark (quilts and pillows), Devan (functional textiles), and DNA Interactif Fashion (fashion goods), Isobionics (flavors and fragrances), Airfryer (kitchenware), Jaga (radiators), Segers-Balcaen (plastic packaging), and Dingens (mercury free barometers). These companies all use open innovation to produce and deliver products or services.

Each of these SMEs provided an interesting case to examine how SMEs apply open innovation. We did not restrict our attention to any industry or size class (taking into account that small companies should have less than 500 employees). The companies are active in a wide range of industries. Some of these are high-tech start-ups, others are low-tech companies that changed strategy dramatically and used open innovation as one of the central strategic tools to grow and improve profitability. Some companies are several decades old and have 500 employees; other companies are just a few years old and have less than five employees. The reader should thus not be surprised by the heterogeneity

of the cases. The diversity of the themes we will discuss illustrates how open innovation can take different shapes within each specific firm or industry. This is also a major message of our study: Each manager must develop open innovation activities that are relevant within the framework of the company's strategy. The benefits of open innovation are therefore also specific to the strategic position and situation of each firm. In addition, we did not limit our attention to open innovation cases where SMEs only sell or license technology.

After getting the approval of each company, we scheduled a meeting for a first interview. The interview was conducted by Prof. Dr Wim Vanhaverbeke, who was accompanied by one or two researchers. We started by explaining the method and goal of our study and then used a semi-structured questionnaire to guide the story line of the company representative. Most questions were related to firms' open innovation practices, but we realized in all interviews that open innovation cannot be isolated from the broader strategic ambitions of the companies. When necessary, we also prompted for additional questions regarding contracts, how the collaborations were managed and organized, success factors, and difficulties they experienced. Interviews were recorded with permission of the interviewees.

As soon as the transcripts of the interviews were finished, this document was sent to the interviewee, to screen it for potential mistakes and misinterpretations. In a few cases, the interviewee asked us to adapt the transcript or make particular parts of the interview anonymous. The reviewed transcripts were used to write the case descriptions and to facilitate the analysis of open innovation in SMEs along different themes. Some additional interviews were scheduled with the firms' innovation partners. In this way, we were able to calibrate opinions of different managers and to obtain a richer picture of how the collaboration among partners unfolded. Most interviews were conducted between November 2010 and May 2011.

2 Business model innovation in low-tech SMEs

Analyzing the open innovation activities of SMEs in traditional industries starts with a broader analysis of the business model innovation of those companies. The role of open innovation can only be understood within this broad strategic setting: companies engage in open innovation to create value for customers in new ways and to create a more profitable business. The analysis of the business model innovation, therefore, logically comes first, and the usefulness of open innovation hinges on the role it plays in achieving broader strategic goals. In the next section, we illustrate how the different companies we interviewed sidestep the commoditization pressure by changing their business model. Next, we focus on the initial entrepreneurial act to initiate such a business model change. In section 2.3, we look at how several companies transitioned from products or services to experiences in their search to offer more value to the customer. Finally, we examine the different drivers that enable SMEs to accomplish these major business model changes.

2.1. Business model innovation in SMEs to sidestep the commodity trap

Many SMEs face severe commoditization pressure in their markets. Just as each product or technology has a life cycle, price competition and commoditization pop up and start dominating market dynamics at a particular point in time. When products or services commoditize, price competition becomes predominant and results in intensive price battles and industry shake-outs. SMEs usually do not have the scale and scope to compete effectively on price and have no other choice than to find new ways to differentiate their offerings or capitalize on new growth opportunities beyond their existing business.

As the burgeoning management literature on business model innovation has shown during the last decade, SMEs can take different approaches to reshaping offerings and seizing new growth opportunities. A business model defines the way companies deliver value to a set of customers at a profit. It consists of tightly interlocking elements: companies create a customer value proposition, identify key resources and processes needed to deliver that value, and design a profit formula.¹¹ The attractiveness and financial viability of a business model erodes over time as price competition starts to dominate. Sooner or later, firms' existing businesses are prone to commoditization. Firms subsequently engage in so-called "strategic innovation" or "business model innovation" to find new ways to create value for customers. Business success comes from satisfying real, although frequently latent customer needs, but a customer value proposition must also deliver value for the firm as well. Next, the company must decide which key resources and processes it needs to achieve the required profitability. Companies that are successful in business model innovation gain a unique position in the competitive space that is difficult for others to imitate. Different strategies have been developed explaining how to attain a unique position through strategic innovation. Kim and Mauborgne¹² developed their blue ocean strategy and Johnson¹³ talked about a company's white space. White space represents the business opportunities outside a company's current businesses that require a different business model to exploit. Each in their own way, many other management authors have suggested methods and models to implement business models and business model innovations.

SMEs that successfully sidestepped the commodity trap have changed their existing business model successfully to deliver more value for the customer at a profit. In contrast with large firms, SMEs

sometimes develop their business model in a rather intuitive way, based on strong but informed vision, conviction or basic insight. We observed in all the SMEs we interviewed that open innovation is always embedded in the company's broader strategic goals. The value of opening up innovation process, acquiring and developing new technology, and setting up a network with several types of partners can only be understood in a meaningful way when these innovation activities are placed within the SMEs' overall strategy or business model. We thus explore the strategy of innovating SMEs in this and the following chapter before we move into how small firms manage and organize the challenges of open innovation.

Technology developments play a crucial role in the SMEs we analysed—even those operating in so-called low-tech industries such as textiles, furniture, and bicycle accessories. However, technology by itself has no single objective value. The economic value of a technology only emerges when it is commercialized in some way.¹⁴ It is the business model that determines the economic value of a new technology by indicating how customer value will be created and how the company can capture value from that technology. In contrast with other innovation reports, therefore, research and technology are not the main theme of this report. Scientific discoveries and new technologies may be crucial ingredients in open innovation strategy, but when isolated from SMEs' strategies and business model development, they are useless in explaining why and how several innovating SMEs successfully sidestepped the commoditization trap.

2.2. The role of the initial business concept or vision

Developing a start-up's business model or reinventing the existing strategy of an SME usually starts with developing basic insight into how a company can deliver value for a specific target customer. Specifying the customer value proposition can be fairly simple, but can also be a tough process that takes months and sometimes years to get right. Imagine, for the moment, the following example: Today, more and more large manufacturing companies share their view on abandoned research projects with outside managers and potential investors. Likewise, DSM, a large and innovative Dutch chemical company showed Toine Janssen, a seasoned manager of Philips, a new biotechnological process. This process had the potential to develop several aroma substances for the food, beverage, and flavour and fragrance industries worldwide at half the cost of conventional production techniques. DSM had abandoned the project because they estimated that the market was too small and the company was not really seeking to develop a strong position as a supplier of flavours and fragrances. In this case, the business model's customer value proposition for the customer of Isobionics (see p 81), the Dutch start-up Janssen established in 2008, was fairly simple; indeed, the company delivers existing flavours at reduced costs to customers in the flavour and fragrance market. The value proposition for the customer was well articulated: a considerable reduction in the production costs of existing flavours and fragrances through a new proprietary technology based on a new biotechnological process.¹⁵ It is therefore also not surprising that it took Toine Janssen only a week before he decided to pursue the venture.

In other cases, it takes more time to articulate the customer value proposition of a new business model in small firms. Large companies may detect new business opportunities by carefully analysing market trends, spotting new technologies with promising applications, and so on. Small companies do not have the required resources in-house to analyse new growth opportunities systematically. On the contrary, most of the small companies we interviewed started with a basic insight. It is usually the founder, CEO, or top manager who is committed to developing a new business idea. The process started in several of our cases by identifying a trend or a need—often a latent need that the target customer had not yet even expressed. Take the example of Devan Chemicals (see p 19). This small, family-owned company was established in 1977, with Patrice Vandendaele becoming the manager of the company, which now employs 45 people. He was determined to profile the company as a highly innovative firm in the textile chemicals industry with a strong focus on increasing textile functionality

and making textile chemicals more sustainable. Patrice's strategic orientation appears to be very simple, but it was a much more difficult task to turn it into a successful strategy that propelled the company into an industry leader with a global presence. Today, Devan Chemicals is a technology company that uses chemicals and processes to modify, protect, and enhance textile surfaces. Technologies include active temperature regulation, repellency and release of stains, flame retardant solutions, moisture management, and sensorial applications. The innovation lead over other (and larger) competitors drives the company's growth and profitability. The innovation lead is also a dynamic target: competitors are imitating several of its innovations. Yet the company is achieving success through an open innovation strategy as we will see in chapter 3. Sustainability was the other key concept of Devan's strategy. The company foresaw that the increased use of chemicals on textiles harming human health and the environment would increase the need for sustainable solutions. Sustainability is entrenched in each part of the company, even in its logo. Management integrates sustainability into every company decision (Corporate Sustainability); the company creates products that have a minimal impact on the environment (Product Sustainability); and it creates new concepts and products that will make the final product more sustainable (Concept Sustainability). Thus, in the case of Devan Chemicals, two interlinked keywords in which the company's leaders firmly believe became the cornerstone of a successful, long-term strategy to fight commoditization. The choice of the keywords, however, was based on years of personal experience in the industry: Patrice Vandendaele had known the industry for decades; therefore, his choice of this strategy was based on a genuine understanding.

In other cases, similar keywords or basic business insights ignited a new strategy for the SME. Quilts of Denmark (see p 65) is a Danish SME that produces quilts and pillows. It was founded by Søren Løgstrup and Erik Schmidt in 2000. Each had more than 20 years of experience in the bedding industry. The two founders intended to revolutionize the traditional and highly commoditized quilts and pillows business in Europe. In the 1990s, the economic prospects for quilt and duvet manufacturers were steadily worsening. Most European manufacturers were small, family-owned companies, and retail businesses continued to consolidate. Market power was increasingly shifting in the direction of the retailers. Retailers consolidated into larger groups with stronger purchasing power, however, and focussed mainly on price competition to gain market share. As a result of price competition between these large retailing groups, the average profitability in the quilt manufacturing industry was decreasing rapidly.

Løgstrup and Schmidt started their business with the conviction that a healthy night's sleep was a growing need in Western societies and that customers would be willing to pay a premium for high-quality sleep. Consequently, the two entrepreneurs defined their business as a "provider of healthy sleep", not as quilt producers focusing exclusively on the products they sell. Their wish to become a provider of healthy sleep was the result of their experience, combined with a genuine knowledge of trends that were developing both inside their own industry and in other industries that focus on the end consumer, such as the burgeoning wellness industry. Despite their conviction that providing healthy sleep was a useful way to discover a new business opportunity, both entrepreneurs had no idea when sleep could be considered "healthy". They therefore visited several renowned sleep institutes located in Danish hospitals, including the Glostrup Hospital of the University of Copenhagen. These contacts introduced the founders to the science of sleep and the clinical practice of sleep medicine. They discovered in clinical reviews that sleep problems and disorders were a major problem in modern societies, and they learned how the quality of sleep affected people's lives. For example, more than 70 million Americans did not sleep well, and this lack of sleep costs American society billions of dollars annually. And, they learned that an estimated 56,000 car accidents in the United States occur because the driver falls asleep behind the wheel. According to scientists, this trend is an outcome of the growing impact of the Internet, television, and other distractions at night. Løgstrup and Schmidt also discovered during their consultations with sleep specialists that many factors influence the quality of sleep. Temperature variation, however, was one of the most important ones. Stabilizing temperature, in turn, became the key objective of the TEMPRAKON, the first functional quilt QOD introduced in

2003. This product revolutionized the traditional quilt industry. “Providing a healthy sleep” should be considered the value proposal that the company makes to its potential customers. QOD offers customers a new meaning to the product of quilts. Quilts have always been considered a product that keep people comfortably warm in bed. By their nature, however, they trap heat, resulting in temperature variations that are usually too large to ensure healthy and comfortable sleep. Moreover, the value proposition the company makes to potential buyers is not based on market research. Nor is it a user-centred approach, because the customers were not able to envisage that the properties of a functional quilt such as TEMPRAKON could actually benefit their ability to sleep well. Instead, the idea of a functional quilt such as the TEMPRAKON is the result of a highly unconventional, cross-industry learning process led by sleep experts. The QOD case illustrates that developing a successful business model that ultimately changes the industry starts with nothing more than the conviction of a well-informed entrepreneur. At the outset, QOD management had no idea whether the objective of providing healthy sleep was a realistic target, nor did they understand how quilts could contribute to this process. It took a stepwise approach of more than three years before the business model for a functional quilt was developed in great detail. The new quilt was launched in 2003—just three years after QOD was established. After it was introduced, however, it was an instant success. The QOD case also illustrates how small companies can fight commoditization in their industry: *the higher the focus on price competition in an industry, the more rewarding it is for companies to differentiate their product to deliver value to customers in a way they could not anticipate themselves.*

Curana (see p 24) is another example that illustrates how developing a new business model is a gradual process that can take years. It is, in fact, a never-ending process. Curana is a micro-company (less than 20 employees) that is active in the bicycle accessory market. It is a third-generation, family-owned business located in Roeselare, Belgium. Curana worked as an OEM of bicycle accessories such as luggage carriers and mudguards, always responding to the customers’ requirements. Curana competes in a highly competitive market and since the 1960s the market has experienced continuous pressure to consolidate. Curana was one of the remaining players in the market in the early 1990s. At that time, the market was still not internationalized, but it was increasingly difficult to make profits as price competition intensified over the years. The competitive landscape changed drastically in the mid-1990s when mountain bikes became fashionable, and soon, other new segments of sport bicycles developed. By this time, however, the bike industry was internationalizing rapidly: mountain bikes were produced on a global scale, and European bicycle manufacturers started sourcing internationally for less expensive accessories. In particular, imports from Taiwan were growing at a tremendous speed. Facing rapidly declining profits, Dirk Vens, CEO of Curana, decided to change the firm’s strategy drastically. Instead of being an OEM supplying to bicycle manufacturers, he decided to adopt an ODM (Original Design Manufacturer) strategy. In 1999, the company transitioned into a product-driven company with a strong emphasis on design and innovation. The company was not interested in copying or improving bicycle accessories that were already on the market, because success would still be determined by cost effectiveness and price competition. Curana wanted to develop concepts that were not only new to the firm, but also to the industry. Dirk Vens’ ambition was to create unique products for each bicycle manufacturer. In this way, the company could set its own prices and avoid price competition. This transition was easier said than done, however. How could they conceive and design a mudguard for which bicycle manufacturers would pay a premium price? Curana had no in-house design capabilities, making the ambition even more challenging.¹⁶

The entire change in strategy was anchored into a product development project with several external innovation partners. The effort finally resulted in the B”Lite mudguard in 2002.

Developing the B”Lite was a slow and agonizing process; several crucial adjustments were necessary during development. The company was convinced, for instance, that plastic mudguards had some advantages compared to steel and aluminium mudguards. The latter required more manufacturing processing steps and were thus more expensive when manufactured in countries with high-labour costs. A designer working at one of the bicycle manufacturers became a critical link. His opinion was

that the product was not revolutionary enough and did not have the right high-tech look to shake up the bicycle parts industry. The designer prodded Curana to look at the garden chairs industry. Here, plastic chairs represented the low-end segments, whereas chairs that integrated metal and plastic represented the top segment. This conversation encouraged Dirk Vens to think about a mudguard that combined aluminium and plastic. Next, the company learned that combining metals and plastics would lead to considerable technical problems unless the parts were glued together. As gluing was not a commercially viable option, the company established a strategic partnership with a polymer extruder. The technical challenges were enormous, but finally led to proprietary technology that protected Curana and its partners from outright imitation. Further adjustments led to a product that was finally highly valuable for bicycle manufacturers. When the B"lite was launched (see p 24), it was presented as a mudguard with a clean, high-tech look that combined a shining aluminium strip with coloured plastic. Furthermore, installing the mudguard was easy through the use of intelligent clicking systems.

In sum, the success of innovating SMEs starts with conceiving and developing a new business model. Sometimes, the business model is straightforward, as we have seen in the case of Isobionics. This represents an instance when the company is replacing existing product offerings with a new one at considerably lower production costs. In the other cases, conceptualizing and articulating a business model is a more complex process requiring months and years to get the details just right. We have thus far examined several ways to develop a business model. Some companies, such as Devan Chemicals, start with key concepts that act as fundamental guidelines for many years. These concepts are very powerful if they are implemented in a firm's strategy systematically and consistently. Similarly, QOD's and Curana's success is based on clearly defining what the company wanted to do—a provider of healthy sleep in the case of QOD and a highly innovative ODM for bicycle accessories in the case of Curana. All firms have in common that their efforts are focussed *on creating value for a particular target customer*. They start with an explicit or intuitive idea of what customers might value. Business model innovations start with articulating a customer value proposition.¹⁷ During our interviews, all managers underlined that creating value for customers is the first and most important element in generating new business. That does not imply, however, that unique customer value propositions are developed by questioning existing customers. In many cases, this would be a good recipe for incremental changes, but not for game-changing and highly profitable business model innovations.¹⁸ Next, business models cannot be anticipated fully in advance and articulating them may take time. Innovative business models are sometimes hard to articulate because too many questions remain unanswered. The needs of the target customer might not be explicit. Or, it might not be clear how value can be created for the customer group. In other cases, substantial uncertainty exists about which technologies are the most promising for delivering customer value; which partners the company can rely on to develop and commercialize the new offering; and how the firm can assure that the new business will be profitable. This does not mean, however, that SMEs should wait to innovate until they have a full business plan. *Game-changing business model innovations cannot be planned analytically because many of the variables relevant to their success are unknown at the outset. In contrast, SMEs have to experiment to discover new business models. Moreover, experimentation is path-dependent; that is, early experiments and choices shape the trajectory for to evolve the business mode further.*¹⁹ New opportunities will be discovered each time the company achieves a new step in realizing its business model.

Figure 1: Case Devan

Case Study

DEVAN: DRIVEN BY INNOVATION

Devan, founded in 1997 by two families: Dekeyzer and Vandendaele, is a family-owned business that in its early days produced textile chemicals. Today, the company is a manufacturer of innovative textile and auxiliaries such as flame retardants, fibre lubricants, coatings, and specialty chemicals. Initially, the company was led by Mr. Vandendaele, consisted of seven employees, and had a €2 million annual turnover. In 1991, Patrice Vandendaele took over his father's position in the business. For the next 19 years, Patrice managed two full-time jobs: research and development (R&D) manager and chief executive officer (CEO). In 2010, however, he delegated the daily management to someone else.

When Patrice began leading the company in 1991, Devan produced and sold chemicals for textiles, but depended completely on suppliers. This limited them to a certain number of products and to the Benelux. Patrice realised this situation was not favourable for long-term success; therefore, he led the company into developing its own fire retardants. Thereafter, Devan expanded into antimicrobial technology and reactive polymers. The company continued to introduce new products, which earned them a reputation as a highly innovative company. Devan continued to grow and today employs 45 people. Headquartered in Ronse, Devan has R&D centres in the U.K. and Portugal and an additional office in the U.S.

Devan was one of the first companies to develop halogen-free and thus environmentally friendly fire retardants. The company's second innovative product, based on antimicrobial technology, was revolutionary in another sense: it is non-migrating. This means that once applied to textile, a consumer can wash the item as much as desired, but the molecules will not leach into the water. Moreover, the chemicals do not migrate to the skin. This innovation makes Devan the number one manufacturer in Europe of antimicrobial treatments for textiles. After these two success stories, Patrice acquired an English company, because it had an interesting patent on reactive polymers. Reactive polymers cause moisture in treated textiles to spread and evaporate more quickly than in untreated textiles. Such treated textiles are more energy efficient; for example, the polymer causes sweat to evaporate more quickly from sportswear.

The next step for the company was integrating micro-encapsulation onto textiles. Capsules about 8 microns in size are filled with an element such as perfume, a skin care product, or insect repellent. These capsules are then glued to the textile. With friction, the contents of the capsules are released and perform their intended function. The latest application of this technology is probiotic bacteria micro-encapsulation. These bacteria grow on textiles and prevent pathogen bacteria from spreading. They also dispose of dust-mite excrement, making the textile anti-allergen. To further enhance this technology, Devan acquired Micropolis, a spin-off from the University of Minho in Portugal. Micropolis held the patent that causes these microcapsules to be reactive, such that molecules on the surface of the capsules attach to the textile without the need for additional adhesive.

According to Patrice, Devan is driven by innovation. By constantly developing new products, the company keeps growing. Research and development is the engine that drives the company. As of 2011, an important trend Devan is pursuing is to add fewer chemicals, particularly fewer toxic chemicals, to textiles. Although the volumes of chemicals needed are reduced, the added value rises. In this way, the company continues to honour its commitment to socially responsible ecology.

"By constantly developing new products, the company keeps growing. Research and development is the engine that drives the company."



DEVAN: DRIVEN BY INNOVATION

duced elsewhere, even though they are patented. To protect themselves by some extent against competitors seeking to copy their products, Devan manages the final mix of the products. This means that the company, which sells about 4,000 tons of chemicals annually, employs just five workmen on the payroll.

With production limited, Devan's strategy relies heavily on its sales and marketing philosophy. When Devan first created an innovative product, it started from technical opportunities. Customers were not sufficiently aware of the value of these chemicals in their markets. Since these were expensive products, customers were not that eager to buy them. Devan thus decided to move away from this push-model and evolve to a pull-model. They talked to the clients of their clients to identify market needs. By doing so, they developed a reputation, and clients began coming to them asking for new products that they can offer their customers. Today, 70 to 80% of Devan's products are developed under the influence of pull-through effects. Patrice describes market feedback as being significantly influential in determining the company's R&D strategy.

In addition to responding to market needs, Devan also works to translate technological information about products into unique value propositions that appeal to clients. Essentially, they create a positively framed story that clients can tell their customers. For example, instead of talking about 'killing bacteria', they talk about 'active freshness' and 'active hygiene'. Folders and tags are handed out to clients to give them an idea about how to market the products to consumers.

Another strategy the company applies is to engage a single strategic partner for every new product developed. This strategic partner is a client who further develops the product side-by-side with Devan and is the first to market that product. In return, the partner earns about a year of exclusivity, under the condition that they sell a predetermined minimum amount. After the exclusivity period, the product is available for other clients.

A significant element of Devan's success is driven by open innovation. They benefit by working closely with universities and other knowledge partners for three reasons: 1) they are too small to buy expensive research equipment and facilities; 2) knowledge workers have a large number of untapped potential; and 3) they employ many good researchers with whom Devan can work. In Belgium, Devan works with Ghent University, Centexbel, and Hogeschool Gent. In France, they have connections with Ensait in Lille, and in Germany they have partnered with DWI (Aachen). This network of knowledge partners creates a snowball effect in that these partners keep proposing new scientific and technological ideas. In fact, Devan frequently has to turn down some offers for cooperative partnerships. If they were not selective in developing partnerships, they would be enmeshed in a system of continuous, fundamental research, where nothing advances to the production phase. Devan's strategy is to divide their researchers in two teams: one team works with current customers and develops for the short term, whereas another team does fundamental research with the aim of developing new innovations for the long term.

"To create sustainable cooperation with innovation partners, Devan creates a win-win situation. Devan keeps innovating and thereby guaranteeing future revenues for the company. On the other hand, knowledge partners are given market access via the SME and are able to move beyond the research phase."



FIGURE 1: A sample of Devan's wide product range.

DEVAN: DRIVEN BY INNOVATION

To create sustainable cooperation with innovation partners, Devan creates a win-win situation. Devan keeps innovating and thereby guaranteeing future revenues for the company. On the other hand, knowledge partners are given market access via the SME and are able to move beyond the research phase. Moreover, the budget Devan provides its partners allows the universities to fund PhD researchers.

According to Patrice, the government actively promotes open innovation. The IWT (the Agency for Innovation by Science and Technology) is an important source of financing. Devan also participates in several European projects. One such project is called 'For the benefit of SMEs', which provides money for small- and medium-sized businesses (SMEs) to spend on university collaborations. Another type of European project is called 'Collaborative Projects for SMEs'. Here, SMEs cooperate with several universities related to one central theme.

In addition to financial support, the government also protects SMEs from unfair competition via legislation. Filing for REACH and BPD legislations is a considerable expense, but the Regulation on Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) and the Biocidal Product Directive (BPD) also rule out illegal copies of products. The main aims of REACH are to protect human health and the environment from the risks that chemicals can pose; promote alternative test methods; circulate substances on the internal market free of charge; and enhance competitiveness and innovation.

By focusing on R&D, creating a specific sales and marketing strategy, and fully using open innovation, Devan has achieved a stable market position. To maintain this position, the SME strictly follows several principles. First, they focus on what they know. Some technologies could be applied in other areas, but Devan operates on the premise that 'we know the textile market, we know the client, we know the end product'. Second, Patrice follows a strategy that avoids commodities. Whenever margins fall too low, they move away from that product, because they no longer have competitive advantage in that area. Instead, they look for niche markets with small volumes. Relatedly, Devan wants to stay small because this affords them the benefit of being fast and flexible.

By sticking to this clear vision, Devan Chemicals will continue to be a success story.



Learn More

<http://www.devan.net/>

2.3. Innovate beyond products and services: the relevance of the experience economy for innovating SMEs

New offerings can create value for customers in different ways. A company might increase the functionality and reliability of a product; the company can offer more convenience to the customers; or the company can reduce costs and thus the price of a product or service. In today's service economy, many SMEs wrap additional services around their products to increase customer value in exchange for a premium price. Although selling additional services might be a viable strategy in many industries, several of the successful SMEs we analysed preferred to offer genuine experiences to their customers as a new source of value.

Pine and Gilmore²⁰ have analysed in detail how 'experiences' are a new economic offering. Experiences are as distinct from services as services are from goods. Experiences have always been around (in the entertainment business, for instance), but they have gone largely unexplored as a major driver for strategic innovation in SMEs, in both manufacturing and services. As products and services increasingly become commoditized, experiences have emerged as a next step in creating value for customers. Commoditization makes it increasingly difficult for SMEs to operate profitably in established markets where scale and scope economies become the dominant driver to gain and sustain competitive advantages. As the next examples will show, some SMEs have grown profitably by transforming existing products or services into experiences for the customer.

Curana is a great example that illustrates how commodities such as mudguards and other bike accessories can be used to transform bicycle riding for the end consumers into an engaging experience. Currently, many consumers consider bicycles part of their lifestyle. Mountain bikers, racers, recreational bikers, and 65-and-older bikers, for example, all have their own bicycle style. Bike accessories with a sleek design help shape the unique look of a bike considerably. More and more consumers are buying bikes on the basis of conforming their self-image. A bike, a car, or even a jogging outfit reflects who we are or how we want to perceive ourselves and how we want others to perceive us. In the case of biking, the industry tends to integrate bike accessories and cyclist accessories (cycling glasses, cycling shoes, cycling helmets, etc.), emphasizing that the cyclist is buying both bike and an outfit as part of his lifestyle. These products should reflect the customer's self-image.

Today, the tag "By Curana" is a brand, and consumers are applying increasing pressure on bicycle manufacturers to integrate Curana accessories on their bikes. Curana's brand only became a strategic asset in the last few years, however. It is the outcome of a series of decisions Curana's management took. First, as described, Dirk Vens decided to design and manufacture the B"Lite, a mudguard with a clean, high-tech look combining the shining aluminium strip with coloured plastic. Curana made the B"Lite as an ODM for the Accell Group, one of its major customers. Although growth and profitability were exceeding the expectations of the company, Curana actually quit the ODM strategy. Their innovation strategy is 100% offensive, meaning that Curana develops new concepts, uses new materials, and creates new accessories without waiting for a specific request from a customer. Curana also operates using a "proactive" design process that starts with exploring social changes, fashion trends, developments in technologies and materials, and so on in combination with identifying several problems and needs bicycle users and value chain partners' experience. This proactive design process guaranteed that Curana would always create extraordinary products that differed from existing products on the market. This distinctive design process led to bike accessories that were original and highly appreciated by bike manufacturers that were searching to differentiate their bikes. This, in turn, gave the Curana products more visibility, and soon the company was rewarded with several design and innovation awards. Curana could now use its brand to signal quality, originality, and authenticity to

further strengthen its market position. Consumers wanted to buy bikes with Curana accessories. They wanted to buy the real product from the genuine maker. Even if competitors are copying some accessories, the brand is a way to discern an authentic bike accessory from an imitator. Curana thus migrated from an OEM role, producing accessories according to specifications and prices customers set. Moving from an OEM to an ODM allowed Curana to set its own price and create value for its customers producing products with a customized design. Being an ODM would not differentiate Curana from other ODMs, however. Thus, Curana chose to switch to a proactive design strategy, proposing its own ideas and prototypes to bicycle manufacturers. The innovative and unusual concepts and designs made Curana a well-known brand. Today, most bicycle manufacturers in Europe are lining up to integrate Curana products in their product mix. In this way, the power balance changed dramatically for Curana. As an OEM 15 years ago, Curana had no market power; now it determines not only its own destiny, but also the direction of the entire bicycle manufacturing industry.

Figure 2: Case Curana

Case Study

CURANA: VALUE CHAIN ORCHESTRATOR

Curana is a third-generation business founded in the 1940s by the grandfather of Geert and Dirk Vens—Curana's current owners. The company started as a bicycle shop that produced its own frames, diversifying in 1946 into manufacturing bicycle accessories. When the business passed to the next generation in the 1960s, they approached the market conservatively. They developed very few new products, working simply to manufacture bicycle accessories such as luggage carriers and mudguards. They did, however, respond to customers' requirements. At that time, all accessory suppliers struggled with strong price pressure from bicycle manufacturers, and by the 1990s, Curana was almost the sole player that survived in the Belgian market.

Dirk and his brother began managing Curana in the early 1990s as third-generation owners. They inherited the company as major changes were dawning within the business landscape. Several years later, mountain bikes appeared on the market and revitalised the bicycle business. The market shifted toward global competition, and European bicycle manufacturers started sourcing internationally for less expensive accessories. Still, most bicycle parts producers did not withstand the lethal competitive pressure.

Next came major changes in the raw materials used to produce bike accessories. Mudguards, for instance, were no longer made only from steel, but also aluminium and polypropylene. Curana, still surviving, faced increasing competition from companies across Europe that flooded the market with plastic mudguards.

With market conditions deteriorating rapidly, Managing Director Dirk Vens felt strongly that the company had to change its strategy. For nearly 50 years, Curana had been a production-driven bicycle parts manufacturer, making fenders and racks according to customer specifications. In 1999, however, the company launched a major strategic reorientation. They decided to conceive, develop, and produce products that were completely new to the industry. For example, because plastic had some advantages over steel and aluminium for mudguards, Curana's management wanted to design and produce plastic mudguards. They were not satisfied, however, to just copy or improve bicycle accessories already on the market. This approach would merely bring them back into the loop of price competition. Instead, the company wanted to develop concepts that were not only new for Curana, but also for the industry itself. They wanted to be the only company to offer certain products to the market. In doing so, they could set their own prices and avoid price competition. Dirk Vens realised, however, that the company was not prepared for this new challenge. It had never before designed or innovated a single product. Dirk knew he would need guidance.

"...the company wanted to develop concepts that were not only new for Curana, but also for the industry itself. They wanted to be the only company to offer certain products to the market."



Figure 1: BLite, Injection moulded mudguard with sandwich composite insert.

In December 1998, Dirk contacted Pilipili, a neighbouring design company, seeking advice on developing ideas for new types of plastic mudguards, but the project ended without tangible results. Somewhat later, Dirk met a designer of Batavus, a Dutch bicycle manufacturer and one of Curana's main clients. The designer was sceptical about the quality and look of the newly designed plastic mudguard. He felt the product was not revolutionary and did not have the right high-tech look to shake up the bicycle parts industry. He suggested using a design that integrated metal and plastic to provide both strength and a totally unique appearance.

CURANA: VALUE CHAIN ORCHESTRATOR

To elaborate on this idea, Curana collaborated again with Pilipili, investing another substantial sum to design and develop a new mudguard. The resulting mudguard looked good, but created insurmountable technological problems for actual production. Thinking about possible innovative solutions, the team turned to an alternative for aluminium or steel. This special “sandwich” material was composed of two thin layers of aluminium separated by a layer of polypropylene, a lightweight and stiff material. With this, Pilipili and Curana succeeded in developing the B”lite, a mudguard with a clean, high-tech look that combined a shining aluminium strip with coloured plastic. Installing the mudguard was made easy by using intelligent clicking systems. Furthermore, the aluminium with the layer of polypropylene could be used to conduct electricity, eliminating the need to use wires for the bicycle’s lights.

The B”lite concept was presented to the Accell Group, an international group of companies active in designing, developing, producing, marketing, and selling bicycles. Accell’s managers were very enthusiastic about the B”lite, and a deal was signed. The Accell group would buy a large volume of the B”lite with two conditions: They wanted full exclusivity for two years and Curana must prove they could manufacture the new mudguard before May 2001. The deal represented huge revenue growth for Curana if the company succeeded in meeting the deadline.

“Customers started to realise that Curana was an important partner for their own success. Indeed, Curana today is a strategic development partner for all leading European bicycle manufacturers.”

Curana proceeded by contacting numerous injection moulding companies, but they were critical of the idea. No one had done this before; it was a totally new process to be invented. A managing director of one of the companies, however, accepted the challenge and started collaborating with Curana. In 2001, however, the manager left the company, and Dirk was left with a management team that remained sceptical. The innovation process was subsequently riddled with problems and the company missed the May 2001 deadline.

Dirk, refusing to concede, contacted Willy Van Hoye, an engineer of the VKC—a research and development centre that specialised in solving technical problems. Initially, the injection moulding company hesitated to cooperate. Dirk insisted, and Willy succeeded in solving the problems. It was time to speed up testing. Again, the injection moulding company balked, only promising the next test by early May 2002. For Dirk, this was a dead end. Consequently, he engaged Anziplast, another local injection moulding company. Anziplast’s managing director embraced the challenge fully, and the company worked day and night. The two companies managed to produce the mudguard in time, and Curana presented the results to the Accell group.

The B”lite was Curana’s first major success: turnover quadrupled in the six years after the product was introduced, and it accelerated Anziplast’s growth. The success of B”lite motivated management to introduce other mudguards with a high-tech look. In the following years, the company introduced equally successful products such as the C-lite and the D-vide. Moreover, it was a logical step to extend the product portfolio of design-based products into chain fenders, overcoat guards, and luggage racks, among other accessories. Customers started to realise that Curana was an important partner for their own success. Indeed, Curana today is a strategic development partner for all leading European bicycle manufacturers.

The development of the B”lite was critical in turning Curana around. The company redefined itself as a product-driven company focusing on how to design



Figure 2: C-lite, fully customizable mudguard made out of sandwich composite material.

CURANA: VALUE CHAIN ORCHESTRATOR

and manufacture entirely new products that could differentiate Curana from its competitors. The innovation strategy was 100% offensive: Curana positioned itself as a developer of new concepts using new materials created such that they added value for bike manufacturers, dealers, and consumers. Since its inception, the company evolved from simply a product supplier to a developer of highly innovative solutions.

According to Curana's management, the company underwent three additional strategic changes after 1999. Before 1999, Curana was an Original Equipment Manufacturer (OEM), selling bicycle accessories to several European manufacturers. Since the 1999 decision to focus on design and innovation and develop a mudguard that combines plastic and metal, Curana switched to an Original Design Manufacturer, or ODM, strategy to design and manufacture products for specific bicycle manufacturers. By collaborating closely with a group of innovation partners, Curana now added value for its customers through innovative designs and creating products that were totally new to the industry. The company also became a price setter, with the ultimate benefit of determining its own margins.

Curana further fine-tuned its business strategy in 2006 by establishing an internal design office. By this time, design had become the heart of the company. Curana gradually moved toward what the management labelled Original Strategic Management (OSM). To develop new ideas over and over again, the company continuously explored trends, global changes, fashion, new materials, technology, and design developments by collaborating with innovation partners. Curana now offered proactive design solutions. By continuing to offer products to the market, the company has become indispensable to European bicycle makers.

In 2008, Curana took another significant strategic step: management decided to pursue an Original Brand Management (OBM) strategy. In the last few years, the company has won several design and innovation awards, including the prestigious Design Management Europe Award in 2008 and the Henry Van de Velde Award in 2010. The growing popularity of Curana as a provider of innovative concepts has generated interest in the company as a strategic partner for bike manufacturers, most of which are constantly looking for innovative concepts. Other bike parts manufacturers are also interested in Curana's design skills and have asked for cooperation. In addition to clients and competitors, end-users have also taken note of Curana's accessories. Curana cherishes its position as an innovative player in the consumer market. For this reason, Curana has paid increasing attention to its communication strategy, to the way products were displayed, and to using a consistent house style.

Curana's business model has evolved considerably during the last decade. The company's metamorphosis has propelled Curana into the role of a value chain orchestrator. It not only determines its own business success, but also enhances the prospects of the European bicycle industry.



Figure 3: Flood, luggage carrier with integrated functionalities, made with gas injection technology.

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We find a similar switch from product based thinking to experience based thinking in the case of PRoF. PRoF (see p 59) is an acronym for Patient Room of the Future. It is a consortium of architects, manufacturers, professional organizations, user groups, social representatives, and teaching institutions that created a totally new concept for the patient hospital room: the Patient Room of the Future. PRoF is a concept in which the patient is the focal point of attention: his experience during the hospitalisation is the central concept around which the consortium works. The Patient Room of the Future is the result of intensive research into the needs of the medical world and the patients themselves. During hospitalisation, professionals in the medical world are confronted more and more with specific questions from patients, visitors, and colleagues. Patients desire more privacy, autonomy, and choice; visitors would like more opportunities to assist the patient and an infrastructure that allows them to stay in the patient's neighbourhood. Medical staff must care for more patients; patients stay for shorter hospitalisation periods; and the drive is strong to increase the medical staff's productivity. PRoF is an all-inclusive concept that tries to provide answers to these questions by focussing on the patient and his environment, with durability, functionality, usability, and a modern design. The concept has been implemented in a growing number of European, national, and regional norms. In Chapter 4, we analyse how PRoF is organized as an interesting open innovation initiative. PRoF-projects deserve more attention here because they owe their attractiveness to approaching the hospitalisation from the patients' perspective. PRoF shifts attention from the physical infrastructure and quality of medical equipment in the room to how patients experience the hospitalisation. Similarly, the range and quality of individual services (nurses, doctors, cleaning services) is not the main qualifier; indeed, more services can be quite bothersome for patients. Instead, ProF is a customer-centred approach using the patient room as a stage to improve the patient's hospitalisation experience drastically. It is a formidable and largely untapped approach to increasing value for the customer and enabling medical staff to deliver value by making their jobs more convenient using, for instance, smart and integrated information systems.

DNA Interactif Fashion (see p 29) also illustrates how an SME can transform an industry, in this case fashion, into a stage for new ways to experience shopping. Their innovation adds value to customers and helps retailers reduce costs. In fashion, rent is the most important cost factor. The average shop in Belgium is 150 m² and the average rent is 450 €/m². Retailers can only stock 350-450 €/m² in their stores. In contrast, they can stock up to 3,000 to 4,000 €/m² in a warehouse. Huub Fijen, CEO of DNA Interactif Fashion, claims retailers can save 40 to 50% in costs by reducing their shop space if customers could experience shopping and buy fashion in a novel way. Nor is shopping optimized from a customer's perspective. Although many women (and men) perceive shopping to be one of the most valuable activities during their spare time, making choices remains difficult because of the enormous range of brands and models. Finding the right item of clothing is sometimes a real ordeal. Moreover, a Flemish study with more than 2,000 women showed that 50% of clothing purchased was not worn. This is because once the clothing is at home, it does not fit or colours do not quite match. Finally, customers cannot check whether the clothes they are buying in the shop really coordinate with those they have at home.

DNA Interactif Fashion proposed a new business model for fashion shopping. It changes shopping for fashion goods into a completely new experience for the customer. Based on a combination of two technologies (displays and three-dimensional scanning), the company wants to change both the physical shop and the shopping experience. The shop does not need to stock any clothing or provide mirrors and sales assistants. Instead, shopping starts with a body scan of the customer: the digital scan of the full body is complete in less than a minute. After scanning, customers see themselves on large screens as a virtual, three-dimensional model dressed in clothes from various collections that the shop offers. The scan can be extended to customize hair, glasses, or accessories and so on. Changing clothes is now a virtual process: more clothes can be "tried out" as the customer sees

herself walking on a catwalk. Customers can also be welcomed by a stylist with whom they discuss their personal style, but the software also can make choices for the customer depending in the skeleton, weight, age, and other factors. This virtual 'fitting' replaces the sometimes unpleasant or awkward process of fitting clothes. While virtual shopping is one thing, trying on clothes is, of course, still necessary to see the colours, feel the fabric, and evaluate the clothes the customers selected before they purchase. This process is called 'iStyling'. It creates new ways to change shopping and the shopping experience in the fashion industry drastically. The final product is an integrated solution from a strong technology application that combines visualization, 3D scanning, and content from different fashion segments. Customers experience an additional advantage: purchases are stored in a personal, virtual wardroom, which can be consulted any time. This makes combining clothes easy and effective. Furthermore, retailers can adapt their promotions to each customer's personal style.

This approach not only provides extensive capabilities for the buying process, but also in the after-sales market. iStyling records the articles that have been purchased. The new approach can thus take this into account for advice when making new acquisitions. Moreover, customers can see online at home how they might look in a new collection. This innovation is all about experiencing fashion; about a customer's personal style and (self-)image. Fashion is no longer about the garments or about how top models look in these outfits. Instead, it is about how a customer buys on the basis of conforming her self-image. Stylists even guide their customers through a transforming or restyling experience, subsequently changing, adapting, or upgrading prior dressing habits to professional standards

So, far we have focused on how small companies develop new business models and how this move allows them to sidestep the commodity trap. We narrowed our attention in this chapter to the role of the business concept and the potential of turning business models that are product and service oriented into more profitable business models based that generate experiences for customers. The role of open innovation is not in business model innovation is not discussed here. This is the subject of chapter four in which the role of open innovation in new business development is analysed in detail.

Figure 3: Case DNA Interactif Fashion

Case Study

DNA INTERACTIF FASHION: TECHNOLOGY MEETS FASHION

In 2006, a customer asked Dirk Ghekiere, a civil engineer and founder of DZine—a leading digital signage company—for a digital solution for his fashion store. This question triggered Dirk to imagine a store where customers did not need to physically try on the clothing. A digital system would help the customer virtually fit and select clothes. To advance his vision, Dirk partnered with Eyetronics, a Belgian company that specialised in 3D scanning. He subsequently presented his idea to IWT, the agency for Innovation by Science and Technology. IWT granted approval for a feasibility study, but thereafter, the project stalled because Dirk and the team at Eyetronics had no clear plan of how to proceed.

Two years later, in 2008, Dirk met Huub Fijen. Huub has a background in ICT, had founded several companies, and was looking for a new challenge. When he heard about Dirk's idea, he was motivated immediately. He compiled a video about the idea and how they could further roll out the project. His idea was to develop a specific 3D scanner that would create a virtual avatar of each customer. That avatar could then be dressed using virtual clothing that was available for purchase at the store's warehouse. This way, the customer would no longer need to physically try on outfit after outfit; indeed, sometimes an arduous process. Instead, the customer would see on a screen how the clothes looked. Dirk Ghekiere and Dirk Callaert from Eyetronics were very enthusiastic about Huub's vision and asked him to carry out the feasibility study. Consequently, DNA Interactif Fashion was founded, and Huub started conducting interviews with store managers, sales people, designers, and customers. With each interview, Huub looked for the potential added value for every possible partner. He found that retailers would save a considerable amount of expensive store space because they would no longer need a showroom. Designers would save money by not having to invest in samples of their clothes for customers to fit. Customers would stop buying clothes they would never wear.

“With each interview, Huub looked for the potential added value for every possible partner.”

After several failed attempts, it became clear that Eyetronics was not able to develop the scanner it envisioned. The equipment they were able to develop was the size of a room and was very expensive. The investment would be much too high for potential customers. Undeterred, Huub continued to look for alternate solutions. Eventually, Eyetronics was bought out, so Huub sought another partner. He joined with an American nonprofit organisation funded by the clothing industry. They had already developed a scanner the size of a fitting room, and DNA Interactif Fashion secured an exclusive distribution contract for the equipment in the worldwide fashion market. Now, they were ready to develop their concept further.

The concept was called iStyling and featured several components. From a technological viewpoint, the scanner itself was the most innovative. Customers would enter the scanner and position themselves with their feet spread 20 centimetres, hands on two handles, and chin slightly raised. In the span of just 58 seconds, the customer's exact measurements were registered. The computer then compiled a virtual avatar on which all available clothes could be fitted.

In practice, the customer's avatar is projected onto a 3D screen, developed by Philips, and can be viewed from different angles and in motion. Hairstyle, skin colour, and other details can be adjusted, so that the avatar resembles the customer. A stylist is present during the entire process and advises the customer on which colours complement the customer's features and what styles are most flattering. The stylists also analyse the customer's body shape and select clothing that will highlight assets and minimize flaws.



By 2010, Huub and Dirk started to roll out a business plan and wanted to keep different options open. They wanted to sell

DNA INTERACTIF FASHION: TECHNOLOGY MEETS FASHION

the complete IStyling concept, but were also willing to sell the scanner separately. For example, they remained open to scientific research or other applications that were not related to fashion.

Another challenge the team overcame involved digitalizing the patterns of the clothes. To start up the project, DNA Interactif Fashion needed access to patterns within a clothing collection. Brands were very reluctant to share patterns, because this is a traditional control point against imitation. But Huub found a partner in Offshore Legends, an upcoming Belgian brand; Scabal, a suit maker; and Scapa, another Belgian brand that was enjoying international success. Initially, clothes were uploaded into the system by dressing a mannequin and creating a 3D scan of the clothes. This process was very time-intensive and expensive. Consequently, the team took another approach: a computer-aided design system was used to transform 2D patterns into 3D patterns. This method was faster, but the industry was still not willing to release patterns. Eventually, they developed a software system that could generate 3D patterns using a front and back picture of the clothing. This process, which requires just 30 minutes, was much less expensive than the previous methods.

In March 2011, the DNA Interactif Fashion team launched the first IStyling Boutique in shopping mall K in Kortrijk. By this time, the scanning time had been halved, and in 20 seconds, the system could generate a 3D face for the avatar. The launch received significant media attention and some Flemish celebrities were present.

One month later, a second IStyling Boutique opened in another shopping mall, the Inno in Ghent. In the boutique, customers pay €75 for a scan and complete advice from a stylist. Customer reactions and the shopping mall managers were very enthusiastic. Inno calculated that the average amount a customer spends in the mall increased from €50 to €450 when they had a body scan.

Although another scanner is installed in Helsinki and a bridal store in Amsterdam has placed an order, Huub stated that the fashion industry is slower and more rigid than expected. He is convinced however, that a bright future awaits this new shopping experience.

The team is also planning some additional projects. They are working on the IStyling iPhone application, which gives customers styling advice via their smartphone. People can also look at collections and fit clothes virtually using this app.

Next is the possibility of moving toward online sales. After customers have obtained a body scan, they could fit and shop for clothes at home using the Internet. The problem with this evolution, however, is that retailers are very hesitant to join this new way to shop. They are afraid their revenues will decrease drastically because customers will buy their clothes directly from the manufacturer via the Internet, thus cutting out the retailer. For this reason, Huub and Dirk choose to postpone leaping into Internet shopping. Because more and more people are buying music, trips, and books via the Internet however, Huub and Dirk are convinced that this part of the business plan has great potential. Their ultimate goal is to create a virtual shopping mall in which different brands offer their collections. Once fully implemented, IStyling will allow customers to fit and buy clothing electronically and interact with other customers via chat applications.

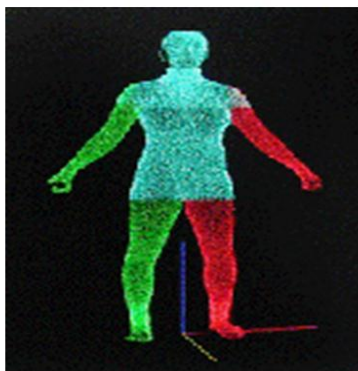


FIGURE 1: iStyling 3D Body Scanner scans the whole human body in less than 6 seconds and produces a true-to-scale 3D body model within 58 seconds.

Learn More

<http://www.3dbodyscanner.eu/index.html>

2.4. Different ways SMEs can create value

Smaller firms face challenges when fast or unpredictable shifts in market demand occur. The rapid change in the bicycle industry in the 1990s, for example, was threatening Curana's competitive position rapidly. Curana innovated its business model primarily in response to these shifts in the marketplace. In fact, Curana changed its business model and embraced an ODM model and later a proactive design strategy as a competitive driver. This change in strategy created value for its customers and was highly profitable for the company.

Changes on the demand side, however, are sometimes slow and steady. Think about the growing awareness of companies to develop environmentally friendly or sustainable products or the increase in prominence of healthcare and wellness in our lives. Devan Chemicals' philosophy is to be an innovative company in the textile chemicals industry by introducing chemicals that are less harmful to the environment and have a positive health effect. Similarly, Philip's Airfryer is a product in Philips' ambitious kitchenware department. Airfryer's Rapid Air technology enables consumers to fry crispy fries that contain up to 80% less fat than a conventional fryer. The Airfryer (see p 86) is a new way to fry a variety of fried foods, snacks, chicken, and other meats, all in an easier and healthier way. Philips is capitalizing with this product on the identifiable trend that consumers increasingly value healthy food without compromising the taste. Philips did not develop the Airfryer's technology, however, but instead engaged an independent engineer, as we will discuss in chapter 5. Finally, the founders of Quilts of Denmark based their strategy on the fundamental belief that consumers perceive health and healthy sleep as becoming increasingly important.

Changes in the markets and consumer behavior are thus important to identify entrepreneurial opportunities for small companies. Likewise, the emergence of new technologies and disruptive technological developments offer similar opportunities for small firms. Many venture capital-backed high-tech ventures have been established to explore business opportunities that can be exploited based on a new applications of technologies. Isobionics is one of those start-ups that have the potential to change competitive dynamics in a traditional industry such as the flavour and fragrances market. The biotechnological processes to produce these substances at a much lower cost than traditional production techniques will ignite competitive reactions, and the market might look quite differently within a decade. It is interesting to note that small ventures such as Isobionics need not have all the required technology in-house. Isobionics licensed the technology from DSM, a large Dutch-based chemical company and developed its first flavours (Biovalencene™) in close cooperation with DSM researchers. Devan Chemicals also chose to be technological leader in the textile chemical industry. It has always been ahead of its time, starting with flame retardant technology and progressing to advanced technologies such as natural allergen control technology and antimicrobial technology. In this case, most technologies are co-developed with knowledge partners such as universities, research labs, and lead-customers. New technologies thus offer opportunities for small firms even in the so-called low-tech industry such as textiles, furniture, bicycles, food, and so on.

Science or technology driven strategies are fruitful for small firms under several conditions. First, small firms profit from pursuing markets that are too small (at least initially) to interest large companies. Second, technological leadership erodes over time when imitators bring similar but less expensive products to the market. Technological leadership is thus a moving target that requires the small firm to migrate from one technological opportunity to another. Third, when new technological developments drive competition, small firms can prosper only when they collaborate with a range of knowledge partners: they don't have the required in-house technology and financial resources to develop the technology on their own. Small firms, however, also face considerable challenges when sourcing external technology, because they often lack the capabilities to identify, transfer, and absorb external ideas and technologies effectively into their firms. They must employ personnel with the required scientific background to understand, absorb, and exploit the scientific discoveries and technologies developed at universities, research labs, or large companies. Finally, small firms must make choices

about the way they will profit from their technology. Sometimes it is more interesting to license or sell the technology; in other cases, it will be more interesting to sell products that incorporate the technology. Which option to choose depends on the strength of the intellectual property system and the role the complementary assets play in a particular industry.²¹

Shifts in government policies targeted at the business environment are another important driver of business model innovations in SMEs. Sometimes, new regulations may increase fixed costs of doing business, which drives out players that are too small to amortize the costs. In other cases, regulations may open new opportunities for small business, endangering the position of large established firms. Examples include the production of sustainable electricity or new types of media. The mercury barometer industry in Europe is an interesting case from this point of view. In 1990, Paul Dingens started a glass works company that produced its own line of glass instruments. This Belgian company grew into one of the largest craft producers in Europe, and by the mid-1990s Dingens (see p 42) had a strong position in the top-segment of this market with a uniquely crafted line of fine mercury barometers. Sales of the mercury barometer halted suddenly when German EU Commissioner Gunther Verheugen banned the use of mercury for non-professional applications. Many European producers of mercury barometers suspended sales and most went out of business because there was no compensation to these companies.

Dingens Barometers and Clocks, however, stayed in business and explored the technical possibilities to produce a new barometer for the high-end segment. Facing the risk of bankruptcy, reinventing the barometer was the only way out. With the help of a few innovation partners and subsidies from IWT (the Agency for Innovation by Science and Technology in Flanders) the open innovation journey started. Dingens wanted to collaborate with the University of Hasselt and knowledge partner Sirris to develop a completely new instrument. The new barometer should have the same advantages of the mercury barometer (accurate, legible, durable, and decorative), but without using mercury. Moreover, the new product had not only to be ecologically friendly, but also easy to use. Dingens and its partners searched for a combination of knowledge from different industries, including aerospace and food, among others. They experimented with techniques, some already used for decades in aviation navigation, that used high vacuum metal cells that respond precisely to pressure differences to indicate the airplane's height. Cell expansion is measured to only thousandths of a millimetre, and a combination of eight cells delivered an exact measurement of the pressure. To convert these minimal pressure differences into a convenient tool for recording weather data, the metal cells were brought into contact with a liquid that reacts to these small differences accurately and thereby allows the scale to expand to 50 cm in length. This makes it not only highly accurate, but also easy to read for both professional and ordinary users. The liquid is also used in aviation and is especially designed so that the temperature would not affect the barometer's reading. The membranes find their origin in the food industry, in fact, where they are used to filter nutrients. In short, a combination of existing technologies used in different industries led to a revolution in the barometer business after the EU-banned mercury barometers. Dingens called its innovation the Innovacelli (The Innovative Torricelli barometer). The innovation is presented in the case box (see p 42). In the next chapter, we will illustrate that the Innovacelli also represents a technology that can be used for new, unexpected applications.

Changes in the environment are thus an important reason small companies experiment with new business models to revamp or grow their business. However, we must also look at value drivers to explain successful business model innovations in SMEs. Small firms can benefit from having several advantages compared to large companies depending on the activities that drive profits in different industries.

We found that SMEs can have a considerable advantage because they can react quickly to changes in the market, changes in customers' needs, and in offering customized products and services to clients (particularly in business-to-business industries). Segers & Balcaen (see p 35) is a small Belgian plastics packaging company that continuously identifies new packaging needs among its customers.

For many other companies, Segers is a preferred supplier because they continuously innovate in order to offer new packaging solutions. In several cases, Segers has created customized packaging according to specific customer needs. Larger competitors are not interested in this type of customer intimacy because customized solutions equate to small production runs. And, such customization takes too much management and engineering time to develop solutions.

New technologies also provide opportunities for small companies. New technologies often find their first applications at the edge of markets or in niche markets, not amidst the mainstream.²² Mainstream customers will only buy a technology product when the new technology has been proven, complexity has been reduced, and the convenience level elevated. Innovations start small and offer great opportunities for SMEs to pursue embryonic markets that are too small to attract large firms. As we will see in the next chapters, small firms no longer develop technologies themselves in the open innovation landscape; therefore, developing technology based business opportunities should no longer be limited to university and corporate spin-offs. Start-ups can use their organizational agility, application know-how, or market intelligence to commercialize technologies that they license from universities or larger, technology-savvy companies. Isobionics illustrates this point. The company took a technology to market that had been abandoned at DSM at a speed that surprised both technology providers and investors.

Small companies also have a greater ability to specialize than large companies that are serving clients in a particular industry or branch. Focusing on a particular type of application makes smaller companies champions in linking market needs with what customers need from technology that is available from different types of knowledge partners. Small firms are successful as innovation champions because they know how to bundle the right expertise of different technology agencies to solve a problem for their customers. Their relational capital is crucial in explaining their success as innovators. Devan Chemicals, Quilts of Denmark, and Curana are examples of how a small firm can be successful deploying this strategy.

Some small firms sidestep commoditization by turning products or services into experiences. Jan Kriekels, CTO of Jaga (see p 47), expressed it this way: “Jaga products are not only heating your house, but also your soul”. People buy Jaga heaters because they care about the environment or because they want a sleekly designed radiator as an eye catcher in their home or business lounge. Purchasing a radiator is about values, about who you are, and about customers’ self-image. Similarly, the founders of Quilts of Denmark intended to be “providers of a healthy sleep”, not quilts-makers. And, DNA Interactif Fashion completely changed the shopping experience. Their products change the activity of shopping for fashion into a styling experience. The experience eventually transforms the customer into a restyled person using personalized advice from a professional.

Key Learning points

- Analyzing open innovation in SMEs in traditional industries starts with conceiving and developing a new business model. (A business model defines the way a company delivers value for a specific customer group at a profit). The value of open innovation activities in SMEs can only be estimated correctly within the context of their broader strategic objectives.
- New strategic objectives of a company should be analyzed via a business model innovation framework.
- All firms have in common that their efforts are focused on creating value for a particular target customer. They start with an explicit or intuitive idea of what customers might value. Business model innovations start with articulating a customer value proposition.
- Creating customer value through game-changing and highly profitable business models will usually not be developed by questioning existing customers.
- Sometimes, the business model is straightforward. In the other cases, conceptualizing and articulating a business model is a more complex process. It may take months and even years to clearly articulate the customer value of an idea. Innovative business models are sometimes hard to articulate because the needs of the target customer might not be explicit, uncertainty might exist about which technologies to use and which partners to team up with.
- However, SMEs should wait to innovate until they have a full business plan. *Game-changing business model innovations cannot be planned analytically because many of the variables relevant to their success are unknown at the outset. In contrast, SMEs have to experiment to discover new business models. It is a discovery driven process.*
- Most of the SMEs use business model innovation to fight commoditization of their products. They can increase functionality or reliability of the products, they can create more convenient products for the customers. SMEs may also wrap additional services around their product or offer genuine experiences to the customers.
- Turning businesses under the threat of commoditization into genuine experiences for customers is a difficult target for SMEs but it is one of the most profitable strategies in the long term and a way to gain more power in the industry.
- Drivers for change may be quite diverse. We identified the following drivers:
 - New substitutes and new players in the market – sharp increase in competition
 - Public policies changing the market conditions forcing SMEs to overhaul their strategy.
 - Slow, steady changes in demand: Growing concerns for sustainability and health impact are long term trends that offer great business opportunities for innovative SMEs.
 - New technologies who have the potential to disrupt incumbents in an industry are an interesting business driver for high-tech start-ups. Their technology should not necessarily be developed in-house (chapter 4).
- SMEs may have some advantages compared to large companies:
 - SMEs are more agile than large companies. If speed to market plays a role, SMEs can outcompete large companies.
 - New technologies often find their first applications at the edge of markets or niche markets, not amidst mainstream markets. Innovations start small and therefore offer opportunities for SMEs to pursue embryonic markets that are too small to attract large companies.
 - SMEs have greater capability to specialize than large firms to offer customized service to customers.
 - Small companies may offer completely new experiences for customers. These radically new ways of offering value for customers takes time to develop and there are too many unknowns at the outset to guarantee a market big enough to attract big companies.

Figure 4: Case Segers & Balcaen

Case Study

SEGERS & BALCAEN: COLLABORATIVE INNOVATION

Segers & Balcaen was founded in the 1950s as an artisanal manufacturer of cellophane packages, mostly for the textile industry. In its 50 years of operation, the company, based in Liedekerke, has evolved into an international leader in the packaging market with about 160 employees, a second production site in Diest, sales departments in Germany and Romania, and a production capacity of 18,000 tons. The flexible packaging solutions Segers & Balcaen develops are used in many markets, from food to horticulture. Among their clients are multinationals such as Coca-Cola and Inbev.

The financial crisis of 2008 caused unstable sales and created a production overcapacity in the European market. Furthermore, the packaging industry is an ever-evolving sector, with strict regulations and pressure to find environmentally friendly alternatives. Segers & Balcaen survived and thrived through this crisis by differentiating its products, focusing on environmentally conscious entrepreneurship, and aiming at niche-markets to serve customers' specific needs. In this way, the company also gradually expanded its technological competencies.

Segers & Balcaen's strong innovative nature is a main reason they continue to lead the packaging market, which is a commodity market. The company is a full-service provider of high-quality packaging solutions. Clients are offered a one-stop shopping solution for all the steps of the packaging process. Every step, from designing the package to assisting with customised machines, is organised in-house.

The company is continuously improving existing products and looking for innovations. To create a win-win situation for both the supplier and customer, the knowledge of both parties is leveraged. Segers & Balcaen cooperates closely with clients to develop the right solution for each product its customers sell. Interacting closely with customers is a form of open innovation that creates more innovative ideas and better products with higher added value for customers. It also decreases production time.

"Clients are offered a one-stop shopping solution for all the steps of the packaging process. Every step, from designing the package to assisting with customised machines, is organised in-house."



Figure 1: Segers & Balcaen has evolved into an international leader in the packaging market.

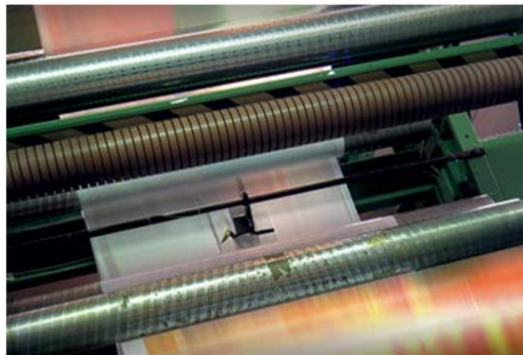
SEGERS & BALCAEN

One example of this joint research and development is an intelligent packaging for chocolate, developed in cooperation with Belcolade, member of the Puratos group. Belcolade exports its chocolate worldwide. This implies that the chocolate must have a shelf life of at least one year. To reach this target, packaging must have a certain oxygen barrier, hydrogen barrier, and delamination. A concrete problem that arose in this case was that the high welding temperature needed to seal the package caused the chocolate to melt. After six months of working on a solution with Puratos, Segers & Balcaen developed a new kind of functional packaging that can be welded at low temperatures.



“To create a win-win situation for both the supplier and customer, the knowledge of both parties is leveraged. Segers & Balcaen cooperates closely with clients to develop the right solution.”

Figure 2: The company is a full-service provider of high-quality packaging solutions.



Learn More

<http://www.segers-balcaen.com/>

3 A dynamic view on business model innovation

Business model innovation should not only be analyzed cross-sectionally, but also dynamically because they develop and change over time. In this chapter, we analyze some aspects of business model innovation in SMEs. First, we look at the possibility of changing business models. Change may not occur just once, but several times, moving stepwise toward a business model that creates more interesting value propositions and results in higher profitability. Second, we examine the process of discovering new applications after a small firm has introduced a new technology to solve a problem in its existing product markets. Next, we examine the reasons the SMEs we interviewed do not diversify into new businesses, even though they have the technological expertise to do so. We pay special attention to the role of customers and innovation partners in this process. Finally, several SMEs have built a corporate reputation or brand as part of their strategy as a way to fight commoditization. Small firms typically lack the financial resources to build a brand, yet many we interviewed had pursued unconventional and less expensive options that provide an interesting alternative.

Developing a dynamic view on business model innovation is also important to understand the dynamics in the open innovation networks of the companies we examined. These open innovation aspects will be described in detail in the next chapter.

3.1. Stepwise discovery of new business models

In the previous chapter, we described how Curana has changed its strategy from an OEM model to a more profitable ODM model. Most SME managers would likely stick to the new ODM strategy, but Dirk Vens of Curana did not. Instead, he changed his strategy three times in a single decade (see p 38). Why did he change the business model several times? Some managers continuously probe new business models, with each new model building on the strength of its predecessor. Switching to a new business model creates opportunities to change it again for a second or a third time. It is a path-dependent process in that opportunities to change the business model into a more profitable model can only be detected after the previous business model has materialized fully. SMEs thus change their business model in a stepwise way.

To illustrate this concept, we take the example of Curana and use a scheme suggested by Dirk Vens (see figure 5, p 38). The scheme shows his company's business model innovations between 1999 and 2010. Curana, a small, family-owned bicycle accessories manufacturer started as a typical OEM: it produced steel mudguards and other accessories according to specs from bike manufacturers in Belgium and surrounding countries. The customers (manufacturers) determined the prices, and the company could not add value because the product was easy for other bike accessory manufacturers to imitate, often at the same price. The competitive position of these OEMs worsened with the increasing globalization in the late 1990s. Market power was shifting in the direction of the bicycle manufacturers, which is why Dirk Vens chose to change his company's business model.

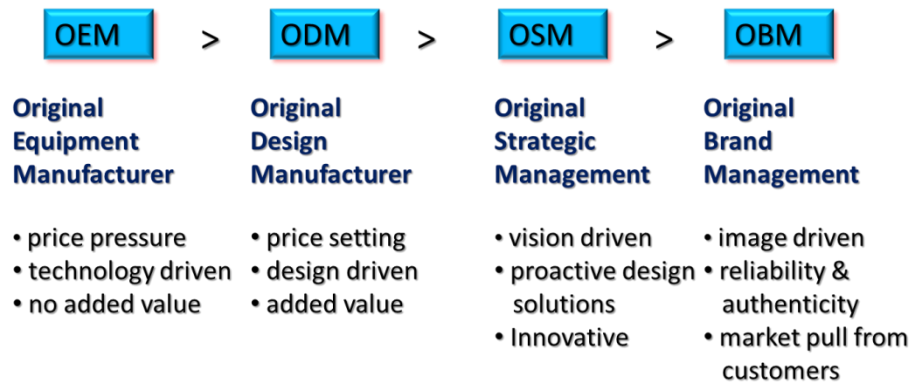


Figure 5: Business model innovation at Curana

The transformation from an OEM to an ODM model was made possible through a new product development project, which resulted in the B"lite mudguard.²³ At that time, Curana only knew the bicycle market and how to produce steel products. The B"lite resulted from an intensive collaboration between Curana, Pilipili (the design office), Anziplast (the polymer extruder), and Accell Group (a major Curana customer). Accell took the commercial risk to buy the B"lite at a predetermined price if Curana and its partners succeeded in producing the product before a particular deadline. The B"Lite enabled Curana to change its business model from an OEM model to an ODM model. In an ODM model, it is the design process that differentiates the product and prices. With an ODM model, control of the product and price reverted to Curana based on the premium customers want to pay for a unique and exclusive design. The B"Lite was Curana's first major success. The company's turnover quadrupled in the six years after the B"Lite was introduced. B"Lite's success urged management to introduce other mudguards and other bike accessories with a high-tech look. Customers started to realize that Curana was becoming an important partner for their own success. Over the years, Curana has become a strategic development partner for all leading European bicycle manufacturers.

Most SME-managers would be inclined to stick to this new business model because avoiding the commodity trap and price competition are their main concerns. Once Curana was recognized as an ODM, however, it fine-tuned a new strategic direction. Design and innovation became core activities to deliver unique products and gain market share. In 2006, the company took another bold move and changed its business model again. It established an internal design office because design had become the heart of the company. Curana gradually moved toward what management labeled as *original strategic management (OSM)*. To develop new ideas continuously, Curana no longer waited for requests or orders from clients, aiming instead for a *pro-active innovation strategy*. At this stage, design at Curana was managed in a cyclical way through four consecutive steps. *Exploration* was the first step. The company continuously explored social changes, fashion trends, and developments in technologies and materials, but it also studied the problems and needs of bicycle users and value chain partners. To support these explorations, Curana had to understand how to manage design and innovation. It thus participated in different networks, such as a learning innovation network, design networks, research programs, and so on. *Design* was the second step. Once an idea was spotted and considered valuable, the company developed simple, handmade models of the product. From this process, Curana learned significant lessons for the next stages of development. The best ideas were fine-tuned during a concept and styling stage. Next in the system design stage, the concept was analyzed from an assembly perspective. During the concept workout, styling, and system design, Curana was in touch constantly with production partners, knowledge and design centers, mold makers, and material experts. The third step is *promotion*. In this step, Curana organized information sessions to promote its new ideas among potential customers. In this way, the company received valuable feedback from potential customers. *Realization* is the fourth step. For Curana, this step started with

developing a high-end, three-dimensional model of the concept in collaboration with an (external) engineering partner. After both virtual and physical verifications, production was prepared in collaboration with external production partners, mold makers, and material experts.

Using the so-called *Original Strategic Management* (OSM) model, Curana and its innovation partners started from a vision based on new opportunities derived from global trends, new materials and technology, and design developments. It is a vision-driven approach where direct interaction with potential customers is delayed until a later stage in the process. Customers are still important, but they are not driving the company's innovation strategy. Through this strategy, Curana created bike accessories that were unique to the industry. To feed this strategy, Curana collaborated progressively with design communities and innovation centers. Its management and designers were guest lecturing about their experiences with design, open innovation, and intellectual property management. Within just a few years, Curana emerged as the most creative firm in the industry, and the company became *indispensable* for European bicycle makers. The OSM strategy gave the company more degrees of freedom to operate—in that it was no longer limited to customer-initiated projects—and new ways to further differentiate its products from competing offerings on the market.

In 2008, the company switched to an *Original Brand Management* (OBM) strategy. Curana was recognized in the industry as a trendsetter, which triggered the company to build a brand-based strategy. The company's innovative nature was celebrated as it won several prestigious innovation and design awards. End-users started to really know Curana's bike accessories, and touching the heart of the end-customer became increasingly important. The company now emphasized bicycling as a lifestyle, in which bicycles and accessories were crucial to shaping the experience. Authenticity in delivering that experience was also important. The customer wanted the leading design brand, not an inexpensive imitation. For this purpose, the label "ByC"—representing the phrase "By Curana" and pronounced as "bike"—was developed to establish a direct link with the end-consumer and create pull-through demand.

Three strategic changes in a single decade may appear to be too much turbulence, but it is a logical consequence of the firm's discovery driven growth. Dirk Vens had no grand design in 1999 for the company's strategy in the coming decade. Too many variables were relevant for Curana's success which were unknown at the outset. Dirk Vens was searching for a new business model that would bring growth and profitability. He started with one product development project that resulted in the successful launch of the B"Lite and the start of the ODM business model. The B"lite, however, was not invented in a straightforward or linear way. The company and its innovation partners continuously probed new solutions; they were experimenting with different options because too much uncertainty existed to plan analytically a way to move forward.²⁴ Experimenting and redirecting projects are essential in discovery driven growth.

New opportunities to create and capture value are discovered step-by-step, and each previous step is necessary to move to the next. Let's look again at the four business models in figure 5 (p.38). Once Curana had adopted the ODM model, it created strong design skills and a network of innovation partners that were indispensable in designing, developing, and producing new products. Only at that point did the company realize that it could increase the uniqueness of its designs (and the value for customers) further by switching to a *proactive innovation strategy*. This change in strategy gave the company more degrees of freedom to act (customers were no longer taking the initiative) and resulted in higher profitability as Curana developed its own style and design. At this point in Curana's strategy trajectory, it became difficult for competing firms to duplicate the strategy because of Curana's growing reputation. Finally, when the company switched to an OBM strategy, it capitalized on its reputation and newly created brand. Curana positioned its products as the authentic product versus possible imitations by others. The OBM model could only be developed after the OSM model; Curana's products would never be novel and authentic if the company did not proactively decide to design bicycle parts. Because of this change, the company was recognized in the industry as a trendsetter

which, in turn, triggered a brand-based strategy. These consecutive steps propelled the company into a leading position in the bike accessory market. Each change in strategy strengthened Curana's unique offerings, which became more challenging to imitate. By transitioning from an OEM to a leading company setting industry standards, Curana gained more freedom to decide direction and more market power. In contrast, if the company had remained with the ODM business model, several competitors might already be imitating Curana's strategy.

Curana's successive business model changes also offered it a unique position in the market. Curana develops new concepts and designs, but sells them as tangible products. Together, Curana and its network of partners invent, design, develop, patent and manufacture bike accessories. Curana is not another design office; it is not a polymer extruder or a classic manufacturer of bike accessories. The company created its own market space by bringing together these competences in its innovation network and by incorporating these skills into completely new and stylish bike accessories. Curana's market position is unique: upstream players in the bicycle industry cannot copy the strategy because they can only offer part of the solutions that Curana offers. Likewise, bicycle manufacturers cannot drive the coordination among upstream players in the same way Curana drives the coordination among partners in the innovation network. In other words, innovation networks are powerful tools to differentiate a firm's products from competing products. Imitation is almost impossible unless a company establishes its own innovation network.

3.2. The process of discovering new applications

Several firms we interviewed were looking for a solution to solve a problem in their existing markets. When existing product markets come under pressure, a firm tries first to fix the problems by introducing new technology. After the company succeeds in fixing the problems in its existing market, it might detect new applications for the new technology. Discovering new applications, however, is a slow process that emerges, most of the time unintended, after the new technology is established.

Take, for example, Dings Barometers & Clocks. In 2009, Dings launched the Innovacelli barometer, an innovative barometer without mercury that was developed in collaboration with several innovation partners. This new barometer was developed after the European Commission banned mercury barometers. The Innovacelli uses vacuum metal containers that react to the changing air pressure. A combination of eight vacuum boxes produces an extremely accurate measurement of even the slightest change in air pressure. These movements are passed on to a liquid in a glass capillary tube, which in turn displays a highly accurate pressure. Because the metal vacuum pressure boxes accurately measure even the slightest change in pressure, this new product was a perfect replacement for mercury barometers, which have been the most accurate barometers for centuries. Mercury barometers represented 80% of Dings' turnover.

The new technology, however, offered several other technical advantages that were slowly translated into new business opportunities. First, mercury barometers have a minimum length of 90 cm to be effective, but the height of the Innovacelli could be reduced to a minimum of 40 cm. This had unexpected consequences, because the barometer could now be made stable enough to stand freely on a table and to withstand earthquakes. This was particularly important for the Japanese market, which Paul Dings discovered unintentionally during an economic mission in Japan. He learned that the barometer's small size was also interesting in markets where houses are small and traditional barometers were too large to be a decorative instrument in the house.

Second, Dings had always been selling in the business-to-consumer (B2C) markets through retailers. Paul Dings knew that mercury barometers had long been banned in the United States, and that in professional applications, mechanical barometers were used instead. He discovered through

informal talks with his agent in the US, however, that many professional users did not trust the barometers they used. Applications for airports, blood testing, treating lung patients, tuning linear accelerators in cancer treatment, and tuning engines to name a few applications require real air pressure to be measured very accurately. Air pressure changes with the altitude and mechanical barometers are not precise enough when adapting for the altitude.²⁵ Several hospitals and even NASCAR²⁶ contacted Paul to develop an Innovacelli that was easy to adapt to the location's height. He made a simple system representing a variable scale so that each pressure zone can be achieved, even to very low pressures at extreme altitudes.

Paul Dingsen originally expected to sell 1,000 to 2,000 Innovacellis annually in the B2C market. Now, he calculated that there were 5,900 hospitals in the US that are specialized in radiation, lung diseases, and blood gas analysis. If each hospital needed two to five barometers, the B2B market was several times larger than the B2C market. The B2B market was also a more attractive market because Dingsen could sell directly to the end customer and would no longer deal with margin-eating dealers and importers.

Figure 6: Case Innovacelli

Case Study

THE INNOVACELLI: CRISIS BECOMES OPPORTUNITY

Dingens Barometers & Clocks is a small Belgian company that produces high-precision barometers for the high-end market segment. It was founded in 1965 by Denis Dingens and his wife. Initially, the company produced only frames and the instruments were purchased elsewhere. After 15 years, Dingens began producing mercury barometers, including both the instruments and frames.

In 1990, Paul Dingens, the son of Denis, took over the company shares and started a glass works company, in which he produced glass instruments. Paul broadened production and added woodworks, spray painting, and frame production and design. Launching top segment barometers opened new markets, and the company was very successful, realized strong growth, and built a new venue.

In 2000, however, the tide turned. Asian producers introduced digital barometers, which were less expensive and less complex to produce. Although the high-end market stayed relatively stable, this new competition affected the lower segment. To compensate for loss in sales, Dingens Barometers & Clocks started producing clocks and frames as an original equipment manufacturer (OEM). This strategy slowly started to pay off, but in 2007, the company faced another major blow. German EU commissioner Gunther Verheugen banned the use of mercury in consumer products. With this prohibition, 80% of Dingens' sales were lost, and the company faced a financially challenging period.

What followed, was a turbulent period, during which only Paul Dingens himself believed the company could survive. In 2008, a Chinese investor provided capital and gave the company another opportunity to flourish. That same year, Voka (the Chamber of Commerce) informed the company about partners that eventually could help in exploring the possibility of innovating new barometers without mercury. Paul scheduled a GPS-brainstorm, a tool developed with Flanders DC, with the Innovation Centre of Limburg – a province in the East of Belgium. In this meeting, external advisors and management of Dingens Barometers & Clocks brainstormed about a strategy to follow. The subsequent strategic change was drastic. Paul decided to pursue a new type of high-precision barometer. He not only purged the company of non-believers, but further, he laid off 13 of the 20 employees to staunch the company's financial bleeding. It was an expensive and painful process.

Meanwhile, Paul prepared an IWT (Agency for Innovation by Science and Technology) project with Bert Celis of the Innovation Centre Limburg, who acted as coach and innovation mentor. Approval requirements dictated that the project should be technical, innovative, and feasible, and that the applicant must demonstrate clear market knowledge. This was not an easy assignment for Paul Dingens; however, by the end of 2008, the project was filed and defended. In January 2009, IWT approved the dossier. This implied that IWT covered 45% of all costs. In addition to the IWT support, the company secured a Vinnof loan for 80% of the remaining costs.

"...in 2007, the company faced another major blow. The German EU commissioner banned the use of mercury in consumer products. With this prohibition, 80% of Dingens' sales were lost..."

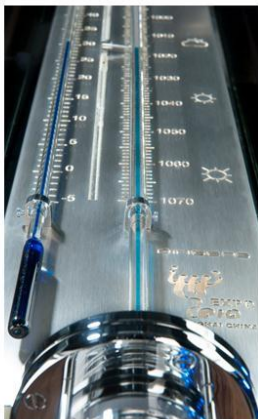


FIGURE 1: Innovacelli Barometer - Modern Series.

THE INNOVACELLI: CRISIS BECOMES OPPORTUNITY

“Dingens developed a new instrument in close cooperation with two knowledge partners: the University of Hasselt and Sirris, the Collective Centre of the Belgian Technology Industry.”

With these support measures, Dingens developed a new instrument in close cooperation with two knowledge partners: the University of Hasselt and Sirris, the Collective Centre of the Belgian Technology Industry. Professor Robert Carleer of UHasselt conducted the chemical research and investigated each component's sustainability. Sirris was responsible for the mechanical aspects of the new instrument. The result of this open innovation project was a new barometer, The Innovacelli. This innovation has all the advantages of the mercury barometer in that it is accurate, legible, durable, and decorative. Now, however, it is a durable and environmentally friendly product.

The Innovacelli is based on techniques that have been used in aviation for many years. In flying a plane, high vacuum metal cells respond very precisely to pressure differences and indicate the plane's height. The expansion of these cells can be measured to thousandths of a millimetre. To convert these pressure differences into a tool to record air pressure, the metal cells are brought into contact with a liquid that reacts to differences very accurately. It's a system based on an invention by Christiaan Huygens in the 17th century and allows the scale to expand to 50 cm in length. This makes the instrument highly accurate and easy to read.

Dingens' initial goal was to develop an instrument that could replace the mercury barometers, while being eco-friendly and sustainable. In addition to reaching these goals, the company ended up with a product that was much more accurate and user-friendly. The Innovacelli outperformed the original barometers in several respects. Unique to this instrument was the altitude calibration. With a simple turn of a knob, the barometer can be set to the altitude at which it will be used. Indeed, the procedure to adjust a mercury barometer to different altitudes was much more complicated.

All of these advantages created new and unintended business opportunities for the company. One of those opportunities was situated in the U.S. The Innovacelli produced by Dingens Barometers & Clocks solved a need in American hospitals, where the resistance to using mercury is much more outspoken than in Europe. Barometers are needed for blood gas analysis, treating lung disease, and delivering cancer treatments. Before the Innovacelli barometer was developed, the only alternative was the digital barometer. The problem, however, was that digital barometers are not accurate enough for professional applications. In the U.S., 5,900 hospitals, each using two to five barometers, represented a gigantic market for Dingens Barometers & Clocks, who initially forecasted sales between 1,000 to 2,000 barometers annually.

In addition to expanding his market, Paul Dingens needed a solution to another problem. Because barometers are extremely sustainable, every customer is actually a lost customer. People often shared with Paul that they still owned a mercury barometer that once belonged to their grandfather. Because the Dingens Barometers are



FIGURE 2: In 2009 Dingens Barometers & Clocks launched an innovative barometer without mercury: the Innovacelli Barometer.

THE INNOVACELLI: CRISIS BECOMES OPPORTUNITY

built to last, people only buy once. To address this issue, Paul devised a new business case: he provides a service that takes in mercury barometers and recycles them, thereby removing the mercury hazard for the owners.

The durability and flexibility of the instrument also allows Dingens to develop an instrument for the new Antarctic ICE Expedition 2011-2012 for Dixie Dansercoer and Sam Deltour. This instrument will record meteorological data at an altitude varying from 0 to 3,000 meters on the Antarctic Plateau at a temperature of -50°C and under extreme environmental conditions. This development demonstrates that the instrument can be applied to various situations and products can be developed on demand. Moreover, by involving itself with this expedition, the company has also shed the reputation that barometers are old-fashioned and antiquated. In this sense, the project is an important marketing-tool, because the company currently lacks the budget to roll out a proper marketing strategy.



Figure 3: Vacuum metal containers react to the changing air pressure. A combination of 8 vacuum boxes can give an extremely accurate measurement of even the slightest change in pressure.

With the help of the Open Innovation process, Dingens Barometers & Clocks converted a crisis into an opportunity. The IWT application procedure forced Paul to conduct an elaborate feasibility study in which self-critique and sense of reality were very important. The IWT's approval of the project motivated other partners, clients, and employees to trust the company.

According to Paul, the Innovation Centre also played an important role in the process. They motivated him and provided the much-needed knowledge of different sectors and a stimulating environment. Another crucial element of the Open Innovation Process were the knowledge partners—the University of Hasselt and Sirris. They provided extended knowledge, structured research, and experience that elevated the product to a higher level. Not only were the standards regarding accuracy, sustainability, and legibility met, they also created a user-friendly, easily calibrated, and transportable product.

Learn More

<http://www.barometers.com>

<http://www.innovacelli-barometer.com>

<http://www.antarctidice.be/>

<http://www.antarctidice.be/media/14020/mob-ice-exped2011low.pdf>

The AirFryer (see p 86) is another example how new applications emerge gradually. The Philips AirFryer was originally developed as a tool to fry French fries and other food Europeans fry with a deep fat fryer. The Airfryer was seen as an alternative to create fries that were much healthier than frying in regular fryers. It was positioned as a top-segment product in the frying tools market, priced at 199 €. Philips soon realized, however, that the appliance's new Rapid Air Technology—the device uses a grill and a fan to blast very hot air around food at high speeds—required new handling. Philips spent significant energy educating customers about how to make the fries tasty and crispy in an Airfryer; essentially, customers had to learn to fry again because hot air frying differs from frying in regular fryers. Cooking customs had to adapt considerably. With the Airfryer, a batch of handmade chips needs just half a spoonful of oil and takes more than 12 minutes to cook. Oven-ready French fries can be cooked to a crisp in nine minutes. More important, however, is that rapidly rotating hot air technology can produce a brown and crispy finish in everything from chicken legs to scampi. Steak, hamburgers, chicken breast, and frozen chicken nuggets are only a few examples of what can be fried. Those with a sweet tooth will be happy to learn that the Airfryer can bake a cake in 25 minutes.

The wide variety of meals that can be fried with the Airfryer (and competing devices) will most likely change frying habits and cooking in general in the next decade. With Philips communicating with customers via its My Kitchen Web site, different customers are already experimenting with new ingredients, meals, and so on. In addition, Philips was collaborating with large snack companies such as Mora to combine efforts to promote food snacks and the Airfryer, explaining to customers how they could optimize the device for several frozen snacks.

Using the fryer's food separator accessory, users can fry several foods at once without mixing their flavors—no one wants their apple fritters tasting like halibut or chicken nuggets smelling like scrimps. The AirFryer also has an air filter to keep the smells under control so that the house does not smell like a chip shop. Tasty and healthy fried food is, of course, the major sales argument, but these additional features are also interesting. The food separator allows customers to fry an entire meal and can inspire snack producers to develop different combinations with the same frying time as a ready-to-eat meal.

In summary, Philips developed a device to fry tasty but healthier chips. Because the technology was quite different from deep fat frying, it also created new options to change recipes and frying habits. These options, however, were not considered at the outset. The Airfryer was positioned as a high-end product and as a possible alternative for regular fryers. The new possibilities the Air fryer and its Rapid Air Technology present only emerged after customers started to use the device and when other players in the market, such as snack producers, envisioned new market opportunities. The Airfryer has now been on the market one year, which is far too short to explore all the possible options and applications. It will be interesting to follow up in the next five to 10 years on the ecosystem that is developing around the AirFryer or similar frying devices. New applications for new technologies are detected only slowly. It is a gradual process that is difficult to discover when a product that incorporates a new technology is launched.

3.3. Diversify or not?

It is remarkable that the firms we interviewed did not diversify over time into new businesses that were not or only weakly related to their core business. Each firm stayed focused on its product markets and customers. The most interesting example in this respect is Curana. Although the company changed significantly in the last decade, it has always been focusing on providing solutions for bike manufacturers. Similarly, Jaga is still a radiator factory after decades of changes. Quilts of Denmark

stayed in the quilts and pillows market. The innovation and design capabilities these companies built over time gave them definite opportunities to diversify into other markets. Curana, for instance, was invited to design lighting armatures. Technically, this was perfectly possible, but two reasons emerged as to why a small, innovative company should stick to its core products. First, new product markets have their own specific challenges. Lighting, for instance, is highly regulated on security issues, and a company such as Curana has no idea how to cope with these challenges. Second, the company's reputation is related to its own ecosystem, including its customers. Outside that open innovation network, the company cannot rely on its reputation and it has to start from scratch to build its network of partners and customers.²⁷ Open innovation networks thus enable a company to deliver value in completely new ways to its customers. They also, however, keep the company tied to the existing innovation partners and customers. In a phrase, innovation networks enable, but they also bind.

Devan also shows a similar pattern of moving from one product category to another. The company has stayed highly focused on the textiles chemicals industry. It still supplies the same type of clients as it did 20 years ago. Indeed, the type of products changed, but not the clients. The firm moved from relatively easy chemical applications in the textile industry to very advanced products. Probiotex, for instance, applied microcapsules containing suitable non-pathogenic bacterial spores that, when released by breaking the microcapsules, colonize the surfaces of treated textiles. The bacterial colonies consume unwanted matter (dirt, soil, dust mite excrement) on the surface of the treated material. This improves hygiene and reduces the incidence of allergic reactions. Research and development over the years has resulted in using fewer chemicals in this industry. And, the new products are eco-friendly and some provide a more hygienic or healthier living environment. The race into ever more complex applications of chemicals coincided with a continued focus on the same type of customers and applications. Furthermore, the innovation partners were involved in long-term contracts and formed a stable network of trusted partners that had known one another for years or decades. This improved the effectiveness of their collaboration over time.

PRoF is the only example that initially seems to escape this logic. PRoF is a customer-centered consortium and should not be confused with different ecosystems in which partners work together to deliver a product or a service to a particular customer group. PRoF delivers a new way of thinking about patient hospital rooms, personalized residences, or healthcare. The PRoF business model brings together several companies with complementary competencies to develop a new idea or concept for a particular end consumer (patient or the elderly). PRoF was successful in transposing the concept from a patient room, to a personalized residence, and finally a place to care for elderly persons. Here again, however, several aspects remain unchanged over time, including the focus on a particular customer group and the combination of specific partners in the consortium (same leading companies). Moreover, the partners get much more exposure through the PRoF-consortium than if they work separately or within a traditional industry approach.

In all these examples, we see that the companies do not diversify. They stick to their value chain partners or customers. In several cases, the innovation network is one of the factors that limit the options to change over time. The innovation network is an enabling factor in generating new products or services, but it also limits the number of options for the company to change and diversity.

Figure 7: Case Jaga

Case Study

JAGA: OPEN INNOVATION FOR RADIATORS

Jaga is a radiator company situated in Diepenbeek that employs 600 people. Their production lines focus on ecology and aesthetics and are divided in three groups: energy savers, eye catchers and top performers. The company targets the top segment of the market with products based on technology, design, and a philosophy of cradle-to-cradle service. This vision however, is the outcome of an evolution that matured across 40 years.

In the early 1960s, brothers Jan Kriekels, Sr. and Gaston Kriekels founded the central heating installation company Jaga. Jaga was a modest family business, which operated mainly in the local construction market around Hasselt, but soon experienced severe delivery problems. Due to excess demand, radiator companies in the area could not deliver to the ever-expanding construction market. The two brothers saw the need and opportunity for a local radiator company, and in 1970 they started their own radiator production line. They produced one type of radiator that had three features: short delivery time, high warmth output, and a classic but inexpensive design. This simple strategy proved to be exactly what the local market needed at that time. Soon, most local installation companies became Jaga customers, and the company expanded quickly in the following years.

In the 1970s, the global energy crisis triggered the company's first setback as high oil prices had a dramatic effect on the construction market and consequently the radiator market. Jaga saw their revenues drop by 25%. To survive, managers and engineers at Jaga explored new energy saving products. They designed and built three new products: the heat pump, the air dehumidifier, and the cool cell. This drastic change in strategy represented a significant research and development (R&D) investment for the modest family company, but proved to be successful. Less than five years later, however, energy prices dropped to one-third of their high, and the idea of energy savings ended rather abruptly. This plunged Jaga into even deeper financial problems.

Jan Kriekels, Jr. was first introduced to the family business during the 1970s and during the next 20 years he learned about almost every Jaga department. In the 1990s, he succeeded his father

“With a strong belief that innovation lies at the heart of the company culture, Kriekels initiated a cultural change at Jaga.”

as Jaga's director and assumed responsibility for the once successful company that needed a drastic strategic change in order to survive. With a strong belief that innovation lies at the heart of the company culture, Kriekels initiated a cultural change at Jaga. His goal was two-fold: 1) to make the company more creative and 2) ensure that individuals would get more freedom inside the



Figure 1: The Heatwave is the first radiator to unite the fine details of craftsmanship with industrial efficiency. The result is an expressive design with a maximum amount of surface to release warmth.

JAGA: OPEN INNOVATION FOR RADIATORS

company to become corporate entrepreneurs. With this goal established, Jaga changed the way it offered products by implementing several major strategy changes.

The first strategy the company implemented was called the solution strategy. Jaga wanted to provide solutions to customers' needs by eliminating commodity products, building a variety of products to create choice for customers, targeting an international market using local partners, and differentiating itself with unique products for a specific market.

"...the Lab was open to scientists to conduct simulations for personal research. By opening themselves to the scientific world, Jaga connected with scientists in an effort to outpace the competition in product technology."

The results of this strategy exceeded customers' expectations, and soon Jaga began to experience a downside of being successful: competitors started to imitate the company's products. To strengthen the Jaga brand name, the company launched the 'Experience strategy' in 2002. The first step with this effort was to launch an Experience Department that would be responsible for product events, marketing Jaga, and communicating the Jaga philosophy to potential customers and stakeholders. The Experience Department's first important achievement involved installing the Experience Lab in 2005 to support engineers and sale employees. The Lab consisted of two separate houses that could simulate every weather condition and calculate heating time and costs. In addition to being available to Jaga employees, the Lab was open to scientists to conduct simulations for personal research. By opening themselves to the scientific world, Jaga connected with scientists in an effort to outpace the competition in product technology.

In one case, a Russian researcher, Professor Tabunschikov, was invited to conduct private research at the Experience Lab. The effort progressed without contracts or conditions, but instead was based on trust. This cooperation positively influenced export activities in Russia, and Jaga was asked to deliver heating solutions for the Federation Tower in Moscow, Europe's highest building in 2008.

Next, the Experience Department built a product showroom in the main facilities of the company in Diepenbeek. This showroom was part of an extra service project that explored how to cross company boundaries and established new relationships with suppliers, customers, complementary manufacturers, and other actors in the value chain.

Jan Kriekels expressed the need for more creativity and innovation in the Western business world. In his view, most companies were not successful in tapping knowledge from sources that existed outside the company. Jaga recognized growing interest in open innovation and was aware of the potential to source ideas from communities, which strength was already proved in the software and ICT industries. In 2005, Jaga began to create a blueprint of an own Uchronia (Greek for timeless) community.



Figure 2: With its low water content and high coefficient of heat conduction for low flow temperatures, the Strada DBE, with its modern Low-H₂O element, is ideal to use with combination and high efficiency condensing boilers and condensation technology.

JAGA: OPEN INNOVATION FOR RADIATORS

To officially launch the beginning of the Uchronia community, Jaga participated in the Burning Man Festival of 2006. This annual festival is held in the Black Rock desert of Nevada (USA). According to Jan Kriekels, the philosophy of the Burning Man festival is very similar to the goals the company set for Uchronia: to build new, beautiful art forms using a team of creative souls. For Jan, it was very important that Jaga personnel experienced this culture themselves. Jaga participated in the festival to make a bold statement to the world. In total, 43 Belgians, including Jaga employees, labour representatives, and work partners built a massive wooden structure that consisted of 150 kilometers of timber, with a floor span of 60 by 30 metres and a height of 15 metres. The piece was inspired by Arne Quinze en Jan Kriekels. Building and burning their art piece was meant to be the official start of the Uchronia project, while also drawing massive press attention. During the festival, the Uchronia community website (www.uchronians.org) was launched. Anyone could register free of charge on the Web site to become an "Uchronian". The Web site had three major features: an interactive forum where people could share ideas; a project page where active projects were presented and continuously updated with details about progress; and an inspiration page that printed interviews with recognized innovation leaders. Unfortunately, the community never materialized in the way Jaga expected. Several online community experts observed that creativity is too broad and too abstract as a concept to make people passionate about it. It was not possible to transplant the culture of Burning Man to the Uchronia Web site. Jaga was highly successful in starting up open innovation initiatives, but Uchronia did not deliver what Jan expected.

In June 2007, Jan Kriekels organised the Jaga Product Days. All Jaga personnel were encouraged to present their ideas for future products. During Jaga Product Days, a total of 119 ideas were presented in a factory hall near the Jaga factory in Diepenbeek. One of the popular findings of this event were simple but valuable adjustments to existing radiators. The Product Days idea resulted in several valuable new projects for the company and demonstrated that the company could fully use both employee potential and external sources.

In a time when budgets were tight due to rising prices for raw materials and declining demand from the construction industry, Jaga developed yet another open innovative solution. In 2007, the company had transformed its information technology (IT), and the team responsible for the changes was no longer needed. Rather than downsizing the IT team, however, the company positioned the team's knowledge and skills as a multifunctional team that other companies could hire to invest in their own IT structure. This way, management ensured that personnel stayed up-to-date with current trends, but was still available for Jaga when needed.

Recently, Jan Kriekels wanted to take open innovation to the next level. He founded 'Open Green Force'. A major difference from previous open innovation projects is that in this case, Kriekels' commitment was personal. At the outset of this project, Jaga is not directly involved. This start-up was a partnership of Jan Kriekels, Katja Craeghs, and SIM Belgium, a company that promotes young entrepre-

"One of the venture's objectives was to make green energy accessible to everyone by conducting home energy scans and subsequently providing the customer with advise on which investments to make and how to finance them."



Figure 3: Uchronians at the Burning Man Festival 2006.

JAGA: OPEN INNOVATION FOR RADIATORS

“The goal of Open Green Force is to implement some of the ideas that Jaga employees had suggested, but were not interesting or realistic enough for the company to pursue.”

neurial talent in Belgium by offering support in expanding new and innovative business activities. Support included personal assistance as well as financing and company management. The goal of Open Green Force is to implement some of the ideas that Jaga employees had suggested, but were not interesting or realistic enough for the company to pursue. SIM wrote a business plan for the project, which consists out of multiple, innovative green solutions for the housing and renovating market. One of the venture’s objectives, for example, was to make green energy accessible to everyone by conducting home energy scans and subsequently providing the customer with advise on which investments to make and how to finance them (i.e. by using potential subsidies). Jaga also benefited by supplying the green heating solutions.



Learn More

<http://www.jaga.be>
<http://www.uchronians.org/>
<http://www.burningman.com/>
<http://www.theradiatorfactory.com/experience/>

3.4. Building and exploiting reputation and brand

Several of the companies we interviewed were building a reputation or brand. Usually this effort is part of the strategy to differentiate products or changing from a product or production-oriented strategy into an experience-based strategy. Building and branding a corporate reputation is a logical consequence of this change. Several small companies we examined were building a corporate reputation around authentic ideas, values, or experiences. Building a credible reputation can be very expensive, and SMEs usually do not have the money to make this investment. Less expensive alternatives exist, however, that rely on the reputation of external organizations and that make reputation building financially feasible for SMEs. First, SMEs can try to get labels of different official organizations. These can be all types of organizations certifying that products meet requirements or standards concerning health, technical quality, environmental norms, safety norms, and so on. Second, they can try to build a reputation in a credible way by winning awards: Quilts of Denmark, Jaga, and Curana are three companies that used different types of awards granted by prestigious organizations to build their image. These awards boost the visibility and reputation of the small company. Finally, articles in magazines, short interviews that are broadcasted or put online, and conference talks are also instrumental for increasing the company's reputation.

Take, for instance, Quilts of Denmark (see p 65), which developed a functional quilt with the product line branded TEMPRAKON. After consulting with an examination board of sleep experts, QOD decided to produce a functional quilt that would reduce the temperature variation under the quilt to provide a healthy sleep. The company finally found a promising technology that was developed originally for NASA in 1988 by Triangle Research and Development to produce astronauts' suits and gloves. Subsequently, the Space Foundation recognised TEMPRAKON bedding products as a Certified Space Technology. The use of this label on the quilts was a guarantee that QOD could differentiate its TEMPRAKON line of products from potential imitators. A label from an official institute such as the Space Foundation builds a company's reputation in a highly credible way. Since the founding of the company in 2000, QOD had also received several innovation awards from the Danish government and the Tuborg Foundation, among others. Furthermore, QOD's products were also approved and tested by Oeko-Tex Standard 100 for chemicals and dyestuffs; Astma-Allergi Forbundet (the Danish Asthma & Allergy Association) for allergies; NOMITE for dust mite allergy; and Downafresh for European Standard hygiene requirements. Finally, Hans-Erik Schmidt, one of the founders, was frequently asked to speak at conferences to explain the success of the TEMPRAKON.

Curana exemplifies another way a small company can build a strong reputation in less than a decade. The company had won several design and innovation awards; for example, it received the prestigious Design Management Europe Award in 2008. In the same year, the company also won the IF Packaging Award for packaging its D-Vide product and received two IF Eurobike awards for a new dress guard and the C-Lite mudguard and chain fender. In 2009, it won another IF Eurobike Award with Flood, a lightweight luggage rack with a built-in rear light. Finally, in 2010, it won the prestigious Henry Van de Velde Award. Besides awards, Curana became well known as a result of publications both within and beyond the bicycle industry. Examples include newsletters from universities and knowledge centers and publications of Design Vlaanderen, among others. Just as in the case of QOD, Dirk Vens, CEO of Curana, was a highly sought-after speaker for seminars and conferences to address design, entrepreneurship, and open innovation. All these activities provided the company with more international visibility and a reliable reputation as top design company.

Jaga is another (and a more extreme) example that illustrates how corporate reputation can be built. First, Jaga cooperated continuously with several architects, designers, and artists such as Arne Quinze, Joris Laarman, and many others. This intense interchange with creative people resulted in a flow of refreshing ideas for the company. Next, Jaga won numerous awards for different products. Its Playradiator (see p 47)—a colorful radiator for childrens' rooms—for instance, won the Henri Van de Velde award in 2011. The new St. Bartholomew's School in Newbury uses Jaga LST radiators, which

incorporate Low H₂O heat exchangers. This school won the Architectural category in the prestigious Green Apple Awards in 2011. Furthermore, Jaga was involved in several events such as the Burning Man event in Black Rock Desert, Nevada. Jaga's project, 'The Belgian Waffle', led by Jan Kriekels, won the 'best art installation' award in 2006. Finally, the company also sponsored specific sports such as yachting, Olympic class sailing, and historic motorbikes. All of these efforts and awards contribute to the idea that the companies can boost creativity, craftsmanship, and improve the sustainability of their products.

Jaga's success is linked closely to Jan Kriekels success. As Jaga's owner, Jan organized an increasing number of highly innovative projects. He became an icon of creativity with an international reputation. As a result, he was invited as a guest speaker at several conferences for his controversial ideas about creativity and the role entrepreneurs play in the business community. Furthermore, he was appointed as a jury member of several international innovation and management organizations. For instance, he was appointed as jury member of the Design Management Europe award, which is granted to European companies that use design to create added value for their customers and know how to commercialize design in products. When a manager becomes an icon of creativity and innovation, it becomes an additional asset in for developing new business opportunities. Today, Jan Kriekels has a worldwide reputation as a thinker and evangelist of the cradle-to-cradle philosophy. His extensive personal network and his ideas combined with down-to-earth projects such as those in found in "Open Greenforce". This organization analyzes the investments required for a building to reduce energy consumption to a minimum. Combining people with strong ideas and reputation with green technology projects is an interesting recipe for successful new ventures.

Jaga is certainly an extreme example of how a company can build a reputation over time. It also shows, however, how powerful an innovative culture in a company can be. In 2010, the company was losing money due to the rapidly increasing price of raw materials, particularly copper. Most companies would downscale innovation and creativity experiments. In contrast, Jan Kriekels sent two top managers home to restructure the firm into a company with a flat organizational structure. The idea was that 25 small profit centers could work with a relative autonomy to increase creativity and customer orientation. This organizational change was implemented in mid-2011, meaning it has just recently been implemented. It is thus too early to evaluate its effects on the company's bottom line.

Key learning points

- Successful SMEs do not remain with one business model forever. They are continuously probing new business models. Each new business model builds on the strength of the previous business model and improves its value proposition and profitability. This constitutes a path-dependent process because new opportunities to transform the business model into being more profitable can only be detected after the previous business model has materialized fully. In business model innovation, too much uncertainty exists to plan analytically a way to move forward. Indeed, SMEs change their business model in a stepwise way.
- Business model innovations are designed to create more value and generate more profits, and increasing profitability can be the result of several changes. We have emphasized innovating SMEs can increase profitability by increasing the number of control points and creating a unique offering. In the case of Curana, the company gained control points to differentiate itself from the competition. In addition, its accessories were unique, incorporated great designs, and combined new materials in a way no other single producer could copy.
- If a company faces serious problems in its existing markets, it will look for a (technological) solution to solve the problems. Discovering new applications for the new technology is a slow process that emerges, most often unintended, after the new technology has existed for a while.
- In contrast, small, innovative companies do not diversify. They stick to their markets, customers, and partners.
- Open innovation networks enable a company to deliver value in a completely new ways to its customers, but they also keep the company tied to the existing innovation partners and customers. Innovation networks enable, but they also bind.
- Small companies must use relatively inexpensive but credible ways to develop a reputation or brand. Examples include certificates, awards, lectures at conferences, press coverage, and other inexpensive means.

4 How SMEs build new business models through open innovation?

In the previous chapters, we explored how small firms can boost their competitiveness in the long run by changing their business model. So far, we have not been emphasizing the role of the innovation partners in enabling or supporting these changes. In this chapter, we examine how SMEs integrate open innovation as they develop new business models. We have already explained why the business model approach is useful in the context of SMEs that want to improve their competitive position²⁸. Business models also play a central role in open innovation as the continuous sourcing from and collaboration with partners can add value for the focal organization²⁹. The business model literature, however, has been marginalizing partnerships to outsourcing or acquiring particular activities or assets. A major shortcoming in the existing literature, therefore, is to analyze *how open innovation and collaboration with external partners can add value to the business model of SMEs*.

A business model describes how an SME creates value for a particular customer group and how it captures a portion of that value. Open innovation uses the division of innovation labor to both create and capture value. We will look first at how the companies we interviewed jointly create value with their innovation partners. Next, we examine how collaborating with these partners also empowers an SME to capture greater value by using the partner's key assets, resources, or positions. Third, we focus on the management of an SME's network of innovation partners; creating and capturing value never materializes automatically. Values only materialize if a focal SME (or nucleus of SMEs) takes a lead in organizing and managing the innovation network. Finally, we also pay more attention to particular problems such as depending on IP-deals with partners that operate as technology suppliers.

4.1. Benefiting from open innovation: value creation

All SMEs we profile in this report generate value jointly with their innovation partners. SMEs have good reasons to reach out to different partners to develop and commercialize new business ideas. While the open innovation literature has focused mainly on large companies that open up their internal R&D labs, small firms are by default open in their search for innovations and new business opportunities. This is because they do not have the competencies and financial means to develop technologies internally. Innovation in SMEs is hampered by lack of financial resources, scant opportunities to recruit specialized workers, and small innovation portfolios such that risks associated with innovation cannot be spread. SMEs must rely on their innovation networks to find missing innovation resources. Today, open innovation activities are more important than ever because of the increase in technological complexity and the shortening of product life cycles.

Characteristic barriers to innovation in SMEs are financial constraints, competitors who are rapidly copying the innovation, lack of protecting intellectual property, absence of complementary assets such as production facilities and access to distribution channels, poorly developed design and manufacturing skills, and insufficiently developed technological and managerial skills to commercialize a product professionally³⁰. Consequently, it is not surprising that small companies are practicing open innovation in one way or another. *The main question, however, is how they can create value and capture value in this way*. In this chapter, we examine how an innovating SME, together with its innovation partners, creates value for a target customer group.

Business model innovation starts with discovering or recognizing new forms of value creation for a particular customer group. Companies create different "value drivers"; that is, sources to create value

and referring to any factor that enhances the total value created by a change in the business model. Examples—as we have seen in Chapter 2—are reducing costs for customers (e.g., Isobionics), increasing time efficiency, solving problems (e.g., DNA Interactif Fashion), increasing the attractiveness of the customers' products or services (e.g., Curana), and providing new functionalities and increasing emotional value (e.g., Quilts of Denmark, Curana, and Jaga). In each of these cases, the focal SME needed strong partnerships with other organizations to develop the new product or service. Limited by financial constraints or lack of technical competencies, the companies we interviewed had to team up with partners with complementary skills.

The partners with which the focal SME will partner is determined largely by the existing technology base of the SME and the skills required to develop and commercialize the new product or services. Most SMEs we studied rely heavily on value chain partners and a few additional knowledge partners such as universities, research labs, and knowledge intermediaries. This strong reliance on value chain partners is partially due to the fact that most companies are active in low- and medium-tech industries. In these industries, innovations are usually the outcome of recognizing new market opportunities, with technology push innovations playing only a minor role. Each firm we examined started its open innovation adventure with a new concept about how to serve customers better. In some cases, customers identified a problem themselves; in other cases, the entrepreneur devised a new concept. More radical innovations require more new partners to be introduced into the network. In the case of Segers & Balcaen (see p 35), the company followed the same innovation pattern of offering customized solutions for each customer with particular packaging problems. In this case, only the customer changed. In contrast, DNA Interactif Fashion (see p 29) was conceiving a complete turnaround in the purchasing experience of fashion goods and, as a consequence, also in shop design. It had to team up with different parties to develop the two basic technologies (displays and 3D scanning) to make virtual shopping possible. In addition to the many technology providers, DNA Interactif Fashion also had to team up with fashion retailers and other organizations in the fashion industry. Because the final product was a completely integrated solution based on integrating visualization, 3D scanning, and content (clothing, hairstyles, eyeglass frames, accessories, etc.) from the different segments, DNA Interactif Fashion was collaborating with a dense network of strategic partners to establish this new virtual shopping and “fitting” experience. The innovation replaced the sometimes unpleasant or awkward process of fitting and viewing clothing in reality. Many of these partners have never worked within the fashion industry, making collaboration not straightforward.

In a similar vein, Quilts of Denmark (see p 65) changed the quilts industry such that the company can no longer be compared with traditional quilt manufacturers. Quilts of Denmark defined itself as a provider of a healthy sleep by developing the first functional quilt based on Phase Changing Material (PCM) technology. It combined valuable insights from sleep experts with the PCM technology, which has the required characteristics to improve sleep. Starting with the simple conviction that providing a healthy sleep was a useful way to discover new business opportunities, the company's entrepreneurs (both of whom had 20 years of experience in the quilts and pillows industry) had no idea what “healthy sleep” meant. Therefore, they visited several renowned sleep institutes located in Danish hospitals such as the Glostrup Hospital of the University of Copenhagen. After setting up an examination board with these sleep specialists and physiotherapists, they discovered in clinical reviews that sleep problems and disorders were a major problem in modern societies. They also learned how the quality of sleep affected people's lives. The examination board concluded that the company should focus on how the temperature under the quilt varied, which is one of the major factors that determines the quality of sleep. Once the target was set to reduce the temperature variation to the comfort zone focus, the project changed into a search for the right technology. Ultimately, the company found phase-change technology that had been originally developed for NASA in 1988 by Triangle Research and Development (TRDC). Hans-Erik Schmidt, one of the founders, contacted NASA, and the space organization connected him with Outlast Technologies, an accredited licensee for this technology.

QOD had to solve two technical issues. First, the material Outlast used was hard and, therefore, not suitable for use in quilts and pillows. The challenge was to find a way to introduce the phase-change material into quilts and pillows without reducing the flexibility and fluffiness of a quilt. Outlast and QOD worked out a solution in which the PCM was encapsulated in very small microcapsules. These microcapsules were filled with a special type of wax that absorbed and released heat. A piece of fabric that could be manufactured into a quilt could contain millions of microencapsulated phase-change microcapsules. Microcapsules could be applied either on top of fabrics or infused into the fibers during the manufacturing process. Because Outlast was the engineering partner in this venture, its technical competencies were crucial in developing the microcapsules. Second, QOD had to develop the right mixture of microcapsules. The optimal environmental temperature around the body is about 28 to 30 degrees Celsius when a person is sleeping. The rate of cooling/heating and the final temperature could be obtained through a mixture of microcapsules. The wax in different capsules could melt at different temperatures depending on its chemical composition. QOD used the knowledge of its medical contacts to develop the mixture of microcapsules that delivered the optimal temperature and cooled off or heated up slowly enough to ensure a comfortable sleep. QOD experimented with different mixtures, and samples were controlled and tested with the help of medical experts. QOD's first functional quilt—branded as Temprakon—was the result of linking PCM technology with insights about sleep comfort from the medical world. By reaching out to partners that had never been in contact with the bedding industry, QOD could launch a product that changed the quilts market considerably.

Open innovation was also key in establishing Curana's commercial success. Without the collaboration of external partners, Curana could not have accomplished or even started its strategic turnaround in 1999. It started with the search for new concepts and opening the production system, but was rapidly expanded to cooperative networks. Subsequently, each partner contributed in a specific way to the success of the innovative drive in the industry. To develop and produce the B"Lite—Curana's first mudguard with a sleek design—the company was collaborating only with Pilipili and Anziplast. Even at this stage, however, Curana called in the technical expertise of VKC. Later on, Curana established strong bonds with suppliers, the designer community, knowledge centers, and customers.

Working with external partners over the length of the value chain (from design to production and sales) leveraged the business to new opportunities that could not have been seized without collaboration. Open innovation was a direct consequence of Curana's strategy: By offering new concepts proactively to the market, it had to be the vanguard for developing new products and using new materials and technologies. Accordingly, Curana was developing concepts that the company could not produce itself, and it was looking for partners for expertise it did not have in-house. The advantages of open innovation were obvious; together, partners had more knowledge and expertise; they could produce results more quickly; and they could develop highly innovative products as they built upon one another's specialized expertise. Through partnerships, Curana could grow faster in a cost-efficient way. Moreover, Curana's network gave it access to an extensive pool of knowledge and expertise, which it could transform into extraordinary solutions for its customers. The network was a powerful tool in speeding up the innovation process and in combining novel designs with new materials. In this respect, Curana's innovation network is a nice example of how collaboration with innovation partners defines the competitive strength of a small firm and how the network becomes the locus of innovation³¹.

Jaga illustrates still another way to create value through open innovation. The company originally set up very simple initiatives to boost the company's innovative nature. In their simplest form, the *Jaga Experience Labs* form a test facility consisting of two separate houses that could simulate every weather condition and calculate heating time and costs. The lab was open for scientists to conduct simulations for personal research. By opening up to the scientific world, Jaga connected to scientists, obtained an early view on new and promising technologies, and in this way stayed ahead of the competition. In this way, Jaga got in touch with promising technologies to develop low CO₂ emission radiators, Jaga's so-called Energy Savers. The collaboration with scientists around the world also

resulted in more cooperation with construction firms worldwide. Moreover, *potential clients* such as construction companies and installers of heating systems *could also test and compare Jaga radiators with competing products on the markets*. Because Jaga had years of experience in the business of radiators with low use of HO₂ and low emissions of CO₂ as a result, most experiments favored Jaga products.

Jaga also explored initiatives to spur the creativity of employees and external partners by setting up Jaga Product Days in 2007 (see p 47). Jaga personnel and suppliers were encouraged to present their own ideas for future Jaga products. No a priori limitations indicated that the design had to be a radiator, but the submissions had to present new ideas about general heating solutions. Entrants had only six weeks to invent, create, and present a product prototype or product idea on a flyer. In an official contest, in which professional and non-professional designers were divided into two groups, product ideas were evaluated and awarded. For the non-professionals, extra technical resources and guidance were provided. Although this event was organized on short notice, 119 ideas were submitted of which 49 came from non-professional designers. Multiple juries evaluated products: Every export country had several representatives at the Product Days that graded the products on selling potential in their country. The R&D department graded the products with a focus on design, technology, and inventiveness. Management focused on the general selling potential that a product would have in the (near) future and on the production possibilities.

One of the popular findings of the Product Days was a simple but valuable improvement on an already existing radiator. The Strada radiator had a panel on top of the radiator that users sometimes had to remove to clean the battery or replace the oxygen filter. To remove this panel, most people at home used a screwdriver, which would often damage the varnish. Based on an idea from Product Days, a small pop-up device was now installed to remove the panel easily without using tools. The device was hardly visible when tucked in, but became a handle device when popped out. Another noteworthy project was called “Play”, which had the concept of a child-friendly radiator. With colorful and removable parts, the radiator could be changed in design. It also was user-friendly by concealing hot parts so children would not burn themselves if they were playing with it.

Jaga already had plans for expanding the Product Days in 2009, where universities would be invited to participate in the product days with their own ideas. They would also have access to factory resources and would be assigned dedicated engineers that could help build a prototype. In this way, the Product Days would have a more open character, but still be focused on future radiator product design. The Product Days is a tournament *and great tool to unleash creativity in a company at a very low cost*. It is a simple idea that can be organized in every company. It is, however, *only useful when individual creativity is decisive for the competitiveness of the product or business*. It is related to crowd sourcing or contests that have been organized by companies such as Netflix³². The expanded version of the Product Days did however not materialize till today.

PRoF members (Patient Room of the Future) (see p 59) jointly created value for customers in yet another way. From this point of view, PRoF is an interesting initiative because the consortium was not set up to produce and sell a product or service. PRoF envisions bringing in innovative ideas regarding how a patient room could look like in the future. It is a *customer centric consortium* that starts from the patients’ experience. We all know from our personal experience that we do not associate hospitals with a home-like feeling. It is important to understand the difference with the other innovation networks we described earlier: These are typical ecosystems to develop and commercialize innovative products or services for specific customers³³. PRoF is different: It starts from the patient’s room as customer-centric concept and analyzes it via a set of keywords regarding how the overall concept of a patient room should be changed to deliver value for the different stakeholders involved. Stakeholders are, in this case, the patient, nurses, doctors, family of the patient, and so on. PRoF was structured in such a way that it could progress with the new concept for a patient room and stay in tune with the stakeholders. PRoF includes both a small and a large consortium. The small one consists of a well-

selected group of architects, interior decorators, and several manufacturers of beds, nurse call systems, lighting, etc. These producers all make specific products or deliver services that were necessary to develop a new concept of the patient room. This group had commercial interests, and they invested money in the project. In contrast, the large consortium included usability groups such as nurses, hospital management, and so on. The small consortium started with a set of 20 keywords they received from the first meeting of the larger consortium. Keywords came from people who had experience, such as nurses, for example, who complained that they only could do real nursing work during 50% of their working time. The remainder was absorbed by administration and other tasks. The small consortium took this feedback as an input to set up an IT-system where nurses have more time for real nursing and make patients less dependent on nurses using intelligent monitoring and communication systems. The small consortium used the keywords to develop a new concept of the patient room that was subsequently translated into several products and systems to realize the concept. The concept was checked and monitored regularly in meetings with the large consortium. Companies learned from the usability groups' feedback and adapted products accordingly. Constructing the new patient room was accomplished after a year, and it was presented to the healthcare community on July 1, 2010. The manufacturers in the small consortium create value for patients and usability groups in a way that they could not achieve as single producers. The hospital market is a contract market and is highly regulated, with almost no room for innovation. All manufacturers thus faced the same problem. The PRoF consortium allowed them to set aside the regulations and think in an innovative way about a patient room that could add significant value to all the stakeholders involved. All product and services innovations were aligned with and integrated in the new patient room concept, which in turn was derived from the keywords that summarized the major challenges for the people that have experience with patients and patient rooms. Integrating different products and services into a new patient room concept also implied that their value for the usability groups was several times higher than when these products were sold as separate goods or instruments.

Figure 8: Case PRoF

Case Study

PATIENT ROOM OF THE FUTURE: CREATING A CONSORTIUM OF EXPERTISE

After taking the helm of his family-owned company, Jan Van Hecke, managing director at Boone International realised he had to diversify if the company intended to stay competitive as a furniture manufacturer. Realising that the government needed to invest more and more in hospitals and health care, he determined that the hospital furniture market was an interesting business opportunity. Although hospitals are a protected contract market, Jan succeeded in entering the market and has since evolved to be the third largest contract in Belgium to furnish hospitals and retirement homes. Working with various hospital suppliers, Jan noticed that every player in the supply chain was innovating on their own without working cooperatively with other suppliers. While this arrangement could trigger additional efforts to develop new products, it mainly caused delays and restricted major innovations in the sector.

To overcome these constraints, Jan established a consortium of manufacturers, architects, user groups, universities, nurses, and patient associations. He essentially created an innovative and complementary group with one common goal: To develop at least one innovative but feasible project every year. He started by looking for market leaders in the field. One such company was Televic, a company that develops, manufactures, and installs communication systems for health care. Televic was represented by Piet Verhoeve and project developer Cubist Creations, a company owned by Valerie Dhaeze. The consortium launched in 2009 with a brainstorming session in which 12 diverse actors participated. During this session, the consortium tried to identify problems in the market and connect some key words that would lead to a solution. The acronym 'PRoF'—the Patient Room of the Future—provided a practical platform for the players to brainstorm new applications and innovations for future products to serve the healthcare industry. Crucial in this process was that participants learned from one another in bringing their varied areas of expertise to the table. Even the Flemish government became involved in this project.

“Jan created a team spirit and open-minded atmosphere by stressing the importance of trust among the partners. He divided the group into two consortia: a limited, executive group and a larger group named the think tank. Neither was hierarchically organized.”



Figure 1: The Patient Room of the Future (PRoF) provided a practical platform for the players to brainstorm new applications and innovations for future products to serve the healthcare industry.

ROOMS OF THE FUTURE: CREATING A CONSORTIUM OF EXPERTISE

The Patient Room of the Future started with intensive, cross-disciplinary research. One of the team's first goals was to discover what needs and questions arose concerning hospital admissions. The medical world is confronted continually with specific questions from patients, caregivers, and visitors. Patients want more privacy, autonomy, and freedom of choice; caregivers and visitors not only want to support the patient, but desire an infrastructure that allows them to stay or sleep near the patient. Furthermore, medical staff were coping with an increasing number of patients per day, shorter hospital stays, and increased efficiency. The goal was to design an enhanced patient room by 2010 and bring the concept to the market in six months.

"On July 1, 2010, the prototype of the Patient Room of the Future was introduced at Boone International in Poperinge during an impressive public relations event."

From that first meeting forward, Jan created a team spirit and open-minded atmosphere, by stressing the importance of trust among the partners. He divided the group into two consortia: a limited, executive group and a larger group named the think tank. Neither of these groups were hierarchically organized. All partners were considered equally important for the process and had the same amount of decision-making power. According to Jan, feedback was given constantly and decisions were the result of an organic process of discussing and deliberating. Although there was no hierarchy, Jan clearly assumed a leadership role by taking the lead in managing the consortium. As coordinator, he set up and carefully prepared the meetings, ensuring that everyone was invited. Jan asserted that beyond these logistical tasks, the consortium was a self-organising structure in which every member was motivated to meet deadlines and deliver on time. Jan also created a strict schedule to guarantee that the project moved ahead expediently; in this way, team members witnessed the progress each time they gathered. This, in turn, infused members with enthusiasm during meetings, and they stayed committed to the project.

On July 1, 2010, the prototype of the Patient Room of the Future was introduced at Boone International in Poperinge during an impressive public relations event. Because of its conceptual design, the patient room of the future offered solutions for the needs and questions of both patients and caregivers. Valerie Dhaeze dressed and furnished the room, together with various architects and interior designers, starting from the patients' needs and concerns. The result was a modern patient room with a homely feel and filled with the latest technical innovations. In the room, a wall bed was installed next to the patient's bed, so visitors could sleep over. Doors were magnetic and floating, and each room had its own terrace. In addition to the design, the technical properties of the room were enhanced. The room's IT system had the intelligence to detect the patient's needs, wishes, and preferences via sen-



Figure 2: Valerie Dhaeze dressed and furnished the room, together with various architects and interior designers, starting from the patients' needs and concerns. The result was a modern patient room with a homely feel and filled with the latest technical innovations.

ROOMS OF THE FUTURE: CREATING A CONSORTIUM OF EXPERTISE

sors built into the furniture, built-in displays, and other technical innovations. Ultimately such improvements benefit the patient and simplify matters for the caregivers.

Another partner in the project was Philips. They equipped the room with an Aurea TV, with a fully integrated care servant system. The system operates both the television and peripheral equipment. The patient could watch television, go on line, and use video on demand, among many more amenities. In-Ham, an expertise centre that offers services to users with disabilities to achieve qualitative adaptations to living environments, provided the consortium with important advice on using the sanitary equipment and how to install showers and toilets. The bathroom – called the ‘wet cell’ – was seamless and very hygienic. Hogeschool Ghent developed textiles for the room that visually indicated bacterial contamination. The press described the patient room of the future as ‘making you forget you are ill’.

After successfully releasing the Patient Room of the Future in 2010, the partners joined again to develop a new and more ambitious project: the Personalised Residence of the Future. The idea emanated from realising that the healthcare sector is increasingly confronted with a growing number of elderly, inadequately adapting healthcare facilities to growing needs, and limited financial support from governments. The new project focuses on elderly persons and enhances their environment by emphasising comfort and a home-like feel. It was important to work in a non-stigmatising way and to co-mingle different generations so that elderly people do not become isolated. In addition, the group decided it was important to ensure the patient’s privacy, autonomy, safety, and freedom of choice. Their goal was to find feasible solutions for an intergenerational environment, with an infrastructure that allows caregivers to work comfortably. Thanks to progressive solutions in architecture, technology, and services, aged people would be able to stay at home for a much longer time rather than moving to a home for the elderly.

By 2011, the consortium consisted of more than 60 partners that combines all possible areas of expertise, technical knowledge, and professionalism needed to develop this room. Again, Jan emphasised the strength of the complementarity and equivalency of the different partners.

“The group decided it was important to ensure the patient’s privacy, autonomy, safety, and freedom of choice. Their goal was to find feasible solutions for an inter-generational environment, with an infrastructure that allows caregivers to work comfortably.”

In July 2011, the consortium presented the Personalized Residence of the Future, a unique concept demonstrating how a living environment can be adapted to the particular needs of the elderly. Results were impressive and occurred exactly one year after the successful launch



Figure 3: The Personalized Residence of the Future deals with a totally innovative concept of a Life Long Living environment. .

ROOMS OF THE FUTURE: CREATING A CONSORTIUM OF EXPERTISE

of the Patient Room of the Future. Thanks to innovative architecture, technology, and materials, the Personalised Residence of the Future embodies a balance between autonomy for elderly people and their caretaker. It was conceived as an apartment of four modules, each with a different function. Three modules are used as living space, with the fourth module adaptable according to the resident's needs. Some sensors detect, for instance, whether a resident falls down. Parameters can be registered and needed interventions can be planned and adapted automatically to each individual. Even the newest generation of LEDs was used to imitate daylight so that residents can read under optimal conditions.

“PRoF proved it had developed a successful way to bring together different participants around a customer-centred concept. PRoF also proved the group could work quickly to develop an innovative prototype and reach the goal of delivering a new concept each year.”

With the launch of the second concept, the PRoF proved it had developed a successful way to bring together different participants around a customer-centered concept. PRoF also proved the group could work quickly to develop an innovative prototype and reach the goal of delivering a new concept each year. This consortium, with its innovative and complementary partners, was eager to move on with similar, but broader and more ambitious projects. While presenting the Personal Residence of the Future in July 2011, the main team members had already planned a follow-on project in July 2012. They realized that they had to scale up the projects and bring other European partners to the team. The theme for 2012 is ‘services and care’.

Members of the Consortium

ACS - Agentschap Ondenemen - Alho - Anamorf - Aquaware - Artesis Hogeschool Antwerpen Departement Productontwikkeling - Avantgarden - Boeckx Architecture & Engineering - Boone International | Boone Projects - BSC | Aquaware - BURO II & ARCHi+I - BVZD Vlaamse Vereniging voor ZiekenhuisDirecteurs - Cubist Creations - Devan - De Witte Lietaer - DOT Directies Organisaties voor Pleegzorg - Durlet - Elasta - Enter - Extremis - Familiehulp - Fedustria | Optimo - F.O.S. | Seniorenzorg - Frames & fields - Francovera - Groep Kordekor | Groep Sanakor - Haelvoet - Hogeschool Gent TO2C - Holst Centre - IBBT (IBCN | SMIT | CUO) - IMEC - Ingenium - In-Ham Gits | Centrum voor Assistieve Technologie - Inoxline | Lannoo Metaalwerken - ISS - IWT - Knockaert Gerie - Kone Deursystemen - Lucas | KULeuven - Modular Lighting Instruments - Mondoor - MTC The Right Chair - Philips (lighting, healthcare, consumer) - RHMS Réseau Hospitalier de Médecine Sociale - Tele-Signal Electronics - Televic Healthcare - Thuiszorg - TTC Tile Trade Center - UGent Vakgroep Management, Innovatie en Ondernemerschap - Van Maele - VDB Productions - Veldeman Bedding - Vink - VitraPoint | ARTerior bvba - Vlaamse Verpleegunie | Urobel - VTDV Vereniging voor Technische Diensthoofden in de Verzorgingsinstellingen - Westelec - X-Aequo Design

Learn More

<http://www.televic-healthcare.com/en/PRoF>
<http://www.prof-projects.com/home.htm>

4.2. Capturing value in open innovation

Firms involved in open innovation activities not only have to create value for a customer group in a unique way, but they should also appropriate part of that value to be profitable. Open innovation allows companies to implement business models that generate more profits. We provide illustrations from the SMEs we have analyzed.

Some companies make money by staying ahead of the market as a truly innovative company. For example, Devan Chemicals established technology partnerships to develop textile chemicals with new functionalities. This small firm develops only chemicals that are new to the world and sells them at a high premium price. Protected by patents and in-depth knowledge about textiles due to its innovation partnerships with leading companies in the textile industry, Devan can profit from these innovative products for several years before competitors start to invade the market with inexpensive imitations. The company deliberately stops selling products once competitors begin to take away too much market share and price cuts significantly erode the profit margin. It is important to emphasize that the strategic partnerships of Devan Chemicals with technology institutes on the one hand and with lead customers on the other hand is essential for understanding how the company can continue to make profits in this way. Close collaboration with technology partners with leading-edge competences and detailed knowledge of the challenges of textile producers are key factors that explain why Devan Chemicals could stay ahead of competitors for decades now.

Other companies make money using open innovation to move from commodity products to highly differentiated products. Companies such as Jaga, Curana, and Quilts of Denmark go a step further in this ambition to capture more value by recognizing that experiences are a distinct economic offering with a high potential to charge premium prices. The founders of Quilts of Denmark started their business in 2000 with the firm conviction that it is possible to sell quilts at a premium price if they could offer customers the experience of a healthy sleep by adding new functionalities. They started with the observation that many people do not sleep well and that providing the experience of a “healthy sleep” could be an attractive sales argument. Similarly, Jaga is not selling radiators, but values. Eco-radiators appeal to some customers because they reduce the carbon-footprint of heating houses and buildings. Design radiators can be sold at a higher premium price because some customers value a nicely designed radiator such as the Heatwave (see figure 6). This radiator is developed by an artist, Joris Laarman, and Jaga. The result is an expressive design with a maximum amount of surface to release heat.

Finally, Curana captures value by developing radically new concepts in the bike accessory market. Today, the company develops new bike and biker accessories to turn biking into a unique lifestyle experience. In this way, products express who a person is or wants to be. Jaga, Curana, and Quilts of Denmark successfully sidestepped the commodity trap and now capture more value by focusing on how they can offer highly differentiated products and unique experiences to the consumer. Imitation is difficult because customers make a clear distinction between companies that offer the authentic experience and those that are copying it ³⁴. This also explains why these companies are investing significant energy in building a reputation and a company brand.

The same companies have yet other ways to capture value. The success of Quilts of Denmark’s first functional quilt, branded TEMPRAKON, was the result of years of close cooperation between sleep specialists and physiotherapists, on the one hand, and Outlast, which was responsible for developing the PCM microcapsules. The fact that developing a functional quilt required a combination of different types of knowledge from very diverse scientific disciplines offers Quilt of Denmark a strong control point: The right mix of microcapsules that provide a healthy sleep is a trade secret. Although the PCM technology was developed by Outlast and the production of microcapsules was outsourced

completely, Quilts of Denmark extracts a significant share of the value by producing and selling TempraKON.

Curana has a similar but more sophisticated way of making money. It has been migrating from an OEM to a unique position in the market, as we mentioned in Chapter 3. Curana develops new concepts and designs but sells them as tangible products. Curana invents, designs, develops, and manufactures bike accessories. It is no longer an OEM or an ODM; it is not a design office, not a polymer extruder. In this way, the company has created a unique position that cannot be copied by others unless they set up and manage their own innovation network. In short, Curana created its own market space by changing the relationship between bike accessories supplier and bicycle manufacturer fundamentally.

How do the manufacturers profit from participating in PRoF? First, they gain direct access to potential customers—although they are not in a sales mode in PRoF—and receive valuable information about the needs of nurses and hospital management. Second, the consortium is an initiative that allows them to develop a concept of a radically new patient room in a way that could not be realized if they were acting as single companies. There is synergy among the different, complementary partners in PRoF; indeed, a positive energy is spawned by the speed of action that is typical for the PRoF consortium and the combination of skills that triggers partners to develop extraordinary solutions. Third, the consortium gives manufacturers much greater visibility in the healthcare community. The Patient Room of the Future has been presented to most Belgian hospitals since its official launch in July 2010. In addition, a showroom presents the brand new idea of a patient room to potential customers. Visiting the showroom has the additional advantage that potential customers can invite different manufacturers at the same time. In the patient room, products were combined into broader solutions. It is thus necessary to look at the function or role of each product in the context of the room. Finally, PRoF had an impact on the producers' top line. There were two approaches. First, the global approach sold the PRoF room as a complete concept offered jointly by all producers. Second, members profited from increased sales of individual products or clusters of products. PRoF invited engineering offices and architect offices to diffuse the idea of the Patient Room of the Future among decision makers in building hospitals.

Figure 9: Case Quilts of Denmark

Case Study

QUILTS OF DENMARK: HIGH TECH FOR HEALTHY SLEEP

Quilts of Denmark (QOD) was founded in 2000 by Søren Løgstrup and Erik Schmidt. In the 1990s, economic prospects for manufacturing quilts and duvets faltered. Quilts were a commodity, buying habits changed, and the price became the main competitive focus. Retailers increasingly focused on price competition, squeezing profits out of the small quilt manufacturers. Consequently, quilt manufacturers were forced to lower their prices and compete principally on cost. The profitability of the industry decreased rapidly, and the industry was no longer attractive for investors.

As seasoned managers, Søren Løgstrup and Erik Schmidt had the intuition as that the industry could offer opportunities to break away from price-based competition. As such, they intended to pursue a radically new strategy to overcome this deteriorating market situation. They subsequently developed unique and innovative products to differentiate themselves from competitors. With an increasing number of customers attaching value to healthy sleep conditions, they considered that providing opportunities for healthy sleep was a major opportunity.

With the central mission statement of 'Healthy sleep for a better tomorrow', Løgstrup and Schmidt intended to produce and retail high-quality, functional bedding (quilts and pillows) that would actively boost clients' sleep quality. At that time, nothing like their products existed; therefore, they had to create the market demand. To realize this vision, they required a better understanding of the factors that influ-

enced sleep quality. They started to collaborate with various organisations including research institutes, laboratories, hospitals, and companies in different industries. They sought any relevant information beyond the boundaries of their industry to understand the characteristics of "a healthy sleep". They ultimately established an informal advisory board, populated with experts on sleep who could advise them on key issues. In addition, the sleep institute at the University of Copenhagen's Glostrup Hospital was extremely supportive and passionate about QOD's ambitions. Through this contact, Løgstrup and Schmidt were introduced to the science of sleep and the clinical practice of sleep medicine.

"They sought any relevant information beyond the boundaries of their industry to understand the characteristics of "a healthy sleep"."



Figure 1: Healthy Sleep. From the moment you fall asleep until you wake six to eight hours later, a fantastic process takes place. Your brain clears of thoughts, Your body and your brain are developed and reconstructed. You produce hormones and strengthen your immunity and creativity.

QUILTS OF DENMARK: HIGH-TECH FOR HEALTH SLEEP

“At the time, the space agency was sharing information about specific space and military technologies in order to promote potential civil and commercial uses.”

A variety of suggestions resulted from Løgstrup’s and Schmidt’s contacts with specialists and discussions with the advisory board. Although different factors are involved, temperature emerged as the most important influence of qualitative sleep. Løgstrup and Schmidt discovered they had to find a way to slowly lower people’s body temperature without causing discomfort and then maintain the body’s temperature at the same level throughout the night. If the product succeeded in keeping the temperature in the comfort zone, people would fall into a deep sleep faster. A higher quality of sleep would result.

The managers started to look for different technologies that could control temperature to produce the desired effects. After exploring several different directions, Schmidt learned about temperature phase change material (PCM) technology in an article on space walks. According to the article in *Science Illustrated* magazine, astronauts were exposed to extreme temperature fluctuations (up to 80 degrees Celsius) during space walks. Temperature phase change material is used in space suits to protect the astronauts from these large differences in temperature. Schmidt discovered that the phase change technology had been developed originally for NASA in 1988 by Triangle Research and Development (TRDC). He contacted NASA and received a positive response. At the time, the space agency was sharing information about specific space and military technologies in order to promote potential civil and commercial uses. NASA connected Schmidt with Outlast Technologies, an accredited licensee for this technology.

In 1991, Outlast Technologies had acquired the exclusive patent rights for the temperature-regulating technology. It intended to incorporate this innovative technology into commercial fibres and fabrics. They were interested mainly in insulation for residential buildings. As such, the material they used was very hard and, therefore not suitable for quilts and pillows. As the collaboration between Outlast Technologies and QOD got underway, the challenge for QOD was to transform this hard material into a soft version. As Outlast began to realise the commercial value of this application in the bedding industry, the partnership grew stronger. Eventually, Outlast decided to devote more time to the textile applications of the technology. At this turning point, both companies accelerated the innovation process and stepped up their collaboration. The technical challenges, however, remained considerable for numerous reasons.

First, the engineers had to discover how to introduce the phase-change material into bedding without reducing the quilt’s flexibility and fluffiness. They worked out a solution in which the phase change material was encased in very small microcapsules. These ‘thermocules’ were filled with a special wax that could absorb and release heat. The thermocules

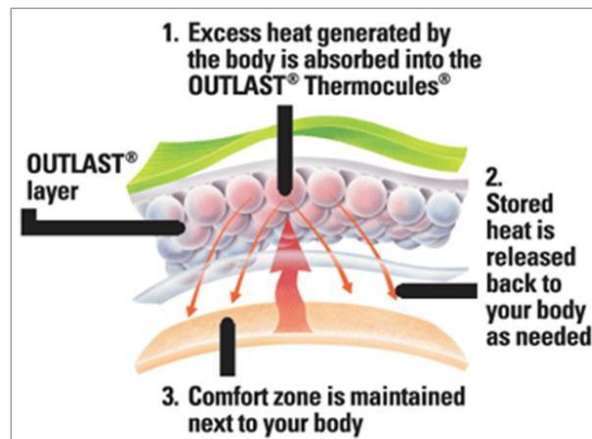


Figure 2: In 1991, Outlast Technologies had acquired the exclusive patent rights for the temperature-regulating technology. It intended to incorporate this innovative technology into commercial fibres and fabrics.

QUILTS OF DENMARK: HIGH-TECH FOR HEALTHY SLEEP

were so small that a piece of fabric could contain millions of microencapsulated phase change capsules. The material changed from solid to liquid and back again as the microcapsules absorbed excess body heat, stored it, and then released it again when the person's body temperature lowered by a few degrees. Essentially, the Outlast technology moderated temperature with an ongoing interaction between the body and the environment that would keep individuals comfortable as they slept.

The second technical challenge lay in obtaining the correct temperature. The rate of cooling or heating and the final temperature could be obtained through the mixture of microcapsules. Quilts of Denmark extensively used knowledge gained from its medical contacts to find the mixture that delivered the optimal temperature and cooled down and heated up slowly enough to ensure comfortable sleep. In total, QOD and its partners spent almost two and a half years developing a commercially viable product.

Quilts of Denmark used this technology to manufacture the world's first intelligent quilts and pillows, and branded them as TEMPRAKON. The innovation was introduced in September 2003 at a textile fair in Frankfurt. According to Schmidt, everyone was amazed by the product, and TEMPRAKON benefited from rapid market acceptance. In 2009, QOD offered a full spectrum of products with four temperature types with various fillings and shells, all based on clients' personal preferences. The Space Foundation recognised TEMPRAKON bedding products as a Certified Space Technology. This guaranteed that QOD would be able to differentiate its TEMPRAKON line of products from potential imitators.

Outlast and QOD had a broad agreement on using the co-developed technology. The agreement stipulated that QOD could license the PCM-technology for quilt and pillow applications on a worldwide scale. Furthermore, their agreement granted QOD the sole intellectual property rights for their most important markets (such as Scandinavia) to sell quilts and pillows and in countries that were specified in the agreement. In other markets, Outlast could sublicense the technology to other quilt manufacturers after consulting and reaching an agreement with QOD. Finally, QOD had the right to protect the technologies that they developed in applying the PCM-technology to products in their business. QOD successfully applied for some patents related to using the technology in quilts and pillows. In addition to forging a broad-ranging agreement, both founders emphasised that the success of their collaboration and commercial success stemmed from the trust they developed in their relationship over time. When problems popped up, both management teams were always looking for a way out. They

"Quilts of Denmark extensively used knowledge gained from its medical contacts to find the mixture that delivered the optimal temperature and cooled down and heated up slowly enough to ensure comfortable sleep."



Figure 3: The 'ultimate dream bed'—the so-called Airborne— which management perceived as an important stepping stone to achieving direct contact with the end consumer and strengthening the TEMPRAKON brand.

QUILTS OF DENMARK: HIGH-TECH FOR HEALTHY SLEEP

realized that the problem of one firm was also affecting the activities and financial health of the other one.

After the successful launch, Løgstrup and Schmidt faced a new challenge. They had to accelerate production to meet rapidly developing demand and to distribute TEMPRAKON products worldwide. To circumvent capacity problems and generate some cash for the rapidly growing start-up, the technology was out-licensed to other bedding manufacturers, particularly in countries in which QOD had no presence or remained disinterested. As a result, production at QOD grew rapidly and in just several years, its capacity had grown enough to sell TEMPRAKON products worldwide.

“QOD’s management launched an effort to increase brand awareness by informing customers and educating retailers and store managers. QOD developed a method to train store sales staff and worked together with stores to increase brand awareness in return for advertising budgets.”

QOD also faced challenges related to pricing TEMPRAKON products. To reach financial targets established in its contract with Outlast, QOD cooperated with some large retailers early on and established a solid foundation. To sustain its growth and to overcome downward pricing pressures, Quilts of Denmark worked to increase its margins through brand awareness. In addition to receiving the Space Technology Certification, they also won several awards.

Despite these successes, quilts and pillows remained low-interest products. Most people did not even know the name of any particular brand of quilt. Thus, QOD’s management launched an effort to increase brand awareness by informing customers and educating retailers and store managers. QOD developed a method to train store sales staff and worked together with stores to increase brand awareness in return for advertising budgets.

Driven by the success of the quilts and pillows, QOD continued to experiment with new TEMPRAKON products. To differentiate their offerings, QOD collaborated with designers on the appearance of the products and packaging. Next, they developed the ‘ultimate dream bed’—the so-called Airborne— which management perceived as an important stepping stone to achieving direct contact with the end consumer and strengthening the TEMPRAKON brand.

In 2010, QOD and Outlast developed a second-generation TEMPRAKON. This new technology was technologically superior to the first generation and allowed QOD to terminate many of the sublicensing agreements.

Learn More

<http://www.temprakon.dk/index-UK.html>
<http://www.qod.dk/UK/index.html>

4.3. Managing innovation partners and the innovation network

Small companies can benefit in different ways from open innovation. In many cases, the benefits are obvious, but they never come automatically. Managing relationships with individual partners and organizing the overall network of innovation partners is critical for success. In this section, we present 10 rules to manage open innovation networks successfully.

1. Open innovation relations can only be successful if the innovating company is *selecting the right partners*. This choice is crucial. Dirk Vens of Curana formulates it as follows: “Managing open innovation requires you have to choose the right partners, because once you start cooperating you have to stick to them. You have to share the good and the bad times, you cannot run away when problems pop up. Therefore, you also have to be able to rely on strong partners that are true believers. A strong partnership is especially important when problems pop up—and they always do.” Open innovation is an attitude. It is about sharing risks, investing time and money together in new concepts. A company that engages in open innovation, therefore, has to choose partners that want to innovate proactively and share knowledge and information. The attitude toward collaboration, risk taking, and commitment should be the same among partners. It is therefore not surprising that collaboration with innovation partners is built on trust and strong personal relationships with managers. Strong personal relationships among key persons in partnering companies always emerge as a key success factor. At the same time, this is a weakness of open innovation in SMEs. If your partner leaves the company or secures another position, the joint project may stop or erode. When an innovation champion is no longer a partnering company, the whole innovation project comes to a stop. It turns out that the small innovating firm has to look for a new partner and start all over again. To avoid these setbacks, it is important to screen potential partners carefully and “court” good candidates to know them better.
2. A network of innovating companies also requires the company that took the initiative to develop new product(s) jointly, (i.e., the central firm) should *organize and manage the innovation network*. This implies that the central company must perform several activities to manage the network actively. An important rule in managing networks is that the central firm must ensure that all partners are *better off joining and staying in the network compared to discontinuing the cooperation and leaving the network*. This, in turn, requires several actions from the central firm. First, it should *support firms that get in trouble during the cooperation*. In an innovation network, partners must care about each other; in market transactions companies do not care about each other. In contrast, in open innovation, a problem for your partner is also a problem for your company. Partners must share the problems and look jointly for solutions, including finding the partners in the network that could solve the problem. Dirk Vens of Curana recalls: “One of our innovation partners would produce at a considerable loss if we stuck to the price that was agreed upon. We decided that the partner would increase his price and that Curana would try to pass part of the price increase to its customers.” In an innovation network, partners are interconnected and Curana’s health greatly depends on the health of the whole network. Helping out network partners is an act of enlightened self-interest.
3. Innovation networks need to be *activated* continuously. Inactivity is deadly for the strength of the network and partner commitment. A large consortium such as PROF can easily degrade into a useless talking shop if new ideas and concepts are not introduced each time the consortium gathered. Jan Van Hecke, instigator of PROF, was responsible personally for the pace of action in the consortium. He first defined the end date for a particular project such as the Patient Room of the Future and then went back to fix dates where particular deadlines had to be met. This phasing of the project was very important because it guaranteed that progress was made between two subsequent meetings. This, in turn, was an enormous stimulus for the partners: Progress was made, and prior to each time they gathered, partners had been working on different parts of the

projects, making meetings both challenging and exciting. The sense of urgency and the continuous progress are strong motivators in open innovation networks. In the case of PROF, the result was that 90% of the partners confirmed that they would attend after the first notification of a meeting. Curana had a similar experience. Dirk Vens mentioned “The strength of our collaboration with external designers is that we constantly challenge each other, and that we’re always exchanging information on things that are happening in society.” Adriaan Debruyne (now director of Saflo Creative Consultants) added: “Our antennas are open to society and technologies, and we record a lot. When we bring this to our collaboration, it creates sparks. If, at that particular moment, we’re in a brainstorming session, it can rapidly result in concrete, but also very demanding ideas.” In searching for the characteristics of a healthy sleep, the founders of Quilts of Denmark reached out to sleep specialists and physiotherapists in specialized clinics. These people were very enthusiastic in collaborating with the founders in the examination board of QOD. Cross-disciplinary and cross-industry communication around specific projects released energy and creativity among the partners involved. This approach is still a rarely used technique among SMEs, however, to spark the search for new, innovative products and concepts.

4. Managing innovation networks also entails that the central firm *disciplines partners* that do not play according to the rules and values that are common among the partners. Companies that do not stick to the rules cannot remain in the network. Take, for instance, the example in which a company grants exclusive designs or products to its customers. In this case, the innovation partners must abide by the exclusivity rules and cannot simultaneously develop their own designs independently of the innovation network. If they do, the central firm certainly has to discontinue the collaboration with disloyal innovation members. Disciplining disloyal partners only works under certain circumstances. First, a strong leader must operate in the network, which is usually executed by the company that initiated and drives the network. Second, disciplining or excluding partners only works if the innovation network is instrumental in creating a competitive advantage for the companies involved. In the case of Curana and Quilts of Denmark, the innovation network enabled the companies to develop new and more innovative solutions faster than competitors. Excluding a company from the network means that it will be insulated from a continuous flow of creativity and innovation. Finally, disciplining members is not always the right solution if centrifugal forces in the network are too strong. Curana, for instance, experienced serious pressure to adapt its business model in 2011 when it was exploring the potential of a new, revolutionary patented magnetic mounting system that it could integrate with its bike accessories. It obtained exclusive licensing for this technology in the bicycle industry, but the licensor wanted to renegotiate the deal. Mounting systems have strong network effects and integrating them into Curana’s products was limiting the revenue potential for the licensor. Curana was considering, therefore how to change its business model to benefit from this promising technology in a different way.
5. Open innovation also means *openness in communication and in reporting* among the innovation partners. Partners have to trust each other to charge a reasonable price for the products or services they offer to innovation partners in the network. Because partners in such an innovation network work in a mutually exclusive way, innovation networks can work only when there is a network-wide understanding among partners that upstream partners cannot misuse this exclusivity to earn monopoly rents when they sell co-developed products to the downstream partner. It is possible to draw contracts for large innovation partnerships (it is standard in large companies to do so), but the costs to do so are too expensive for small firms. Exclusive innovation partnerships, therefore, are based on trust among partners. In rare cases, companies will compare prices with third parties outside the network to verify whether the partners are fairly pricing their products. Moreover, partners should try to ensure that each partner can make a living based on the value created by the collaborative innovation. Some of the networks work with open books to ensure that all partners involved use fair overhead costs and price structures and to guarantee that all partners are better off when they become part of the innovation network. Open innovation is not only about sharing costs and risks, but also about sharing profits equitably.

6. Developing an open innovation network also requires that partners *manage the balance between internal management of the company and external management of the network*. Some of Curana's employees, for instance, did not understand why management was preoccupied with managing the network of partners while internal management problems also had to be solved. It is often difficult to explain in the own company that an innovation network with external partners is improving the company's competitiveness and is a source of revenue growth. Therefore, it is necessary to communicate the nature and terms of the open innovation strategy extensively within the company.
7. Collaborative innovation is easier with *partners of similar size and ambitions*. We will see in Chapter 5 how small firms can collaborate effectively with large companies in developing or commercializing new products. Working with large firms, however, is not easy. Small firms are not eager to open up because they fear that large firms will steal technology. Moreover, large companies, compared to the decision making process in small companies, are very slow and inflexible. It is easier for small firms to work together because they have similar decision-making processes, similar financial restrictions to invest in R&D, a similar approach to go to market with new products, and so on. Small innovation partners, however, also have to be equally ambitious. When a joint innovation project is successful, innovation partners must be ambitious enough and envision similar growth strategies to continue the full functioning and growth of the innovation network. Serious frictions among partners concerning their ambition to growth together in the long term open opportunities for competing companies to take market share.
8. *Cost control* is another important management issue related to open innovation. When innovation is restricted to one company, it was fairly easy to control costs. Innovation costs are harder to control, however, when companies innovate jointly in an innovation network. In open innovation, different partners work on different parts of the project and send invoices for their research, prototypes, tests, and services to the central firms. Each partner is preoccupied with his own part of the new concept, whereas the central firm must keep an eye on the overall picture. Keeping costs under control is essential, and the central firm has to discuss with its innovation partners how to set priorities and keep costs under control.
9. Carefully documenting and registering every innovation project are crucial tasks for the central firm in open innovation networks. Over the years, the central company has to learn about the competencies of each partner. When the array of partners with different competencies rapidly expands, knowledge about the network becomes a major asset. When partners hit a major problem, the central firm should be able to tell them who to call to solve the problem. Thus, "knowing who knows what" is as important as the individual expertise of the partners. Detailed knowledge about each partners' specialization in an extensive innovation network enables the central firm to solve tough technical and commercial problems smoothly. Activating partners swiftly in the network enables the central firm to bring together a multitude of competencies to surprise the market with refreshing ideas and products.
10. *Manage tensions and problems* in the network proactively. At the start, collaboration is exciting, but tensions inevitably emerge over time. Problems or failures put the relationship under pressure, and it is important at that point to be *diplomatic and communicate openly* with your partners about problems. Some companies have evaluation meetings with their main innovation partners to talk about anything bothering them. These meetings should be organized when difficulties among partners have not yet grown into insurmountable problems. Tackling problems early in an open conversation help innovation partners keep the joint innovation projects on track.

4.4. Managing intellectual property in open innovation

Collaboration also has implications for firms' intellectual property (IP) strategy. Co-developed knowledge can be protected through patents, trade secrets, or trademarks, but open innovation makes IP issues more complex. Intellectual property rights are usually owned contractually by the innovating firm in the case inventors are companies doing contract research, external designers, or employees. Several firms we interviewed chose not to co-patent an invention that was co-developed with their innovation partners. They chose to make clear agreements upfront about who owns the patent and how innovation partners can use the technology through specific licensing agreements. Co-patenting is also too complex in case a patent is infringed by another company. Who is going to court in this case and who is paying for the litigation costs?

The Quilts of Denmark case shows that the use of IP in collaborative initiatives can raise substantial problems for a small firm. Even when solid arrangements are negotiated up front, small firms may face tough situations. Outlast and QOD had a broad agreement on the use of the co-developed PCM technology for quilts and pillows. Outlast worked on the phase-change materials, which is their field of expertise. To get the desired effect of PCMs in quilts and pillows, however, is QOD's expertise. Both partners have different skills and are complementary in the development process. The agreement stipulated that QOD could license the PCM technology exclusively for quilt and pillow applications on a worldwide scale. In addition, the partners signed an agreement entitling QOD to sole IP rights for its most important markets (such as Scandinavia) and in countries that they have specified jointly. In other markets, Outlast could sublicense the technology to other quilt manufacturers after consulting and agreeing with QOD. If QOD would not agree to grant a sublicense, it had to counteroffer with a credible plan to introduce TEMPRAKON to that market. Finally, QOD had the right to protect the technologies they developed in applying the PCM-technology to products in their business. QOD successfully applied for some patents related to using the technology in quilts and pillows. This way, most quilt producers interested in licensing the PCM technology from Outlast also had to license additional, application-specific IP from QOD. Outlast, in turn, had the freedom to license the PCM technology to manufacturers of other applications such as jackets, underwear, shoes, and so on.

Although this is a straightforward way to deal with a co-developed technology, QOD faced some significant problems in the first years after successfully launch the TEMPRAKON. QOD was a tiny company in 2003, and scaling up the production of TEMPRAKON quickly enough to meet the worldwide demand was a major challenge. However, to hold on to sole IP rights, QOD had to reach the revenue milestones established in the contract with Outlast. To reach these targets given limited production capacity and to generate some cash for the rapidly growing start-up, QOD and Outlast Technologies agreed to sublicense the technology. These sublicenses were granted to producers in countries in which QOD was not present or in which the company was not interested. QOD also profited from the royalties each time Outlast Technologies sublicensed the technology. Although these sublicenses were limited in time and restricted to well-defined products and geographical areas, QOD realized over time that a substantial number of sub-licensees could also work in a counterproductive way. Control over the quality of the product and its positioning in the market was limited, and prices dropped too rapidly because of the poor pricing strategy that some licensees deployed.

This example shows that small firms must be careful with licensing agreements. Outlast Technologies wants to maximize revenues from this new technology by extending the number of applications and by (sub)licensing the technology worldwide. In this way, Outlast Technologies circumvented the problem of QOD's limited production capability and geographical scope. The increasing number of sub-licensees became a problem for QOD, however, as they undermined the quality of the product and the branding of TemptraKON. Yet if partners trust each other and continue to work in a cooperative way, these problems can be solved. QOD's financial strength and production capacity were growing rapidly, and after a few years, its capacity was large enough to sell TemptraKON products worldwide. QOD

and Outlast Technologies launched a new generation TempraKON in the autumn of 2010. The partners re-negotiated previous sublicenses and price settings with licensees in several countries and pushed previous licensees out of the market in countries where QOD wanted to sell products itself.

In summary, small companies who depend on external IP may face significant problems in dealing with licensing agreement requirements. Companies can find solutions for these problems when both partners continue to trust each other and stay focused on the joint value they create.

Key Learning Points

Open innovation as an integral part of business model innovations

In the past, the open innovation literature has focused too much on the direct benefits of open innovation in large companies. Large firms deliberately introduce open innovation practices and look for the direct benefits vis-à-vis the closed innovation situation. Applying these benefits (e.g., sharing costs, sharing risks, faster product introduction, etc.) to small firms in low- and medium-tech industries does not make sense. Small firms are not interested in open innovation as such. Rather, they focus on *major changes in their business model to seize new business opportunities and to boost profitability*. Lack of internal competencies then forces them to look for *innovation partners*. Open innovation cannot be considered in isolation from the broad strategic objectives in small firms. Additionally, the benefits of open innovation-based business model changes differ from the classic open innovation benefits identified for large firms.

Creating value

Small firms are by default open in seizing new business opportunities because they do not have the necessary competencies and financial means to develop new businesses internally. Innovation in SMEs is hampered by lack of financial resources, scant opportunities to recruit specialized workers, poor understanding of advanced technology, and so on. Small firms, therefore, *must rely on innovation partners to realize major business model changes*. *Open innovation is a direct consequence of a small firm's ambition to change its business model*.

A business model describes how a firm creates value for a particular customer group and how it captures a portion of that value. We examined a range of possibilities how small firms *jointly create value* with their innovation partners. Below is the summary of our findings.

- With which small firms a company innovates is largely determined by the new business model the central firm wants to implement. Similarly, the number of partners required and the sequence of collaborating with partners are defined by the business model.
- Most of the small firms that collaborate intensively do so with value chain partners and less with technology partners. Small firms in low- and medium-tech industries start cooperating with partners when they discover new business opportunities, usually based on market or customer insights. Developing technology can be very important in realizing the business model, but it is always a supporting activity.
- More radical business model changes combine knowledge from unrelated fields. Companies pull in expertise from industries and fields that have never been related previously to the current industry to which the small firm belongs. Quilts of Denmark is an excellent example.
- The complexity of the open innovation network depends on the target customer's position vis-à-vis the innovating SME. If direct customers are the target customer, then the innovation network will most likely be small and easy to manage. If the target customer is the end-consumer (assuming that the innovating firm is an upstream company), then the innovation network involves at least all downstream partners of which many may not experience a direct benefit from joining the network. In this case, it is more difficult to create value for the target customer by setting up an innovation network. Success depends largely on the quality of the network management (see below).
- Creating joint value with partners implies that a company organizes itself internally to learn from its partners. In many cases, this can be done using simple and inexpensive tools such as Jaga's Experience Labs or Products Days.
- Value drivers underlying the joint value creation can be quite diverse. Such diversity extends from simple cost or time reductions for the target customer, to new or improved functionalities for his products or offering new and valuable experiences to the target customer. In each industry, value drivers can be different and they can change over time.

Capturing value

Good business models also guarantee profitability. The SMEs we interviewed work together with different innovation partners to create, but also to appropriate more value. We find that small firms who innovate together with partners significantly increase profitability. There are many ways open innovation helps in executing business models with higher profitability. We enumerate a few possibilities:

- Taking a dynamic lead in applying technologies to a particular product market .
- Moving away from commodity-like products and offer highly differentiated products (or experiences) that combine the expertise of several partners, thus changing the relationship with customers profoundly.
- The combination of different fields of expertise to develop a new offering can lead to attractive profits as long as the company can protect (or hide) a specific part of the total solution from its partners and potential imitators. In this way, increasing profits is the result of building control points for the innovating firm.
- Profitability through open innovation can be built in consecutive steps as we have seen in Chapter 3. Curana has changed its business model three times and with each step it could increase its profitability.
- The PROF example shows that firms can explore new business opportunities taking a significant detour of so-called customer-centric consortia. The PROF consortium is not directly sales driven, but when the partners can illustrate the joint value for the customer, they should be able to extract more value from the venture.

The most important take-away is that value *cannot be extracted* from the *collaboration to the detriment of the partners*. Every partner involved in the network should be better off than before joining the network. If partners do not feel comfortable, the joint value will not be maximized. *Therefore, it is better to have a smaller share of a much bigger pie than a large share of a small pie.*

Managing open innovation partners and networks

There are several rules to apply when a company wants to manage the relationships with its innovation partners or an entire innovation network. We summarize them into 10 rules:

1. *Select the right partners carefully.* This choice is crucial because collaborative innovation implies you are “in” for a long time. Once you start cooperating, you have to stick to your partners. You have to share the good and the bad times; you cannot run away when problems arise. Choosing the right partners is winning half the game.
2. Innovation networks do not organize themselves. *Clear leadership is needed to organize and manage the innovation network.* The basic rule in managing innovation networks is that each partner should be better off in joining and staying in the network compared to leaving the network. That implies that some partners may have to be compensated for losses, investments, or risks they take.
3. Innovation networks need to be *activated* continuously. Inactivity is deadly for the network strength and partner commitment. Phasing of the project is very important because it guarantees that progress is made at a pace that encourages and stimulates partners to move ahead. The agenda has to be set and partners stimulated to finish their contributions on time.
4. Joint innovating and commercialization implies that partners that do not comply with the rules have to be *disciplined*. Companies that do not stick to the rules cannot remain part of the network. A well-oiled innovation network increases the speed and productivity of innovation processes. Partners that are cutoff from the network lose considerably in the long term when innovation networks are the locus of innovation.

5. Open innovation also means *openness in communication* and *in reporting* among innovation partners. Partners must trust each other on charging a reasonable price for the products or services they offer to innovation partners in the network.
6. *Manage the balance between internal management of the company and external management of the network*. External network management is very important, but it cannot be at the expense of managing your own firm internally.
7. Choosing *partners of similar size and ambitions* can help improve collaborative innovation. Small firms can collaborate successfully with large companies in developing or commercializing new products, but it is easier to work with partners of a similar size. Such companies have the same decision speed, same approach to innovation, have comparable organizational cultures, and use a business logic that they mutually understand.
8. *Cost control* is important in open innovation. Each partner is preoccupied with his own part of the project, and without cost control, costs are likely to soar rapidly. It is therefore essential that you set priorities with your innovation partners.
9. When the number of partners with different competencies rapidly expands, *"knowing who knows what" becomes a major asset*. Activating partners swiftly enables the network to bring together a multitude of competencies in an accelerated way that cannot be copied by individually competing companies.
10. *Manage tensions and problems* in the network proactively. Tensions inevitably emerge in collaborative innovation relations. You have to be *diplomatic and communicate openly* with your partners about problems. Evaluation meetings with innovation partners can help. It is important not to wait until small but irritating problems have grown insurmountable.

IP Management

Open innovation implies that partners co-develop new solutions. IP-management in partnerships or innovation networks is very important to avoid tensions in the network:

- Define clear arrangements from the beginning.
- In many cases, do-patenting is not an interesting solution. It is usually better to agree in advance who will own a patent (with different types of patents perhaps attributed to different partners) and how the partners get rights to use these patents.
- IP-deals might be reconsidered as time goes on. Most contingencies are difficult to foresee when the first deal is made. Adapting the arrangements to collaborate comfortably for all partners is necessary in most collaborative ventures.
- Patenting is expensive for small firms, especially when a company has to apply in many countries.
- Small firms that apply a partner's technology in their markets may face serious problems living up to the conditions of the licensing agreement. The licensor may grant worldwide exclusivity to its (small) partner, but the latter should consider whether it can generate enough sales in different markets to comply to the sales set forth in the licensing agreement. Excessive sublicensing to other companies may erode the position and profitability of the small partner.

5 Cooperating with giants: Organizing and managing open innovation successfully

5.1. Collaborating with large companies

Many small firms (in high-tech industries) need to collaborate with large companies to develop and commercialize their technology. Small firms require complementary assets that established companies own. Large firms can commercialize new technologies by leveraging their large-scale manufacturing capabilities, brands, or distribution systems without investing large amounts of capital upfront. This dependence of SMEs on large companies to generate value from their technologies has received attention in the recent innovation literature³⁵. SMEs have for instance limited ability to profit from their intellectual property because they lack enforcement power, especially when collaborating with large firms. In the USA, the median cost to each party of proceeding through a patent infringement suit to a verdict at trial is at least \$500,000 where the stakes are relatively modest³⁶. This is a higher cost than most SMEs can withstand. In addition to the high cost and risk of legal enforcement, smaller firms that collaborate with established companies may face the problem of lock in. The profitability of a small firm that licenses its technology to an established company may depend, to a large extent, on the decisions and strategic actions of the latter. This strategic dependence makes the small firm vulnerable: when it discovers a patent infringement, it cannot act against the large company even if objective legal assessments may indicate that the small firm has a strong case. Going to court against an established company that represents a major revenue source is not a viable option for most SMEs.

Open innovation can only flourish, however, if relationships between large and small companies are based on trust and result in mutual benefits. Fortunately, an increasing number of large companies are successfully collaborating with dozens of small firms to create breakthrough products. Moreover, there are more and more opportunities for collaboration between large and small companies. Underlying drivers for this trend toward open innovation are the shortening of product lifecycles, increasing international competition, and growing technological complexity. More and more large companies rely on both internal and external knowledge sources to create new business³⁷. Even powerhouses such as P&G, Unilever, Philips and Siemens, to name a few ones, are relying increasingly on technology and expertise from external partners. Universities, research labs, crowds of experts, lead users, and knowledge brokers are just a few examples of potential external sources of knowledge. Small (high-tech) companies, usually financed by venture capital funds, represent another interesting wellspring of external knowledge for large companies. An increasing number of established companies now recurrently collaborate with these start-ups and create new businesses sourcing their technology. Therefore, large companies have a strong incentive to become a preferred partner of these high-tech ventures. Established companies understand how to avoid conflicts and how to align their corporate strategic objectives to grow new businesses to meet the financial objectives of venture capitalists. The interests of corporate investors and venture capitalists are seldom, if ever, fully aligned, but they must manage potential tensions anyway. Corporations can build a reputation as a trustworthy investor, which allows them to attract the ventures with the best technology.

Open innovation also implies that large companies have to monetize their unused technology³⁸. Large companies have significant numbers of unused patents and in theory can valorize the technology by licensing it, selling it, spinning off a venture, or even divesting a new venture that is ready to sell its first products. Several large companies succeeded in increasing the productivity of its knowledge base

by searching for different external paths to the market. Some companies have a corporate venturing department, which among other activities spins off internal ventures. Alternately, an IP-department can cross-license technologies with other large companies or license them out to other, non-competing companies.

Unused technologies in large companies represent a fertile opportunity for individual entrepreneurs or small firms to start a new business, and several large companies have sold or licensed unused technologies. Results are mixed, however, because large firms have no real incentive to become involved in technology deals with small companies. They often consider it too cumbersome or time-consuming because in most cases small firms generate only small income flows for the licensor, whereas the technology transfers might still require significant investments from engineering. Furthermore, large firms that license technologies risk knowledge leaks with adverse competitive effects as a consequence.

Although cooperation between large and small companies has previously been fraught with difficulties, signs are appearing that the situation is changing. An increasing number of firms are practicing open innovation, and large technology savvy companies are exploring new methods to cooperate with a multitude of external innovation partners, including small companies. In the next sections, we present two examples of a successful collaboration between a large and a small company. The first, Isobionics, illustrates how an external entrepreneur can establish a successful venture by licensing technology from a large firm. In this case, a start-up successfully commercializes the technology which was previously developed by an established company. The other case, Airfryer, illustrates how Philips successfully sources a technology for its kitchenware group from a tiny engineering company. In this case, the large company brings the product to the market (B2C market), but this does not prevent the small company from finding its own niche in the B2B market.

5.2. A start-up creating a business from unused technology in a large firm

Large companies are great wellsprings of new technologies. However, only few technological discoveries developed in the R&D labs of large firms are successfully launched as a new product or service in the market. Most technologies gather dust on the shelves in large companies. A growing number of companies, however, are implementing a “use it or lose it” strategy. P&G, for instance, implements a patent strategy aimed at improving the company’s innovation process: all technologies developed in the company could be licensed three years after market introduction (i.e. for used technology) or five years after patent approval³⁹. The revenue stream from these licensing practices is reinvested in the business unit that owns the technology. In this way, the business unit can balance the risk of increased competition in the market with the royalty income it receives from licensing the technology.

An increasing number of large companies with deep technological competencies make their technology available for other companies to develop. However, it remains a question how individual entrepreneurs and small firms can benefit from this open innovation strategy of large companies? How do they collaborate with these large technology suppliers, and what are the challenges or potential pitfalls when large and small firms collaborate? We examine these topics by analyzing how a start-up, Isobionics, developed a rapidly growing business in the span of several years, developing and commercializing a technology it licensed from a large manufacturing company.

Isobionics, a Dutch biotechnology company established by Toine Janssen in 2008, is located at the Chemelot Campus in Sittard-Geleen (in the southeast of the Netherlands). The company is developing a portfolio of flavors and fragrances synthesized using a biotechnological process that is based on a proprietary platform technology of DSM, a large Dutch chemical company that specializes in Life Sciences and Materials Sciences products. Isobionics’ first product introduced on the market in late

2010 was BioValencene™. This is an aroma substance for the food, beverage, flavor, and fragrance industry worldwide, where it is used in soft drinks, detergents, soaps, and fine perfumery. In the marketplace, it competes with conventional valencene, a citrus aroma, which is currently distilled from orange peels, making it relatively expensive. Isobionics received the Frost & Sullivan 2010 Global Technology Innovation Award for its introduction of BioValencene. In citing the value of the product, the award stated, "...it has the capacity to change the functioning of the market by providing a unique technology, being cost competitive and improving product functionality and process efficiency"⁴⁰.

The Isobionics case demonstrates how an individual entrepreneur (or a small company) can commercialize a technology that a large firm had placed on hold. The Isobionics story dates to 2007, when researchers of DSM developed the idea to produce specific ingredients that could be synthesized by micro-organisms using different key enzymes. This was the initial idea behind the technology that Isobionics later developed into a product. The range of potential applications for this platform was broad, extending from flavor and fragrances (F&F) to agrochemical products (insecticides) and pharmaceutical products. The idea did at that point in time not land in DSM. The management was open for external partners who may be interested in the commercialization of the technology. The technology was also introduced to Toine Janssen, who had been working for several decades at Royal Philips Electronics as a business director. After analyzing the idea and zero order business plan, he concluded that synthesizing flavor and fragrances using DSM's biotechnological process was a promising, game-changing innovation. It could drastically reduce the production cost of existing flavors and generate new types of fragrances.

Once he decided to pursue the technology, Toine faced several major challenges. First, the strategy had to be sound. He focused on F&F because the agrochemical and pharmaceutical applications required more demanding technical requirements and complex approval procedures. In contrast, certifications in the F&F market required only one or two months. The F&F business had already existed for centuries. Historically, flavors and fragrances have been made from natural resources such as roses, oranges, and other fruits, trees, and so on. However, the industry was searching for alternative production methods (biotechnology) because the natural resources had been expended to their maximum capacity. The biotechnological process DSM had developed would give Isobionics a major cost advantage over traditional F&F producers, and it had the potential to develop new flavors and fragrances by collaborating with specific clients. Because more than 3,000 flavors and fragrances already exist, Toine had to decide which flavors to develop first. Valencene (oranges) and nootkatone (grapefruit) were the two first flavors that Isobionics decided to develop and produce first. Technically, they were relatively easy to develop and the markets were small enough to accommodate products from a small company such as Isobionics. Later, the company could migrate to menthol, strawberry, and other flavors that represent markets many times larger than the valencene market. The market for valencene was estimated at \$10 million, nootkatone at \$30 million, and menthol at \$275 million. An additional advantage was production overcapacity in the market: Isobionics could easily find fermenters and did not need to invest in production facilities⁴¹. The development cost of the micro-organisms that could produce a specific flavor was the single largest investment for Isobionics; developing a new natural ingredient was estimated to amount to approximately €5 million. Developing new flavors has traditionally been completed with different universities in Europe, with DSM, and with other innovation partners. Competition among companies producing biotechnological F&F was limited. At that time, Isobionics had two main competitors, but with 3,000 flavors it was easy to avoid competition. Still entry barriers are considerable given the proprietary technology and the years required developing the technology.

Second, Toine Janssen had to secure the required investments for his start-up once the business plan was drafted. At the time Isobionics was established, the start-up was in need of considerable investments to advance the technological development and commercialization of the first flavors. Classic venture capital funds (VCF) were somewhat reluctant to finance Isobionics at the time it was established, because the venture needed considerable investments which were too big a risk for VCFs

in an early investment stage⁴². In the end, Isobionics was financed in a complex but interesting way securing the company a broad financing base. The start-up was financed combining investments from VCFs, a regional venture capital investor in which DSM participated, bank loans, and subsidies from local and national governments. The financing enabled Isobionics to further develop the technology and prepare the commercialization of BioValenceneTM, its first commercial product.

Third, Isobionics could not prosper without the continuous technological support of different innovation partners. Isobionics is a start-up and, consequently, developing the first products and pilot production runs had to be conducted by its partners, including several European universities, research labs, DSM and other value chain partners. The technology licensed from DSM is a technological platform that can be used for different applications. Consequently, Isobionics has signed several research contracts with DSM and other technology partners to develop the technology and to start the production of valencene. As DSM and Isobionics started their technological collaboration, some DSM researchers resumed working on this technology which they started as an internal DSM project. Their experience gave Isobionics a considerable head start. Securing research time from large technology partners is however not easy because the contract work for a start-up, who still has to prove its economic viability, is competing with many internal projects within these large technology partners. Once the start-up begins to prosper, as in the case of Isobionics, managers start to see the value of the R&D collaboration and are eager to work with the venture.

Finally, Toine also had to license the technology from DSM. The negotiation resulted in a licensing deal in which Isobionics could use the DSM's technology for applications in the F&F industry. Signing a licensing deal with a business manager in a large firm is not straightforward, because royalty income only starts flowing in several years after the license deal was signed. By that time the manager has other responsibilities within the company. Therefore, Toine had to look for innovation champions within DSM to get the licensing of the technology on the agenda of the responsible DSM managers. Innovation champions were senior managers in DSM who had a strong belief in the commercial success of Isobionics. Everyone involved in establishing Isobionics agrees that Toine's management experience in large companies was crucial in dealing with large partners to guarantee Isobionics' commercial success.

In sum, Isobionics illustrates how a promising venture can be established by licensing unused technology of a large company. It is a typical win-win situation. Isobionics profits from the collaboration with DSM in different ways: First, it got access to a game-changing technology which was the cornerstone for its commercial success. Second, it could build on the reputation of DSM to get access to universities, technology labs, and commercial partners. Third, DSM was a formidable partner for Isobionics in the further development and continuous technical support of Isobionics' products. DSM, in turn, did also win from its investment in Isobionics. First, it had the opportunity to follow the evolution of Isobionics. In this way, it gained valuable lessons about the F&F applications of its technology which it could apply in other industries. Second, the establishment of Isobionics implies that a technology which was discontinued at DSM can be further developed and the new discoveries can be very useful for DSM's research in related technology fields. Third, it could learn how the development and commercialization of a new technology can be accelerated in a start-up which has the freedom to make its own managerial decisions. Finally, the indirect participation of DSM also implies that Isobionics can be acquired in case its business is becoming an interesting investment area for DSM.

Isobionics illustrates how a start-up can establish a business by licensing technology of a large firm. Now, we turn to a situation in which a large company brings the technology of a small firm to the market.

Figure 10: Case Isobionics

Case Study

ISOBIONICS: HOW A START-UP SUCCESSFULLY COMMERCIALIZES TECHNOLOGY OF A LARGE COMPANY

Isobionics, a Dutch company, was established in 2008. Its activities focus on manufacturing natural ingredients for the flavour and fragrance industry. Their products are prepared with an innovative fermentation process, which results in high-quality, natural products for customers in the food, beverage, flavour, and fragrance markets. The platform underneath the company's technology was developed by DSM, a large Dutch chemical company with strong technical expertise in biotech and new materials. This proprietary technology is environmentally friendly, uses fewer production steps, and is easy to scale up.

The seed for Isobionics was planted in early 2007, when Toine Janssen visited DSM. DSM managers offered Toine, a former director at Philips, to consider a business proposal of a research project that was not picked up at DSM. The DSM technology was a new way to produce natural substances—called isoprenoids—through a biotechnological fermentation process. Normally, producing isoprenoids is expensive and laborious, but the new technology promised to produce better quality, it required fewer production steps, and it was substantially less expensive than existing processes.

Once Toine realised that the business case was indeed feasible and had great potential, he decided to take on the challenge. He started by writing a business plan, finding financial resources, and forging an agreement with DSM. Thanks to Toine's management experience in Philips, he convinced DSM's managers to license the technology as its commercialization had significant business potential. After signing a research and licensing contract to use the fermentation procedure in predefined areas, Isobionics was founded. Isobionics started an R&D agreement with the Plant Research International (PRI) institute at Wageningen Agricultural University.

As a location for their new business, they chose the Chemelot Campus, just a few hundred meters from the DSM laboratories. This co-location allowed Isobionics and DSM researchers to communicate and interact frequently, which accelerated research and decision-making. Toine also successfully raised funding for his venture by filing for subsidies and attracting venture capital funding. DSM also indirectly participated in the start-up financing through its involvement in Limburg Ventures, a regional venture capital investor in materials and life sciences.

“The platform underneath the company's technology was developed by DSM, a large Dutch chemical company with strong technical expertise in biotech and new materials.”



Isobionics
Natural Ingredients

ISOBIONICS

The first product Isobionics commercialised was Valencene, one of the components of orange oil. Valencene can be used as a flavour and fragrance ingredient and tastes like oranges. The majority of applications are found in flavours for the beverage industry, particularly citrus flavours. Isobionics focused on selling to flavour and fragrance companies such as for example Givaudan, Symrise, and Firmenich, all of which supply flavours to multinationals such as Procter & Gamble and Unilever.

The strategic decision to start by producing Valencene was made even while it is a relatively small market compared to

“The co-location allowed Isobionics and DSM researchers to communicate and interact frequently, which accelerated research and decision-making.”

flavours such as vanilla and menthol. Especially important was the fact that this product could generate quick cash. Moreover, by producing Valencene, Isobionics achieved proof of principle and generated knowledge and insights needed for further steps. Isobionics patented the process of producing Valencene (Valencenesynthase). DSM owned the patent on the micro-organism from which Valencene was formed and Isobionics had a licensing agreement with DSM for applications of this technology in the flavours and fragrances industry.

Sales of BioValencene, the first product of Isobionics, escalated quickly. Isobionics immediately started to develop a second product, Nootkatone, which is derived from Valencene and is one of the main components used in grapefruit flavours. The majority of applications for this product are found in

flavours for the beverage industry, particularly sodas.

Currently, Isobionics has grown from one-and-a-half employees to five employees and is working on several other products which are much larger targets. Menthol and vanilla flavours for example, would generate multiple sources of revenue, but would also require Isobionics to establish its own plant.

The market welcomed Isobionics' technology: The company won the Frost & Sullivan 2010 Global Technology Innovation Award in Food Ingredients for its BioValencene product. The award recognizes the company's capacity to change the functioning of the market by providing a unique technology, being cost competitive and improving product functionality and process efficiency. Today, Isobionics is growing very fast and is accelerating its growth as the flavour and fragrance industry has become increasingly interested in biotechnological production processes.



Figure 1: The first product Isobionics commercialised was Valencene, a sesquiterpene and one of the components of orange oil.

Learn More

<http://www.isobionics.com>

<http://www.dsm.com>

5.3. A large company creating value for a small firm's technology

Small, high-tech firms are valuable sources of new-to-the-world technologies. Indeed, small companies have developed radical, game-changing technologies. In several industries, however, small firms cannot commercialize their own inventions because excessive investments in complementary assets are required⁴³. Examples of complementary assets include large-scale manufacturing, brands, and distribution channels, just to name a few. A rapid increase in licensing of technologies is occurring across the globe, and many small firms license their technology to larger companies that own or control complementary assets. From their perspective, established companies are increasingly aware of the growing technological capabilities of universities, research labs, and high-tech start-ups. They leverage these external knowledge sources using licensing agreements, corporate venturing investments, co-development agreements, and acquisitions. Licensing agreements imply that the licensor and licensee share revenues, and the balance depends on their respective bargaining positions. Both firms can design a deal in a clever way, however, which results in a situation through which both firms profit from the new technology. We should not necessarily think in terms of a trade-off as the bargaining metaphors suggest. In many cases, a small innovating company can be highly profitable when it licenses its technology and does not hinder the established licensee from integrating the technology into its product range. Moreover, the licensing deal can be negotiated in a way that both companies are active as producers, but in different product markets. We illustrate this with the case of the Philip's Airfryer (see p 86).

The Airfryer is a new product in the Kitchen Appliances division within Philips. The Philips Airfryer uses just one-half a tablespoon of oil to fry a variety of foods and snacks including fries, chicken nuggets, other meats, and even tempura. Rather than boiling chips in hot fat, the Airfryer uses super-heated air, producing the same quality chips. Its secret is the patented Rapid Air technology, which combines fast-circulating hot air with a grill to create fries with up to 80% less fat, yet maintaining a great taste. The Airfryer was launched in September 2010 in several European markets and was later introduced in most European countries. Philips was not the first company to introduce healthier ways to fry, however. Actify of Tefal was already several years in the market, but it could not be compared with the Airfryer because its frying time was 45 minutes—compared to 12 minutes for the Airfryer. Furthermore, fries from the Actify were considered not that tasty.

For quite some time, the Kitchen Appliances group had the ambition to develop new products that could make cooking and frying healthier. With the Airfryer, Philips tried to make the frying process less unhealthy, while keeping high-quality taste. Healthy frying was one of the group's ambitions, and they studied ways to achieve that target, consulting the literature and research from different institutes. They had already developed a process to fry using hot air/steam rather than oil. In 2006, Philips had a prototype, but the engineers were struggling to transform the technology into a feasible consumer product. The process to bake fries led to acceptable results, but difficulties existed in translating that technology into a consumer product that fits the Philips promise of "sense and simplicity". The appliance was too complex, too large, and too expensive.

The Kitchen Appliances group had contacts, however, with inventors who had developed similar appliances, but they struggled with the same problems. They did not have solutions to create a home-use appliance, simple and cheap enough to make it a success on the market. In early 2009, a small engineering company—more precisely two individuals who worked together—presented their idea to Philips. Their company had developed technology similar to what Philips had developed internally, except that it was simpler. It had the proper execution to translate the technical process in a consumer product. The owners took the right steps to translate the idea into a product that could be sold as a consumer good and was simple to use. It featured a basket into which the consumer placed the fries and a simple user interface.

Godwin Zwanenburg, director lead of Kitchen Appliances and part of Philips Consumer Lifestyle, remarked that within big companies it is difficult to develop new, but simple products. Technicians usually start with a blank sheet and look for what is possible from a technical standpoint. After the right appliance is developed, commercial people express their wishes, which leads to more features being added. These project dynamics are driven by the desire to make 'a perfect appliance', whereas simplicity implies that 'the appliance is not perfect, but good enough'. Small firms, on the contrary, have limited resources and time to develop products: They have to deal smartly with constraints. The result is that small firms are better at developing simple and easy-to-use products.

The small engineering company is a tiny Dutch company, existing out of an engineer and a seasoned manager with 24 years' of experience as a senior manager in the Braun division of Gillette. He left the company when P&G acquired Gillette. His next effort was that he started to commercialize innovations for different inventors. The engineer developed the technology that was used later in the Airfryer. He detected that the existing turbo-fryers on the market did not work, and his simple adaptation to the air-flow made air frying quite effective. The invention was patentable, and he succeeded in building a prototype based on existing technologies. Subsequently, the company was granted a patent for this invention. The application development and pre-production was completed by a Chinese company, which Hans knew from his days at Gillette. It still took two years to develop a prototype that could be demonstrated to potential customers. The manager of the small company decided to license the technology to large companies active in the kitchen appliances industry that could leverage their international presence, brands, and access to distribution channels. Interestingly, Braun was not interested. Philips, on the contrary, was decidedly interested given its strategy to invent new ways to prepare food in a healthier way. Furthermore, the company was already acquainted with the technology but could not translate the technical process into an attractive and simple consumer product. Godwin Zwanenburg, Director of Innovation Lead kitchen Appliances, sold the idea internally and coordinated a demonstration at the Kitchen Appliances business of Philips. The commercial people saw the technology as an opportunity. Philips asked for 'first rights of refusal' for a period of three months to test and evaluate the application. The evaluation was positive, and Philips launched the internal development process and the potential business case.

Small firms are usually reluctant to share information with large companies because the risk of misappropriating the technology is very real. Philips' extensive evaluation of the technology did not pose a risk for the small engineering company, however, because Philips' was reputed as a reliable innovation partner. Philips relies recurrently on new technologies from universities, specialized research labs, and high-tech start-ups. The electronic giant endeavors to be the preferred partner for small, high-tech companies and will therefore never cheat on its innovation partners. Simply put, the reputational damage would be too big. Likewise, the best small-scale technology firms in the world want to team up with Philips because of its reputation as a reliable innovation partner. After all, it is a matter of trust, because it is quite challenging for a small firm to take a large company such as Philips to court. Philips' reputation is one of the company's strong assets: it facilitates information exchange with potential technology partners, and it is an effective and cost-efficient way to manage open innovation. The two companies only signed a non-disclosure agreement (NDA) before they started the information exchange and a letter of intent covering the investigation phase. This also implies that small firms must select carefully innovation partners which can be trusted.

In October 2009, the two companies signed a licensing agreement. Good licensing agreements reflect the needs of both the licensor and the licensee. In this case, Philips was acquainted with the technology, and the small engineering company felt no need to be involved actively in developing the Airfryer. The company agreed to grant an exclusive license to Philips for the consumer market for a period of five years. In addition, Philips received the right to buy the technology thereafter at a predetermined price. The option to buy the technology was crucial for Philips because it is simply too risky for a company to depend on external technology for its major business successes. Thus, Philips would certainly buy the technology in case the Airfryer became a major business success.

Next, the Philips Kitchen Appliances group is not active in the US and Japan. Therefore, the small engineering company received permission to identify local manufacturers to produce the Airfryer, eventually using the egg-shaped Philips design (see figure 7). The company was always consulting Philips when contacting local producers and royalties earned in these markets were shared between them and Philips. Furthermore, the Kitchen Appliances group was only interested in the mass consumer market, not in the professional market. The small engineering company had the freedom to build a business in the market for professional use of the technology such as snack bars. Subsequently, in 2011, the company collaborated with a Chinese partner to develop a first version of the fryer that could fry twice as much in half the time as the Philips Airfryer. the small engineering company decided to license the technology on a non-exclusive basis to several suppliers because the professional market was highly segmented geographically and in terms of products.

Most customers and health authorities perceive that the Airfryer is a highly innovative product that drastically reduces the need for oil and creates fried food that is less unhealthy. The new technology also required consumers to adapt their cooking habits. But the Airfryer could also fry a broader range of products such as 'croque monsieurs' just to mention one example. Therefore, the Airfryer is packaged with an inspiring recipe booklet, written by a culinary expert, which contains 30 easy-to-prepare recipes, as well as cooking tips and tricks. Philips also opened the Philips My Kitchen Web site and blogs where recipes could be added and where people could learn inspirational ways to fry food. Finally, Philips collaborated with some snack producers, such as Mora⁴⁴ to co-promote the Airfryer and Mora's frozen snacks. For the professional market, the small engineering company worked with a major frozen snack producer to jointly bring the new fryer and the new snacks together on the market, mutually helping each launch these new products successfully.

Figure 11: Case Airfryer

Case Study

THE PHILIPS AIRFRYER

In 2010, Philips introduced the Airfryer, a new kitchen appliance at the Internationale Funkausstellung (IFA), an important consumer electronics fair in Berlin. The AirFryer is an egg-shaped device that allows consumers to fry a variety of foods conveniently and easily, including potato chips, snacks, chicken, and meat, among many other foods. The AirFryer was developed using the patented Rapid Air technology, which results in frying crispy fries that contain up to 80% less fat than a conventional fryer. Because the device uses only air to frying the foods, it produces fewer smells and vapours than traditional frying; is easy to clean; and is safe for daily use. The Airfryer was listed in the top five inventions of the 2010 IFA. Alongside Philips' marketing managers, the inventor of the technology was present when the award was presented to the company. He owns APDS, a product development firm founded in 1990, and under which the Airfryer was developed.

Several years prior to this success, the inventor was not happy with the results he achieved with the fat-free fryer he bought via a television sales ad. As an engineer and food aficionado, his discontent triggered his desire to solve the problems he was encountering with his fryer. He started working on a better version of this popular appliance. By 2007, he had found a way to optimise the fryer so that it worked properly. At that time, however, he did not have the financial means or business insight to market the product properly. Coincidentally, the inventor met a seasoned manager that had worked for Braun as a commercial director for 24 years. After that, he started a company that guides inventors in marketing their ideas. The manager immediately recognized the potential of the invention and became a shareholder of a small engineering company, the daughter company of APDS, which was tapped to manage the new product. The partners first tried to secure a bank loan and external investors, but were not successful. Eventually, Fred developed the prototype himself by teaming with Chinese partners who were part of the network to which Hans had access. They subsequently filed for a patent. Two years later, the prototype is ready and the inventor and the manager needed to develop their strategy. They were considering whether they had to produce the product themselves or sell the idea. Because they had connections with Braun, they first presented their invention there, but Braun was not interested. As their next step they contacted Philips.

“...the prototype was ready and Hans and Fred needed to develop their strategy. They were considering whether they had to produce the product themselves or sell the idea.”



Figure 1: The airfryer uses a patented combination of high-speed air circulation with a top grill called Rapid Air technology. The Rapid Air technology makes the hot air circulate rapidly around the ingredients in the basket.

Since 2005, Philips had been trying to develop a fryer that makes the frying process healthier. They had the technology, but were struggling to transform it into a consumer product that was consistent with the Philips credo of sense and simplicity. The product they developed initially with was too complex and too expensive. Early in 2009, the small engineering company contacted them. They had developed a product that not only used appropriate technology, but could also be translated into a consumer product that is simple and user-friendly. Godwin Zwanenburg, the Inno-

THE PHILIPS AIRFRYER

*“For Philips,
license agreements
on external
innovations mean
quick entry into
the market,
without spending
a lot of time and
money in own
R&D.”*

vation Lead at Philips Consumer Lifestyle, presented the idea to his commercial team, and they decided to sign a letter of intent so they could start the investigation phase. In this phase, various aspects of a potential product undergo rigorous testing for safety, technical specifications, applicability, and quality. The product passed every test, and Philips decided to sign a licencing agreement with the inventors. They subsequently created the Airfryer, an appliance that uses 80% less fat than a traditional fryer by implementing Rapid Air Technology. The appliance was fashioned according to the typical look-and-feel of Philips' products.

The Airfryer is launched in September 2010 at the IFA and immediately attracted significant attention. It was featured in magazines and on television and was listed among the top five inventions of the fair. After this introduction, the Airfryer was demonstrated and promoted in various shops in the Netherlands, Belgium, France, and Germany. Philips expended great effort to persuade customers to fry their food in a more healthy way. To do this, they add a recipe booklet to the product and created a Web site where recipes were available to give owners and potential buyers inspiration. Sales took off and Philips began thinking of its next steps. They were planning to introduce the Airfryer in other European countries, Australia, The Middle East, Russia, and America and tailor the product for different electricity nets and cooking habits.

From their perspective, the inventors also had ambitious plans. They aimed to introduce a new version of the AirFryer for the professional market. This product would process a larger amount of food in a shorter time. Because Philips does not target the professional market, the licencing contract allowed the inventors to explore this market niche. They were required, however, to notify Philips and share all royalties and profits.

For Philips, finding externally developed inventions such as the Airfryer is like finding a needle in a haystack. It was important, therefore, that independent inventors find their way to the company, so that inventions with a strong market potential do not remain unexplored. For Philips, licence agreements on external inventions mean quick entry into the market, without spending a lot of time and money on their own R&D. For the inventors, on the other hand, it is a good way to commercialise and market their ideas; indeed, most do not have the much-needed capital, resources, networks, and market leverage. For these reasons, Philips is currently working on a strategy to make it easier for external engineers and inventors to find their way to Philips business developers. Once inventors reach them, for example, through a portal on the Internet, they receive a reply within two weeks that includes a clear evaluation of the technology and the way to proceed. In this way, Open Innovation creates a win-win situation for both inventors and multinationals. Collaborating with smaller firms is a way to innovate that will become increasingly important to stay ahead of competitors.

Learn More

<http://www.apds.nl>

<http://www.philips.be>

<http://www.philips.be/ka/be/nl/index#/home>

Key learning points

- In the past, collaboration between large and small firms has been prone to different types of problems. This situation is changing rapidly as large companies engage in open innovation. They now recurrently rely on technology of small (high-tech) companies and/or monetize unused technology by licensing the technology or spinning off internal ventures. Consequently, new opportunities exist for small companies, but the collaboration can only be successful if the relationship is managed in an appropriate way.
- Small firms that collaborate with large companies have an enormous advantage if the top manager has extensive experience as a senior manager in a large firm. This experience gives the top manager a credible reputation among managers in the partnering company, demonstrating that he understands how to present a business plan that makes sense for all parties. The top manager also knows the decision-making processes in large companies and how to deal with them.
- Small firms should do their homework before they start collaborating with large companies. Some large companies are trustworthy innovation partners because they recurrently collaborate with partners and have built a reputation as a reliable partner in the VC community.
- Problems related to licensing an unused technology from a large company include:
 - The Not Sold Here syndrome: Large companies start from the assumption that if they can't make a business, no one can.
 - Owners of the technology (usually business group managers) do not have an incentive to license a technology because royalty income will come in long after the manager has left that position. This changes when a company has a 'use or lose it strategy'.
 - Licensing to small firms implies *significant work* in return for small licensing revenues. The venture manager, therefore, must be experienced in finding the innovation champions in the company and contact the decision makers directly to keep the project on top of the pile.
- A start-up relying on the technology may be in an advantageous position compared to other start-ups, because it can use the large company's reputation to acquire external financing. Consequently, the large firm may invest, local governments can subsidize or invest more easily, and banks will be less reluctant to grant loans.
- Successful collaborations or licensing deals between large and small companies start with a clear understanding of how each company wants to benefit from the collaboration, and the work toward a win-win outcome. Let your partner pursue business opportunities in areas that do not fit your business model. In the Airfryer case, this translated into opportunities for both partners, one focusing on the consumer market the other one on the professional market.

6 Conclusion

Many small companies today are confronted with harsh market conditions. The current economic crisis has weakened their financial health, especially in industries that are globalizing rapidly. These changing market conditions force them to look for new ways to differentiate their products and services or create new businesses. Because they lack the required internal resources, SME's often collaborate with external partners to innovate successfully and reach more profitable positions in the competitive landscape. Open innovation is thus a logical step to take for many small firms. SMEs in the low- and medium-tech industries we examined indicate clearly that firms that know how to manage a network of innovation partners can seize new business opportunities become key players in growth industries and turn themselves into highly profitable companies.

Why should we care about open innovation in small firms in the so-called low- and medium-tech industries? First, SMEs create the majority of the jobs in these industries in Western economies. Moreover, globalization and commoditization threaten many jobs if companies do not change strategies over time. Second, the firms we examined show that small companies can sidestep the commoditization pressure and price competition successfully by using open innovation to develop new and more profitable businesses. Third, an urgent need exists to study how open innovation is managed and organized in small firms. Most management insights about open innovation are based on cases of large manufacturing firms. Open innovation in small companies has received almost no attention, although our sample proves that small firms can be very successful in using and integrating knowledge from external partners to create new products or services. Fourth, managing and organizing open innovation in SMEs is quite specific, and the lessons learned from open innovation in large firms cannot be transferred to the context of SMEs. This renders the need for a specific approach on open innovation in SMEs even more urgent.

How do small firms use open innovation to create and capture value?

In this report, we have examined how small firms can benefit from open innovation networks. We summarize the most important findings:

Vision: Frequently, a (radically) new vision of entrepreneurs or managers is the starting point for the business model of SMEs. A quilts manufacturer defining the company as “a provider of healthy sleep” is a completely different vision about the industry than what most quilt manufacturers have in mind. The vision may be disruptive, but entrepreneurs always have strong background knowledge of the industry. What works is a vision, not a dream. In most cases, the vision can be considered as a new value proposition, which the company brings to potential customers (not necessarily existing ones). A radically new value proposition may offer customers new meaning to the product or service offering.

The network of partners: Common in all cases is that the SMEs establish a network of external partners. Partners may be technology partners such as universities, research labs, or other companies, but in most cases these are not the most important partners in the network. An SME commonly starts from the vision or concept and searches for partners depending on the technology, value chain positions, and competencies it needs to realize the new product offering. In most cases, the network is small at the beginning (two to three partners), but other SMEs take a different approach and set up a large consortium of partners. The size of the network is determined by the type of products or services the SME wants to launch.

Networks of partners have to be managed as well, but the type of management differs from the internal management of a firm. A network of partners is only viable when each partner is better off compared to not participating in the network. Not every partner is automatically better off joining the network. Partners may have to bear considerable risks or investments in dedicated complementary assets. In open business models, therefore, one has to analyze the joint value creation together with the value distribution among the different partners. Strong network management is necessary to balance the need to maximize the joint value creation and the continuous tension between partners to claim a larger share of the pie for themselves. One of the major learning points to emerge from the cases is that open innovation networks are sustainable only when the value that is jointly created is several times larger than what partners can realize on their own. It is easier to deal with tensions among partners when everyone will lose significantly if partners leave the network. Conversely, a network is not sustainable when partners can benefit more from a stand-alone strategy.

Building strong ties to cope with environmental and relational risks. The biggest challenge in an open innovation network is the market and technological risk on the one hand and the relational risk on the other hand. Business model innovations are high-risk ventures because a firm must search for new technologies and develop new products. Furthermore, the customers' reaction is not easy to predict. In addition, the SME depends significantly on its partners' commitment. The glue of an open innovation network is the *personal ties* between a few key managers and actors. A personal bond, alignment in commitment, and transparency among the partners are necessary elements.

Dependence on partners' IP. Low-tech SMEs can rely on others' IP, or they co-develop technological innovations. Most of the small firms we interviewed have negotiated technology agreements such as licensing deals with their partners. SMEs can be vulnerable because partners will ask for a return on their technology investments. Worldwide licensing deals can be challenging for SMEs, which forces them to sublicense to other companies. This, in turn, may endanger the open innovation venture. Licensing deals can also be negotiated in a way that allows both partners to profit maximally from the technology. This is especially the case when both partners have different objectives: they may focus on different markets (the B2B and B2C markets in the Airfryer case) or one may be interested in the technology as such while the partner is only interested in a particular application (see Isobionics and Quilts of Denmark cases).

A stepwise approach. SMEs change their business model in a stepwise way. In most cases, companies begin with a (radically) new product or service, but this is only a start. There are several reasons why open innovation is a never-ending process for SMEs. First, unlike some high-tech industries, where companies have ironclad IP protection, most low-tech SMEs are not well protected by their intellectual property rights. In some cases, competitors can copy products in less than six months. Second, the first open innovation initiative presents new strategic options for SMEs: they build new skills and competencies over the years, and they become financially stronger. Therefore, some SMEs unfold their business model innovation in several consecutive steps, building new competencies and a stronger financial position at the same time. Finally, a business model change creates opportunities to change a second and a third time. Curana switched from an OEM to an ODM business model. Once the company was recognized as an ODM, it changed its business model again by proactively designing bicycle parts. Because of this change, the company was recognized in the industry as a trendsetter. This, in turn, triggered Curana to build a brand-based strategy. These consecutive steps propelled the company into a leading position in the bike accessory market. If the company stayed tuned to the ODM business model, it would already be confronted with several competitors imitating the ODM move.

The benefits and cost of relational capital. Relational capital plays a central role in developing an open innovation based business model. The competitive strength of the SMEs is no longer (only) related to its internal competencies, but (also) to its network of relationships. After some years, an SME has a large network of organizations upon which it can rely. These contacts give the innovating SME a

strong position for two reasons. First, knowing this multitude of partners (and partners of partners) and having a preferential relationship with them makes the company more agile and knowledgeable than other firms in the industry. Second, the central position of the SME in the network also gives it a stronger negotiation position vis-à-vis other organizations in the network.

Does open innovation fit your company's needs?

We have described and analyzed 10 successful cases of open innovation in small - and medium-sized firms. There is no doubt that you, as a manager of a small firm, identified similar problems as these managers did. You are likely experiencing continuous globalization pressure and competitors are eating away your firm's margins. You can invent all kinds of short-term tactics to defend your market position in the short run, but what options do you have within two or three years: In the long run, companies that face stiff competition have to reinvent their businesses, looking for new ways to reposition their products and services.

Some of the SMEs we described opened new market space, which made their competition irrelevant (at least for several years). They started with a strong vision or conviction that was cultivated by their excellent knowledge of the industry. Do you have a vision? Do you know which new products concepts, which new experiences can shake up your business? Remember, we are not talking about a business plan for the next five or 10 years. What you need is a strong idea for a new product or business. In this respect, we should keep Albert Einstein's quote in mind: "If at first, the idea is not absurd, then there is no hope for it". The idea of a healthy sleep, a mudguard combining aluminum and plastic, or a virtual way to shop for fashion are all somewhat crazy at first look. But, they each changed the industry and turned the innovating companies profitable.

Have the courage to act. Each entrepreneur we met took risks, sometimes considerable, and made investments. Imagining a new product is one thing, whereas starting the venturing process is another. The courage and perseverance of each of these managers is a trait characterizing most of the managers we met.

Third, open innovation requires managers to know how to build networks with other organizations through their personal networks. The managers we met constantly reach out to other companies. They are strong in network building and "knowing who".

A policy initiative: How to accelerate and deepen learning about open innovation among entrepreneurs

One way to accelerate the use of open innovation in small firms is to diffuse successful cases using audio-visual tools on the Internet. Entrepreneurs and small business managers are not triggered to learn and to become more innovative by studies or lists of recommendations that academics or consultants develop. In contrast, they are spurred to take action when they are confronted with the testimonials of entrepreneurs who are using open innovation successfully to develop new businesses. Managers of small firms are usually too busy with day-to-day management to join international conferences to learn about open innovation. Most managers learn about innovation management and open innovation in local, small-scale, innovation networks that in many cases are organized by local agencies. These initiatives are organized locally and therefore have the advantage that they are accessible even to managers of the smallest company. The disadvantage is that the scale is too small to invest significantly in developing content and guidelines. Therefore, it is quite useful to start up an European-wide initiative to make short videos that illustrate highly successful entrepreneurs who have been transforming their business through a network of partners and how managing such a network is

an increasingly important lever in gaining competitive advantage. We suggest developing short movies (10-15 minutes) of 50 to 100 interesting cases around Europe and uploading them on YouTube, Slideshare, and so on. (For a good example, see the videos on the Web site of the Belgian Design Forum.) These videos can be combined with a package of practical management tools for the many local initiatives to use, whereby managers of small firms learn how to innovate and set up innovation networks. Some interesting initiatives are taking place in Flanders; for example, the Innovation Network of the Chambers of Commerce or related activities of the Innovation Centers. The videos and the tools have an advantage: These local entrepreneurs are working together within local initiatives and can tap into a broad range of top-performing companies that are practicing open innovation successfully. In contrast, most initiatives today are relying on a few local examples. The expertise could be upgraded easily to a best practice level when local trainers could work with these videos and management tools.

A short note on the theoretical implications of this report

We studied the phenomenon of open innovation based on qualitative case studies of a set of SMEs in low- and medium-tech industries. Our findings call for a more rigorous analysis of the links between open innovation on the one hand and strategy or business modeling on the other hand. Some articles on this topic have been written, but to our knowledge, they are based on the ICT industry⁴⁵. The lessons from these publications may be too specific for the ICT industry and as a consequence not relevant for many other industries.

A second research topic that should be explored in greater detail is the link between open innovation in SMEs and the role of the entrepreneur or SME manager. The cases show convincingly that the entrepreneur plays a crucial role in the whole process. He perceives the new business opportunities, and his personal commitment and conviction help determine the success and development of the innovation network. Indeed, success hinges on his personal network and his capability to manage the network. We did not examine the entrepreneurship literature to analyze open innovation in SMEs. Clearly, potential exists to connect the two literature streams to strengthen the analysis further.

Third, the potential exists to connect open innovation in SMEs to the discovery driven growth theory of McGrath and MacMillan⁴⁶. The stepwise development of the open innovation strategy of different SMEs is a nice illustration of this theory, which emphasizes the role of experimenting in new venture management.

Finally, the cases point to the need to integrate different management disciplines to understand open innovation in SMEs. The need to combine innovation management, entrepreneurship, and strategy is urgent to understand the richness of these open innovation cases. The three disciplines have been developing largely independently. But to understand the complexity of open innovation in SMEs, we must create bridges among these management disciplines.



Knowledge Partner



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NOTES

Chapter 1

¹ Chesbrough, H.W., Vanhaverbeke, W. and West, J. eds. (2006), Open Innovation: Researching a New Paradigm, Oxford University Press.

² I am grateful to André Spithoven (Belgian Science Policy Office) for calculating the open innovation intensity for both large and small innovating companies in Belgium. Open innovation intensity for both large and small innovating companies in Belgium can be calculated using the European Community Innovation Survey (CIS). SMEs are companies with less than 250 employees (N = 792); larger companies (≥ 250 employees; N = 175). The calculation covers the period 2002-2004.

Open innovation can be measured in different ways. Developing a search strategy is one of the most important aspects of open innovation. The CIS survey identifies nine external information sources for innovation. The nine external information sources are categorized into three types: market sources (suppliers of equipment (i), customers (ii), competitors and other firms with similar activities (iii), commercial labs, private R&D organizations, and consultants (iv)); institutional sources (universities and university colleges (v), government and public research organizations (vi)), and other available sources (professional and industrial associations (vii), trade fairs, exhibitions, and conferences (viii), scientific journals and trade/technical publications (ix). A firm's search strategy is defined by calculating the average score of the binary questionnaire items used to register a firm's use of each of the nine information sources. This measure is then rescaled so that it has a minimum value of 0 and a maximum of 10. The search intensity is calculated by dividing the search strategy score by the employment of the firm.

External R&D indicates how heavily companies rely on five possible external R&D activities: the acquisition of readymade products/services developed by third parties (i); the acquisition of processes set up by external parties (ii); the outsourcing of R&D activities (iii); the acquisition of innovative, externally developed machinery, equipment, and software (iv); the acquisition of external knowledge through licenses or other types of contracts (v). A company's external knowledge acquisition is captured by calculating the average score of the five questionnaire items registering a firm's use of these external sources of R&D. Again, the score is rescaled to include a minimum value of 0 and a maximum value of 10. The external R&D intensity reflects external R&D per employee.

Collaborative innovation indicates whether innovating firms engage in collaborative innovation activities with six potential partners: clients (i); suppliers (ii); competitors (iii); consultants and private R&D organizations (iv); universities (v); and public research organizations (vi). Collaborative innovation is captured by calculating the average score of the six questionnaire items registering the firm's use of cooperative agreements with innovation partners. Also this variable was rescaled and the collaboration intensity measures the collaboration per employee.

Variable	Small and medium-sized enterprises (N-SME = 792)		Large firms (N-large = 175)		Difference
	Mean	Standard deviation	Mean	Standard deviation	
Search intensity	0.228	0.200	0.016	0.009	0.212****
External R&D intensity	0.101	0.112	0.008	0.006	0.093****
Collaboration intensity	0.052	0.100	0.008	0.007	0.045****

Notes: **** = statistically significant at 0.1%.

Source: Belgian Science Policy Office

The figures show that SMEs have, on average, much higher intensity in open innovation practices than larger companies. Open innovation is relatively more important for small firms than for large ones.

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- ³ See in Chesbrough, H.W. (2003), *Open innovation; The new imperative for creating and profiting from technology*, Harvard Business School Press, Harvard : Boston: MA and Chesbrough, H.W. (2006), *Open business models: How to thrive in the new innovation landscape*, Harvard Business School Press, Harvard : Boston: MA.
- ⁴ Van de Vrande, V., De Jong J.P.J., Vanhaverbeke, W. and De Rochemont, M. (2009), Open innovation in SMEs: Trends, motives and management challenges, *Technovation*, 29(6-7),423-437; De Jong, J.P.J. and Marsili, O. (2006), The fruit flies of innovations: a taxonomy of innovative small firms, *Research Policy*, 35(2), 213–229; Massa, S. and Testa, S. (2008), Innovation and SMEs: Misaligned perspectives and goals among entrepreneurs, academics, and policymakers, *Technovation*, 28, 93–407.
- ⁵ See Van de Vrande, V., De Jong J.P.J., Vanhaverbeke, W. and De Rochemont, M. (2009), Open innovation in SMEs: Trends, motives and management challenges, *Technovation*, 29(6-7),423-437 and Kim, H. and Park, Y. (2010), The effects of open innovation activity on performance of SMEs: the case of Korea, *International Journal of Technology Management*, 52(3/4), 236-256.
- ⁶ See in Chesbrough, H.W. (2003), *Open innovation; The new imperative for creating and profiting from technology*, Harvard Business School Press, Harvard: Boston: MA and Chesbrough, H.W. (2006), *Open business models: How to thrive in the new innovation landscape*, Harvard Business School Press, Harvard : Boston: MA.
- ⁷ Chesbrough, H.W. (2007), Why companies should have open business models, *MIT Sloan Management Review*, 48(2), 22-28.
- ⁸ There are different approaches to business models. Different authors have analyzed the business models along different frameworks. Prominent approaches are: Afuah, A (2004), *Business Models: A strategic management approach*, McGraw-Hill; Morris, M. and Schindehutte, M. (2005), The entrepreneur's business model: Toward a unified perspective, *Journal of Business Research*, 4, 123-128; Osterwalder, A. (2004), *The business model ontology – a proposition in a design science approach*, Ph. D. Thesis University Lausanne, Ecole des Hautes Etudes Commerciales HEC. 173 p; Osterwalder, A., Pigneur, Y. and Tucci, C.L. (2005), Clarifying business models: Origins, present, and future of the concept, *Communications of the Association for Information Systems*, Vol. 16, 1-25; Shafer, M.S., Smith, H.J. and Linder, J.C. (2005), The power of business models, *Business Horizons*, 48(3), 199-207. Chesbrough, H.W. and Rosenbloom, R.S. (2002), The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies, *Industrial and Corporate Change*, 11(3), 529-555; Johnson, M.W., Christensen, C.M., and Kagermann, H. (2008), *Reinventing your business model*. Harvard Business Review, December, 51-59.; and Johnson, M. W. (2010); *Seizing the white space: Business model innovation for growth and renewal*, Harvard Business Press, Boston: MA.
- ⁹ Faems, D., de Visser, M., Andries, P. and Van Looy, B. (2010); Technology Alliance Portfolios and Financial Performance: Value-Enhancing and Cost-Increasing Effects of Open Innovation, *Journal of Product Innovation Management*, 27: 785-796.
- ¹⁰ See for instance Yin, R. K. (1994), *Case study research: Design and methods* (2nd ed.). Newbury Park, CA: Sage.; Eisenhardt, K. M. (1989), Building theories from case study research. *Academy of Management Review*, 14: 532–550.; Eisenhardt, K.M and Graebner, M.E. (2007), Theory building from cases: Opportunities and challenges, *Academy of Management Journal*, 50 (1), 25-32. Qualitative, in-depth cases are also valuable for theory building since there is no theory about open innovation in SMEs. We choose multiple case studies because this research method provides a stronger base for theory building compared to single cases. Theory and model building from multiple cases yields more robust, generalizable, and testable theories than single-case research.

Chapter 2

- ¹¹ A business model can be defined in different ways. A. Osterwalder and Y. Pigneur (2009), *Business model Generation* is one of the most influential books on business model innovation besides M.W., Johnson (2011) *Seizing the white space: Business model innovation for growth*

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- and renewal, Harvard Business Press, Harvard: MA. The core ideas of this book are summarised in the following HBR article: Other definitions of open innovation have been provided by Johnson. M.W., Christensen, C.M. and Kagermann, H. (2008), *Reinventing your business model*. Harvard Business Review, December, 51-59. Other definitions have been provided by A. Afuah (2003), *Business Models: A strategic management approach*, McGraw-Hill Irwin. Boston: MA; R. Amit and C. Zott (2001), *Value creation in e-business*, Strategic Management Review, 22, 493-520; and Rosenbloom and H.W. Chesbrough (2002), *The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies*, Industrial and Corporate Change, 11(3), 529-555.
- ¹² Kim, W. and R. Mauborgne (2005), *Blue ocean strategy: How to create market space and make te competition irrelevant*, Harvard Business Review Press, Harvard: MA.
- ¹³ Johnson. M.W. (2011), *Seizing the white space: Business model innovation for growth and renewal*, Harvard Business Press, Harvard: MA.
- ¹⁴ The role of the business model creating economic value from technological inventions is one of the central themes in Chesbrough, H.W. (2003), *Open innovation; The new imperative for creating and profiting from technology*, Harvard Business School Press, Harvard: Boston; and Chesbrough, H.W. and Rosenbloom, R.S. (2002), *The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies*, Industrial and Corporate Change, 11(3), 529-555.
- ¹⁵ In reality, the customer value proposition is a bit more complex. Isobionics' customers, notably food manufacturers, can use BioValencene™--the first commercialized flavour by Isobionics—to create natural citrus flavours and fragrances for their products without worrying about quality issues that plague natural extracts. Furthermore, Isobionics' technology allows developing new flavours and fragrances (F&F) that do not exist in natural products. This opens completely new markets for the F&F industry.
- ¹⁶ Curana developed the B"Lite as an open innovation project. Pilipili, a design company in the neighbourhood, was involved as a strategic partner in the project. Later, other partners joined the project delivering unique skills and competencies that Curana did not master. We will discuss the how Curana managed its network of innovation partners in Chapter XXX. Here, we focus on the stepwise development of the B"Lite project, neglecting the collaboration between different partners during the project.
- ¹⁷ Johnson. M.W., Christensen, C.M. and Kagermann, H. (2008), *Reinventing your business model*. Harvard Business Review, December, 51-59.
- ¹⁸ See, for instance, Govindarajan, V. and Trimble, C.(2005), *The 10 rules for strategic innovation*, Harvard Business School Press, Harvard: MA; Christensen, C.M. (1997), *The innovator's dilemma: When new technologies cause great firms to fail*, Harvard Business School Press, Harvard: MA. Christensen, C.M. (1997), *The innovator's solution: Creating and sustaining successful growth*, Harvard Business School Press, Harvard: MA.
- ¹⁹ This is exactly what McGrath and MacMillan call *discovery driven growth*. Many of the issues on which she touches in her publications about strategic growth are reflected in our approach about discovering and seizing new business opportunities. See R. McGrath and I.C MacMillan (2009), *Discovery driven growth: a Breakthrough process to reduce risk and seize opportunity*, Harvard Business Press, Boston: MA.; R. McGrath (2010), *Business Models: A discovery driven approach*, Long Range Planning, 43, 247-261.
- ²⁰ Pine, B.G. and Gilmore, J.H. (2011), *The experience economy*, Harvard Business Review Press, Boston: MA.; Pine, B.G. and Gilmore, J.H. (1998), *Welcome to the experience economy*, Harvard Business Review, July-August, 97-105; GILMORE, J.H and B.J. Pine (2007), *What consumers really want: Authenticity*, Harvard Business School Press, Boston: MA.

²¹ These conditions have been analysed in detail by Gans, J.S and Stern, S. (2003), The product market and the market for “ideas”: commercialization strategies for technology entrepreneurs, *Research Policy*, 32, 333-350. Markets for ideas have been explored at length by Arora, A. and Gambardella, A. (2010), Ideas for rent: An overview of markets for technology, *Long Range Planning*, 19(3), 775-803.

²² See also G.A. Moore, *Crossing the chasm: Marketing and selling technology products to mainstream customers*, HarperCollings Publishers, New York.

Chapter 3

²³ See previous chapter for a more detailed description how Curana developed the B”Lite. I refer to the “Curana BVBA” teaching case for a more extensive description of Curana’s open innovation strategy. The case is published by the European Case Clearing House (ECCH 810-062-1).

²⁴ For differences between conventional and discovery driven growth, see R. McGrath and I.C MacMillan (2009), *Discovery driven growth: A Breakthrough process to reduce risk and seize opportunity*, Harvard Business Press, Boston: MA, p. 13.

²⁵ Barometers used for meteorological purposes are always calibrated as if the user is at sea level. The effective air pressure is not measured, but the air pressure in relation to 0 metres is measured. For this reason a meteorological barometer must always be calibrated before using it for the first time. In contrast, a real pressure barometer should measure the air pressure exactly at a particular altitude.

²⁶ The National Association for Stock Car Auto Racing (NASCAR) is a business venture that sanctions and governs multiple auto racing sports events. It is the largest sanctioning body of stock car racing in the United States including the Sprint Cup Series, the Nationwide Series, and the Camping World Truck Series. It also operates oversees in 39 states.

NASCAR’s headquarters are located in Daytona Beach, Florida, although it also maintains offices in four North Carolina cities: Charlotte, Mooresville, Concord, and Conover [4] Regional offices are also located in New York, Los Angeles, Bentonville, Arkansas, and international offices in Mexico City and Toronto. Additionally, owing to its Southern roots, all but a handful of NASCAR teams are still based in North Carolina, especially near Charlotte.

NASCAR is one of the most-viewed professional sports in terms of television ratings in the United States. In fact, professional football is the only sport in the United States to hold more viewers than NASCAR [5]. Internationally, NASCAR races are broadcast in more than 150 countries [6]. NASCAR holds 17 of the top 20 attended single-day sporting events in the world,[7] and claims 75 million fans who purchase more than \$3 billion in annual licensed product sales. Fortune 500 companies sponsor NASCAR more than any other motor sport, [8] although this has been in decline since the early 2000s.

²⁷ lansiti M. and Levien, R. (2004); *The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation and sustainability*, Harvard Business School Press, Boston, MA.

²⁸ There is a rapidly growing literature stream. A few examples are Chesbrough, H.W. and Rosenbloom, R.S. (2002), The role of the business model in capturing value from innovation: evidence from Xerox Corporation’s technology spin - off companies, *Industrial and Corporate Change* , 11(3), 529-555; Morris, M., Schindehutte, M., and Allen, J. (2005), The entrepreneur’s business model: toward a unified perspective, *Journal of Business Research*, 58, 726-735; Shafer, S.M., Smith, H.J., Linder, J.C. (2005), The power of business models, *Business Horizons*, 48, 199-207; Osterwalder, A., Pigneur, Y., Tucci, C.L. (2005), Clarifying business models: origins, present and future of the concept, *Communications of the Association for Information Systems*.

Chapter 4

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- ²⁹ Chesbrough, H. (2007), Why companies should have open business models, *MIT Sloan Management Review*, Winter 2007, 48, 2,22-28; Gassmann, O., Enkel, E. (2004), *Towards a theory of open innovation; three core process archetypes*, R&D Management Conference RADMA, Lisbon, Portugal.
- ³⁰ Larsen P. and Lewis, A. (2007), How award-winning SMEs manage the barriers to innovation, *Creativity and Innovation Management*, 16 (2), 142-151.; Van de Vrande, V. de Jong, J.P.J., Vanhaverbeke, W. and de Rochemont, M. (2009), Open innovation in SMEs: Trends, motives and management challenges, *Technovation*, 29, 423-437.
- ³¹ Seminal contributions are Dyer, J. and Singh, H. (1998), The relational view: Cooperative strategy and sources of interorganizational competitive advantage, *Academy of Management Review*, 23(4), 660-679; and Powell, W.W., Koput, K.W. and Smith-Doerr, L. (1996), Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology, *Administrative Science Quarterly*, 41, 116-145.
- ³² In 2006, Netflix, a major movie rental company, organized a crowdsourcing contest on the Internet. The idea was to build a better way to recommend movies to its users than its own software. The winning idea would receive a million dollars. The contest was a huge success. Three years later, the Web-based movie rental service company awarded a team of mathematicians and computer engineers called BellKor's Pragmatic Chaos. The group developed software that is at least 10% more accurate than Netflix's current software (Cinematch) at predicting which movies customers will like based on their past preferences. Crowdsourcing contests are also possible for smaller companies—although most likely in smaller, more focused communities. Moreover, small contests can be held among employees, suppliers, and local communities of designers, engineers, and so on.
- ³³ These value networks have been described by different authors. Iansiti M. and Levien, R. (2004); *The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation and sustainability*, Harvard Business School Press, Boston: MA; and Allee, V. (2008), Value network analysis and value conversion of tangible and intangible assets, *Journal of Intellectual Capital*, 9, 1, 5-24.
- ³⁴ Gilmore, J.H and B.J. Pine (2007), What consumers really want: Authenticity, Harvard Business School Press, Boston: MA.

Chapter 5

- ³⁵ Katila, R. Rosenberger, J.D., Eisenhardt K.M. (2008), Swimming with Sharks: Technology Ventures, Defense Mechanisms and Corporate Relationships, *Administrative Science Quarterly*, 53: 295–332.
- ³⁶ See National Research Council (2004): A patent system for the 21st Century, The national Academic Press, Washington, D.C. See also J.O Lanjouw, and J. Lerner "Tilting the Table? The Predatory Use of Preliminary Injunctions," *The Journal of Law and Economics*. (Vol. XLIV, no. 2, 2001, 573-603) for an analysis of how smaller firms are disadvantaged disproportionately by high IP litigation costs.
- ³⁷ See Chesbrough, H. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press, Boston, MA.; and Vanhaverbeke, W., Van de Vrande, V. and Chesbrough, H. (2008). Understanding the Advantages of Open Innovation Practices in Corporating Venturing in Terms of Real Options. *Creativity and Innovation Management*, 17, 251-258.
- ³⁸ Chesbrough, H.W. and Gaman (2009), How open innovation can help you cope in lean times, *Harvard Business Review*, December, 69-76.
- ³⁹ Sakkab, N. (2002), Connect and develop complements Research and Development at P&G, *Research-Technology Management*, 45 (2), 38-45.
- ⁴⁰ For more information about the Frost and Sullivan 2010 Global Technology Innovation Award, see <http://www.isobionics.com/press3.htm>

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- 41 A fermenter is a vessel in which an optimal environment can be created for micro-organisms to grow and reproduce. Cultivating these mirco-organisms yields a desirable substance. In the case of BioValenceneTM, bioengineered micro-organisms are dropped in a vessel of 25.000 litres of water to which sugar is added.
- 42 This is a common problem for biotech and pharma ventures.
- 43 Two inspiring articles to understand how complementary assets play a role in the value appropriation of innovations are Teece, D.J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, 15 (6): 285-305; and Gans, J.S., and Stern, S. (2003), The Product Market and the Market for Ideas: Commercialization Strategies for Technology Entrepreneurs, *Research Policy*, 32: 333-350.
- 44 See www.more.nl for more information about this snack producer.

Chapter 6

- 45 See Chesbrough, H.W. and Appleyard, M.M. (2007), Open Innovation and strategy, *Califomia Management Review*, 50 (1), 57-76.
- 46 See R. McGrath and I.C MacMillan (2009), *Discovery driven growth: A Breakthrough process to reduce risk and seize opportunity*, Harvard Business Press, Boston: MA.