Modeling the set-up and management of a spin-out: Evidence from a case study

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EVIDENCE FROM A CASE STUDY

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Abstract

In this paper we explore a special case of venturing, namely the spinout approach. More in particular, this paper has sought to model the spin-out process by combining scholarly literature with an empirical analysis of the spinout process of Royal Dutch Shell. Through literature review we have identified multiple factors relevant for spinout success, which are captured in a practical assessment model. In doing so, we have provided managers with a phased approach showing the critical steps that have to be taken in the decision, set-up and management phases of a spinout. The added value of the introduced assessment model is that it treats a spinout as an ongoing process of enacting set-ups, rather than a static event.

INTRODUCTION

In a business environment characterized by rapid, complex and radical technological changes, large established companies are increasingly looking for ways to acquire new technological capabilities and explore new business opportunities in order to survive in the long run (Govindarajan and Trimble, 2005; Vanhaverbeke and Peeters, 2005). Accordingly firms increasingly rely on corporate venture capital as a means of developing new competencies and expanding into new businesses (Dushnitsky and Lenox, 2005; Gompers and Lerner, 2001; Maula et al., 2003; Katila et al. 2008). Corporate venture capital can be defined as minority equity investments by established firms in external entrepreneurial ventures (Sahaym et al, 2009, p.2).

In this paper we explore a special case of corporate venturing, i.e. the spinout approach, which has become increasingly popular in business life in the past few years (Jagersma and van Gorp, 2003). A spinout refers to a certain type of corporate venture capital whereby a company "splits off" sections of itself as a separate entrepreneurial business. Moreover, the parent company receives (minority) equity stakes in the newly spun out venture. Although we witness a strong growth in spinout activity during the last decades, an academic-wide accepted definition is still missing (Tubke, Saavedra and Gonzalez, 2004). We define a spinout as a divestiture of the parent firm's assets (which can include structures, products, patents or personnel) into a newly created entity that is open to separate external financing (adapted from Ledbetter and Zipkin, 2002). In addition we would like to stress that in our definition of spinouts the spun-out venture is not seen as an entity gone forever, but over time might be bought back and integrated into the parent company again.

Spinouts have been a topic of interest in many scientific fields such as entrepreneurship, strategic management and innovation management (Tubke,

Saavedra & Gonzalez, 2004). Nonetheless, despite this increasing interest, there seems to be no clear understanding of how to come to a systematic approach with respect to the *set up and management of a spinout*. For example, previous research (i.e. Burgelman et al., 2004; Chesbrough 2003a, 2003b; Ito, 1995; McElroy, 2003) has elucidated on key motives for organizations to create spinouts, which are strongly related to the benefits for the parent firm when undertaking a spinout and to a lesser extent to the benefits from the venture's point of view. However, this still leaves unexplained *how* to realize the potential benefits of spinouts, and equally important *how* to avoid the high failure rate of spinouts. Other studies of spinouts include the rate at which incumbent firms generate spinouts, the factors that underly the performance of spinouts and the effects of spinouts on their parent firms (Klepper, 2009). Yet, a lot of attention in these studies is focused on the spinout creation itself and not on its further development by the parent firm into a sustainable venture (Hellmann, 2007; Siegel et al., 2007).

So, based on the above, we can state that with a few exceptions (see Agrawal et al., 2004; Lord et al., 2002), literature has largely been silent with respect to the advanced set up and management of a spinout. This is an important limitation of current research as we argue that a parent firm can only profit from the advantages of using spinouts in a strategic manner when it is able to set-up and manage spinouts in a *systematic way.* The latter implies that spinouts are set up with full awareness of all potential advantages and disadvantages related to the choice for this path to bring a technology to the market and that success factors of the spinout approach are fully leveraged. It also entails that spinout management focuses on a continuous reconfiguration of the initial set-up dimensions and in doing so, management can overcome the inherent deficits of a static set-up model for spinouts. In short, the

contribution of this paper is to address the above mentioned void in the literature by offering a coherent model illustrating *how to setup and manage a spinout in a systematic and ongoing way*.

This paper is structured as following. In the next section, we will discuss the different reasons for organizations to set-up spinouts. Next, we elaborate on the set-up structure of the spinout venture and its management. Thereafter, the research methodology is discussed, followed by a qualitative empirical analysis of a spinout at Royal Dutch Shell. In the last section, we discuss the main findings, draw a number of conclusions from this research and briefly present some topics for future research.

THEORY

To assess whether the option to spin out a venture is a realistic path to commercialize a company's ideas we will first discuss the reasons for organizations to set-up spinouts. Generating this understanding is very useful, as a complete consideration of the existing advantages and disadvantages is a prerequisite for solid decision-making concerning the selection of spinouts with relatively high chances of success. Second, although we take a corporate point of view in this paper we will also identify some important conditions related to the venture itself and its external investors[1]. We will first summarize the reasons for large companies to set up spinouts. Next we describe how spinouts can be set up and managed successfully by their parent company.

Reasons to set-up spinouts

[1] We focus in this paper on the relationship between the parent and the venture. Venture capitalists or other investors only appear in the analysis when they have an influence on the relationship between the parent and the venture. We choose this approach to keep the analysis tractable.

Large companies spin-out ventures for different reasons and there are several advantages for a parent firm to pursue a spinout (see table 1 for a short overview). First, setting up spinouts can speed-up the internal deployment of R&D output (Chesbrough 2003a). This is especially true when the option to use spinouts for monetizing R&D output is agreed contractually with a semi-external party such as a corporate VC unit. In that case, the new venture puts pressure on the internal business units to speed up the internal innovation process. Second, spinouts stimulate an entrepreneurial environment that many organizations strive for (Burgelman et al., 2004). Researchers will feel motivated and empowered to know that their R&D efforts are likely to be turned into a new process or product inside or outside the organization. If a venture does not fit into the corporate strategy it still has the chance to become a viable venture as a spinout. This increased probability of success will empower researchers at the parent organization to make faster decisions, take more individual risk and have a greater individual identification with the business opportunities latent in the technical resources of the company (Chesbrough, 2003a). In this sense spinouts are a vehicle for spurring growth and entrepreneurial initiative within the organization (Block and Macmillan, 1993; Chesbrough, 2003b). As a consequence, an external path to market can positively influence the speed of the internal path to market as well. Third, managing spin-outs is a very valuable experience for managers inside an organization. The experience of actually managing a small entrepreneurial business and coping with high technology and/or market uncertainty, are very interesting to increase the competences of top-management of large established organizations (Ito, 1995; McElroy, 2003). In addition, having spinout ventures helps to recruit and retain highly skilled researchers since the spinout

actively makes use of their ideas instead of putting them on the shelf (Chesbrough, 2003a).

Besides speeding up the internal deployment of ideas, spinouts can be used as a mechanism to commercialize technology more cost- and time-efficient than projects that are commercialized within the parent organization. Spinouts are more efficient because of their relatively simpler organization, allowing its staff to take ownership of the decision-making process, and because of a reward system that is better adapted to develop and commercialize the technology (McElroy, 2003). Spinouts are not only more efficient, but they can also be used to commercialize disruptive technologies that have the ability to cannibalize the current business structure (Burgelman et al., 2004; Drucker, 1974). This advantage applies when R&D targets to fulfill the needs of current customers of the parent organization in a different way, which does not fit the existing organization's processes or values. Another potential advantage is that by commercializing technology through spinouts, the parent company can maintain strategic coherence (McElroy, 2003). The advantage of creating strategic coherence applies to a situation in which an organization commercializes R&D for smaller, emerging markets through a semi-external organization like a spinout, and hence the current business structure of the organization is not affected. This is needed as large organizations cannot be expected to allocate too much of their critical financial and human resources into small, emerging markets (Burgelman et al., 2004). However, spinouts can over time create a strong position in emerging markets, and the parent company can decide to incorporate its spinout when matured, e.g. have a better fit with the businesses of the parent organization. Another potential advantage for an organization to set-up a spinout is that it can explore future technologies and markets for the parent organization. Spinouts provide a strategic advantage for the parent

organization to engage in promising new areas outside the existing scope of the company, but with a potential future interest (Dahlstrand, 1997). Next to that, spinouts can generate synergies with the current products – and services portfolio of the parent organization (Iansiti and Levien, 2004). Finally, spinouts are often the only possible path to market to commercialize a technology. Especially R&D output that does not match the existing technology strategy and/or lacks initially the requested commercial viability will remain on the shelf inside a parent organization (Chesbrough, 2003a, 2003b). Having a spinout option available as a path for R&D output will correct the false negative judgments of the parent organization. False negative judgments are projects that initially are judged as commercially unattractive, but which later turn out to be valuable (Chesbrough, 2003a). This is especially the case when the technology of the venture is still in an embryonic phase laden with a lot of technical and market uncertainty. Once these uncertainties have been reduced to an acceptable level, a parent company can decide to spin in the venture or to acquire it based on its first right to purchase the venture[2].

Besides the advantages of undertaking spinouts, there are some important challenges or disadvantages for the parent firm to consider. The first potential disadvantage for an organization to set-up spinouts is the high risk of failure (Lord et al., 2002). In general, the high failure rate of spinouts can be imputed to the high technical and market uncertainty, which both need to be managed in a context outside the boundaries of the parent organization. Second, selecting the wrong spinouts, or even too many spinouts, can hollow-out the parent firm's business by loosing core staff and core activities (Davenport et al., 2002). The last potential disadvantage is

[2] Venture capital funds who invested in the spinout usually allow the parent to acquire the venture under the condition that there is an open acquisition procedure which guarantees that the parent company pays a price in line with the market value of the venture.

that a spinout has the freedom to decide about its own strategic direction, which is not always in line with the interests of the parent organization (Chesbrough, 2003a).

---------- Insert table 1 about here ----------

Next to the potential advantages and disadvantages for the parent organization, we can also identify several pros and cons from the perspective of the spinout venture (see table 2). It is important to note that these advantages and disadvantages are not the *main* reasons to set-up a spinout; however, they still need to be considered by the parent firm when the decision to spin-out an internal project is made.

The first potential advantage for the spinout venture is that they can avoid large overhead costs and bureaucratic decision making because they are typically organized as a relatively simple organization (Davenport et al., 2002; Ito, 1995; McElroy, 2003). In this way, they can work in a more agile way compared to the situation where a venture is part of a larger organization. Second, spinouts enjoy a high extent of independence that allows them to make their own decisions. In combination with the reduced level of bureaucracy this implies that the venture becomes highly flexible in changing its business model as it gains experience during its lifetime. Among other things, this enables the venture to directly and continuously incorporate learning from the market place in its modus operandi, and improves the speed of decision making (Jagersma and van Gorp, 2003).

Third, previous research shows that ventures with corporate backing in terms of resources and assistance, perform relatively better than its standalone start-up counterparts (Chesbrough and Tucci, 2004; Ernst et al., 2005). For example, market

knowledge that the parent firm can provide to the spinout is valuable since this information is usually not easy to get and relatively expensive. Besides the offered resources and assistance the venture can benefit from the reputation of the parent organization. When potential customers and business partners see that a well established company is investing in a certain spinout, they might be more inclined to establish a business relationship with the spinout.

As a final point, spinouts stimulate an entrepreneurial culture in which employees are more willing to take risks and feel ownership for the prosperity of the spinout venture (Chesbrough, 2003a). Often this entrepreneurial spirit is the single factor that is required to transform an innovative idea that was not thriving inside the parent organization into a successful spin-out business (Ledbetter and Zipkin, 2002).

Next to these four advantages for a spinout venture, two disadvantages can be identified. The first potential disadvantage for the spinout venture is that it can lose its access to several key infrastructures after it has been spun-out. Spinouts frequently have to cope with the loss of key infrastructures and borrowing these assets back from the parent organization is an efficient way of doing that (Govindarajan and Trimble, 2005; McElroy, 2003). The second potential disadvantage for the spinout venture is that spinouts are often still kept too tight to the parent organization after they are spun-out, not allowing the spinout to reap the benefits of deciding on its own business model and creating its own core competencies and values (Lord et al., 2002). Hence, spinouts have to try to negotiate sufficient autonomy from their parent organizations to successfully create their own identity.

---------- Insert table 2 about here ----------

Besides the abovementioned advantages and disadvantages, previous research also identified several factors that enable the formation of spinouts. First, there should be an internal *champion* or *sponsor* that has sufficient political power inside the large established organization to stimulate spinouts by re-directing qualifying R&D output towards the set-up of a new external entity (Chesbrough, 2003a; Lord et al., 2002). Second, a corporate VC unit that can actively scout for potential R&D output in the internal organization that qualifies for a spinout venture is increasing the likelihood that a company establishes spinouts (Chesbrough, 2003a, 2003b; Mason and Rohner, 2002). CVC units that formally have the first rights when R&D output is rejected by the internal businesses can in this sense be complementary to, or even act as a replacement of the more informal role of a champion to re-direct R&D output to better paths to monetize the technology. Finally, inventors of the R&D output actively act as entrepreneurs to enable the monetization of their R&D output outside the parent organization (Chiesa and Piccaluga, 2000; Davenport et al., 2002).

In sum, spinout success is defined in context of the upfront expectations of the net advantages a spinout will bring for the parent organization. The overview presented in tables 1 and 2 evaluates the advantages and disadvantages of spinouts for the parent organization and spinout management, creating a starting point for organizations about what can be expected when they spin-out internal R&D projects. This overview can guide organizations to make more informed decisions on whether or not to make use of spinouts as a strategic vehicle to commercialize their technology. Hence, the overview presented in tables 1 and 2 can be an important management asset for guiding relevant business decisions about spinouts.

How to successfully set-up a spinout

After the decision is made to set-up a spinout, managers have to decide on the set-up characteristics and governance structure of the spinout venture. The exact set-up structure has to be agreed upon during the negotiations about the formal separation of the team working under the parent organization. However, organizations should be aware of the fact that the agreed upon structure remains dynamic and requires continuous negotiation and management over the lifetime of the spinout. In addition, it is recommended that an independent counsel guides these negotiations to best consider the interest of all parties (McElroy, 2003).

The set-up phase of spinouts can be structured along five dimensions, i.e. *product*, *market*, *people*, *finance* and *governance*. Although the first four dimensions have been introduced in the context of technology ventures (Mason & Rohner, 2002), they have not yet been adopted in the context of spinouts. The governance dimension has to be added as it plays a crucial role given the interdependency in the parent-spinout relation. We believe that these five dimensions create a basis for analyzing the set-up and management of spinouts in a more detailed way than the prevailing models.

The first dimension entails different aspects related to the *product* or offering of the venture, including the product specifications, the delivery channels and the platform (next generations of the spinout's product/service). The latter is important since high-technology products are often systems that consist of a set of interdependent complements building on specific platforms (Gawer and Cusumano, 2002; Teece, 2007). Second, the *market* to be targeted by the spinout, and an appropriate sales and marketing strategy has to be identified. Paramount for making the right choices in this respect is that the spinout has access to sufficient information

about customers, competitors and suppliers (Teece, 2007). Third, the *financial* picture has to be made insightful to all stakeholders, in order to secure funding. In this phase, parent organizations have to make sure that any investment round is performance-based (Gompers, 2002; Mason and Rohner, 2002), and that the spinout's focus is incentivized to reduce the level of uncertainty of the initial cost and revenue estimates of the targeted markets.

With respect to the *people* dimension, CEO, board and core venture teams have to be selected in coordination with the parent firm. For the spinout CEO position, there are valid arguments for selecting an internal or an external CEO (see Chesbrough 2003a), although it appears that in general external CEO's lead to a better spinout performance (Chesbrough, 2003b). Furthermore, the selection of the core team plays an important role; during this process it is important for the success of the venture to attract knowledge from outside the parent organization as a spinout works along the guidelines of a business model that is fundamentally different than the one of the parent organization (Mason and Rohner, 2002). In sum, external people play a vital role in the success of a spinout and they create value to the spinout venture if they complement the parent firm in terms of knowledge and experience.

Another important element of the people dimension is the compensation of the venture's employees in terms of salary, equity or other financial benefits. First, financial rewards determine, to a great extent, the ability of the venture to attract high-quality employees. In addition, employees are more motivated and committed to the venture's performance when they are offered part of the spin-out shares (Jagersma and van Gorp, 2003). Second, employees in spinout ventures often have to deal with high uncertainty and risk. This can be compensated by offering them the potential of relatively large stock option rewards (Timmons and Spinelli, 2004). Lastly, we have

to remember that external issues also have an impact on the offered compensation. For example the division of equity between the venture and its external investors will affect how much equity eventually is available to the team members (Timmons and Spinelli, 2004).

Finally, for each spinout the most appropriate *governance* structure needs to be identified. In particular, the governance relationship between the spinout and the parent organization requires special attention. In general, successful governance consists of both formal and informal governance. As the formal side of governance contains issues as financial agreements, planning & control, hierarchy and conflict-management procedures, the informal side is composed of leadership style, reputation, cultural differences, trust and values (De Man, 2006).

Some scholars argue that the involvement of an outside venture capitalist firm (VC) is useful to improve the governance of the spinout venture, as these VC firms bring the "critical managerial and entrepreneurial expertise that is absent in most companies and public market institutional investors" (Ledbetter and Zipkin, 2002, p. 341). Others give successful examples of CVC outfits that are governing a portfolio of spinouts in order to manage the strategic alignment with the parent organization. A third option is to have the portfolio of spinouts under management by a venture business office, which owns the equity stake instead of the business units, in order to protect the ventures from "corporate anti-bodies" (Mason and Rohner, 2002). In any case, it is wise for a parent organization to choose a governance model that protects the strategic interest of the parent organization in the ventures, while at the same time introduces professionalism and a latitude – but effective – form of control. Practice has shown that many organizations that successfully make use of spinouts use a CVC

unit that acts as a hybrid between a private VC and an internal business development unit to govern their spinouts (Ernst et al., 2005).

How to successfully manage a spinout

When the venture is established, the parent firm and the spinout venture should furthermore cope with the spinout management. Here it is important to note that reconfiguration of the initial set-up dimensions is one of the most essential spinout management functions. This is based on the idea that during the different phases of the spinout's lifetime the technological and market uncertainty reduce and as a consequence the venture needs to constantly manage and refine its strategic direction (Davenport et al., 2002). To achieve the proper strategic direction and enhance both the venture's internal and external fitness continuous management efforts to build, maintain, and reconfigure the necessary resources are required (Teece, 2007). An ongoing relationship with the parent organization can be one of the main sources for the spinout to gain access to these needed resources at a relatively low cost (Govindarajan and Trimble, 2005; McElroy, 2003; Rothaermel, 2001). Especially customer relationships, distribution channels, supply networks, brands, credibility, manufacturing capacity and expertise in technologies are resources that can be borrowed from the parent organization (Govindarajan and Trimble, 2005). It can thus be concluded that *systematic* management of spinouts has much to do with making well-informed decisions to adjust the initial set-up dimensions of the spinout - often enabled by resources the spinout sources from its parent - and less with daily management of the spinout.

The parent organization has of course its own reasons to have an ongoing relationship with its spinouts, which are also related to the changing nature of technological and market uncertainty. Especially in a business environment characterized by rapid, complex and radical technological changes, uncertainty is very high. Under these circumstances, the parent firm needs to respond in a flexible way and investing in spinouts is a possibility for the parent firm to explore newly emerging technologies or business opportunities. Over time, by continuously monitoring the spinout, the parent firm will get an improved understanding of the business opportunities stemming from the new technology. Eventually, it has the option to spin-in the venture when uncertainty drops to an acceptable level assuming that the parent firm becomes sufficiently familiar with the technology and the venture proves to be commercially viable (Van de Vrande, Lemmens en Vanhaverbeke, 2006).

METHODOLOGY

Setting

In the case-study section of this article we analyze the managerial practice by looking at Avantium, an innovative company that was spun-out of Shell – a large oil & gas multinational – in early 2000. The spinout currently (December 2009) employs about 100 people and targets the R&D experimentation market. Avantium provides customers with high-throughput experimentation services that allow customers to speed-up their R&D, it sells complete research system tools and also manages its own portfolio of drugs and biofuels intellectual property. During its first years Avantium developed the core elements of its advanced high-throughput experimentation processes by investing significant resources to upgrade the technology it inherited from Shell, which founded the basis for high-throughput testing. This included

investments in sub-technologies such as the 10^{-9} scale parallel catalyst-testing platform, technology for heterogeneous catalysis research and parallel batch reactors and catalyst preparation robotics technology. Furthermore, new systems and associated software were developed to create a fully integrated process for high-throughput experimentation. Since 2003 the spinout realized it needed a stronger focus in its approach, and converged its attention on catalysis research for the chemical- and oil industries and on crystallization research for the pharmaceutical industry. In the spinouts first years collaborations and partnerships with industry partners were a key value driver in the company's approach to grow. In 2005 Avantium started with the sales of research system tools, and – to indicate the success of the spinout's partnership strategy – by the end of the year Avantium had formed partnerships with some 40 of the world's major chemicals and pharmaceuticals companies. In 2006 the company initiated its own program for developing new drugs and biofuels. All these developments made Avantium a profitable company since 2007, and stable growth was achieved since then. In less than a decade the company had established itself as a leading player in the technology services market.

Rationale for approach

Because of the absence of any previous systematic research about the setup and the subsequent management of a spinout, we consider it essential to adopt a qualitative approach to our inquiry (Lee, 1999). Furthermore, a qualitative research design involving a case-study is appropriate since scholars have shown that it is well suited for analyzing dynamic processes (Lee, 1999) and the object of study requires observation in its context (Yin, 1994). In particular, we adopt the "theory elaboration" approach, which serves to extend theory in cases where "preexisting conceptual ideas

or a preliminary model drives the study design" (Lee, Mitchell, & Sablynski, 1999: 164).

On the basis of these principles we started writing a case history based on corporate documents, and observational and interview data (Eisenhardt, 1989; Yin, 1994). We triangulated data by using all data sources available, focusing on insights that were supported by multiple data sources and confirmed by several interviewees (Jick, 1979).We also followed-up with emails and/or calls to fill-in missing data or to check insufficiently supported insights with interviewees when necessary. This led to an initial version of the case study. After sharing the draft case study with some interviewees for validation, we engaged in iterations between draft case study, the interview output and spinout literature until a coherent story emerged.

Data Sources and Analysis

The details of the case-study have been achieved through the use of several data sources: (1) corporate archives, including publications, announcements and business plans at both the spinout and parent organization, (2) repeated semi-structured interviews with managers of the parent organization that were involved in the spin-out process, (3) repeated semi-structured interviews with executives at the spinout, (4) follow-ups with emails, phone calls and transcripts of interviews to validate initial findings with managers and executives at both the parent organization and spinout.

A key data source for obtaining insights about the spinout were the semi-structured interviews with managers and executives at both the parent organization and spinout. For this particular case study we interviewed people both directly involved in the spin-out of Avantium, and parent organization executives with

insights in the technology strategy, spin-out rationale and policy. Over a period of 14 months – between November 2007 and December 2008 - multiple interviews were conducted with five types of interviewees: 1) CEO and Management Team of the spinout, 2) technology experts of the spinout, 3) senior business development managers of the parent organization, 4) R&D managers at the parent organization laboratory linked with the spinout 5) technology incubators at the parent organization. These interviews ranged from 90 to 180 minutes. Although interviews were held with a diverse set of people involved in Avantium as sources for the case-study, all interviews roughly followed the order of phases in the lifetime of a spinout. First the interviewees were asked to focus on the spinout decision, and then the interview gradually moved towards the negotiation phase. After that the set-up and later management phases of the spinout were discussed. As the interviews were only semi-structured these phases of the interviews were guided by certain standardized questions. However there was always space for the interviewees to go deeper into certain topics they were most acquainted with, or bring-up new elements and divergent views. Typically the set-up and management phases were discussed along the elements of the classification of set-up and management dimensions, as introduced by this article (*product*, *market*, *people*, *finance*, *governance*). This proved to be a useful way to discuss topics with the interviewees, and also served as a guideline to explore new topics. Depending if the interviewees were, or were not, involved with Avantium in certain phases of its lifetime, certain elements of the interview were trimmed down or even left out.

Furthermore it needs to be mentioned that since our case-based approach resulted in situations in which interviewees were reflecting on periods that could be as far as nine to ten years back, this had implications for the data validation methods we

used. As said before, this case-study used a policy in which before concluding a certain finding could be interpreted as accurate with reasonable certainty, it needed to be underpinned with another source pointing in the same direction (Jick, 1979). This came down to using data triangulation as described earlier, and in practice often meant going through documents such as a Business Plan or other formalized agreements, to underpin a statement. Nevertheless did the use of retrospective data-gathering have consequences for the risk of biased views being included our case study. More information about this issue and other consequences of the chosen research methodology can be found in the Limitations section of this paper.

Procedure

We started by identifying factors relevant for achieving spinout success, as scholars researching spinouts have not yet settled on an overview. Thereafter, our aim was to examine if all identified factors relevant for the successful set-up of a spinout could be captured in a practical applied assessment model including the five dimensions we discussed in the previous section. The model provided a systematic approach to decide about when to spin out a project and how to successfully set-up and manage the spinout process. Now, theory will be elaborated by applying the model to a case study regarding the spin-out of Avantium, which was spun-out of Royal Dutch Shell. The setting of this case is in our opinion appropriate for several reasons. Firstly, the relationship between the parent (a large multinational, with great technical reputation) and the spinout (working on a niche product not deemed relevant enough by the parent organization) is a common case for spinouts. Secondly, the market targeted by the spinout (high-throughput experimentation) consists of competitors varying largely in size, so the performance of the spinout due to the set-

up decisions and management interventions can be viewed in the context of a reasonably mature market with different types of competitors. Learning's from the spinout's set-up and management over time are to be discussed and interpreted, illustrating *how to setup and manage a spinout in a systematic way.*

MODELLING THE SPINOUT PROCESS

A model for the set-up and subsequent management of a spinout

The model in Figure 1 captures the crucial dimensions in the assessment of the establishment and subsequent management of a corporate spinout. The model depicts how Shell de-facto uses a stepwise system for the decision making (phase 0) when deciding about a potential spinout, which can be integrated with subsequent phases that are able to analyze the spin-out process of the venture itself (phase 1) and the set-up and management of a spinout (phase 2). This model, introduced by the authors, reflects best-practices at Shell to decide on-, set-up and manage spinouts. It can be of use for both academia and practitioners when looking at spinouts. In its core it reflects two key points. Firstly, that successful spinouts need to be created with an end-goal in mind (phase 0), and spun-out fast and fair (phase 1). Secondly, that in order to create successful spinouts all of the spinout elements (the authors have defined a categorization in five dimensions) need to be set-up and over time managed successful (phase 2). In that sense the model treats a spinout as a ongoing process of enacting set-ups, rather than static event. Below follows a quick description of the different phases of the model, in the context of the spin-out of Avantium.

Phase 0 of the model focuses on the venture at the time it was still an internal innovation project at Shell. During that phase it became progressively clear that the project (which was later on spun out as Avantium) could no longer be developed

within the company. Hence, in this phase the parent company decides whether the venture can continue as an internal project, whether it has to be spun out, or whether another external path to market has to be chosen. The different strategic advantages for a parent organization to spin-out the venture are mentioned in Figure 1 and reflect the advantages that have been listed in Table 1. These advantages for the parent organization can be divided into two subgroups (technology monetization advantages and strategic advantages related to innovation management), and are compared by Shell during phase 0 with the parental disadvantages for a spinout, next to secondary points about the pros and cons for the spinout venture itself.

Phase 1 covers the negotiation process of the spinout of Avantium. This is a key phase for the successful set-up of a spinout; achieving fair and balanced outcomes as well as speed of negotiation are critical in this phase.

In Phase 2 the spinout management has to determine how they will set-up and manage the spinout. We identified 5 dimensions that are crucial to successfully set-up a new spinout. They are applied to Avantium's set-up phase and we will discuss them in detail below. Finally the model shows how the set-up and management of a spinout - including strategic interventions over time – determine how successful the spinout becomes, and thus also determine the degree of success the parent organization has in pursuing its strategic objectives identified in Phase 0.

---------- Insert figure 1 about here ----------

With this model of the spinout process in mind, we can now return to the start of this innovative company; a research initiative that started within a R&D group working on developing new technologies for Shell.

Phase 0 : Strategic decision to spin-out a venture

The first generation of the technology commercialized by Avantium was invented and further improved by the catalyst R&D group at Shell between 1994 and 2000, with the aim to faster de-risk and deploy new catalysts. From 1998 to 2000, a visionary R&D leader who can be considered as the key inventor of the technology led this catalyst R&D group. The first experiments with the new technology for high-throughput experimentation showed great contribution to an improved speed for deploying new catalysts. However, it became also clear that large investments were needed to develop the technology further, including investments in robot technology and experimentation software. The need for large R&D investments, especially in areas in which Shell was not traditionally strong, were considered a key blocker for the future of this project in Shell's R&D portfolio. The project leader for the internal project realized the need for large investments and technical and commercial expertise in traditional non-Shell industries. This made the project suitable for a broadly supported spinout, because of its ability to attract external investments, while at the same time allowing shareholders with relevant technical and commercial backgrounds to join in. After some discussion the project leader was given six months by Shell to find interested parties that not only would invest as shareholders in the new spinout, but also would serve as its first guaranteed customers. Soon after, the project leader found a set of interested parties that met the demands of Shell, and in the following months Shell decided that a spinout was the preferred way to take the project further.

In conclusion, Shell decided in 2000 to spin-out this internal venture based on 3 of the 10 strategic reasons that we identified in Table 1:

- To attain a more efficient governance model
- To create future synergies with Shell's current products/ services
- To achieve strategic coherence within Shell's portfolio of R&D investments

> "Looking back at the rationale to spin-out Avantium, in summary Shell decided to set-up a spinout because it was a more efficient governance structure, Avantium could over time create synergies with Shell's businesses and Shell could maintain its strategic coherence by externalizing a research project that did not match our overall strategic direction."
>
> **Dr. Jan van der Eijk**
> **Chief Technology Officer RDS (2006-2009)**
> November 2008.

The first strategic reason for creating a spinout was that a spinout was considered as a more efficient way to develop high throughput experimentation technology for Shell. Deploying the technology through a spinout allowed attracting external investment through other industry partners that would also bring in relevant technical experience. A spinout would furthermore be able to work on a much lower cost-basis - mainly due to reduced bureaucracy – which allowed Shell to commercialize this technology more efficiently than it would if the technology would be commercialized in-house.

The second strategic reason to choose for a spinout compared to other alternatives was that the outcomes coming from this project could still be very interesting for Shell, in the sense that catalyst-testing innovations by its nature had the potential of creating synergies with Shell's R&D developments in the catalyst business. As a result, Shell had an incentive to ensure that this technology was further developed by an entity with which it could maintain some sort of technology

development relationship and create synergies for its internal experimentation capacity.

The third strategic reason in favor of a spinout was that a spinout allowed Shell to adhere to a strong strategic coherence in its R&D portfolio. The product of Avantium was something Shell was very interested in as a customer for its catalyst business, but not as an owner of the business as it required expertise and competing in typical non-Shell industries. Creating a spinout, where multiple shareholders would own the technology, allowed Shell to refocus its R&D resources on projects more directly linked to the Oil & Gas industry, and focus more on its role as a customer in the high-throughput experimentation market. This also allowed the new venture freedom to enter in markets where Shell was not active (e.g. testing new drugs for pharmaceutical). As a consequence the spinout could use the technology for monetization in non-Shell related applications and markets and hence achieve a stronger commercial basis and over time become technologically more advanced than an internal venture.

Phase 1: Negotiating the spin-out process

Because of the three reasons mentioned above Shell managers concluded to give the current project leader of the internal R&D project six months to look for interested parties for creating a spinout. The aim was to find interested parties that not only would invest as shareholders in a spinout, but also could serve as its first guaranteed customers. This was a hard condition for Shell, as this would assure the continuity of any Shell investment in a spinout. In the following months, the project leader found a set of interested parties, and it was decided that a spinout was the

preferred governance mode for the further development of this technology. The interested parties that would turn into the new shareholders of the spinout were multinationals like Pfizer, GlaxoSmithKline and Royal Dutch Shell. Also, institutes like Delft University of Technology, Eindhoven University of Technology and the University of Twente were founding parties of the new spinout. Once interested parties were found, Shell started the negotiations with them for transferring the IP to a spinout.

The negotiations with the consortium of companies and universities about the conditions under which the IP would be transferred to the spinout company went smoothly. Within six months all interested parties were aligned and the different partners agreed upon the term sheets. All IP transfer documents were signed after another quarter and the set-up of the new spinout could begin. This success in establishing a spinout in such a short time – a critical factor in this phase – was achieved because a professional external party (an investment bank) took the lead in drafting all legal and commercial terms. Based on this experience it became best practice for Shell to use investment banks to guide spin-out negotiations.

"Although Avantium's spin-out was not done by Shell's corporate venturing arm Shell Technology Ventures (STV Fund 1 B.V.), a clear best practice applied by the company was the guidance of the spin-out out of Shell and the negotiations of terms under which this happened by an investment bank. In our experience this helps greatly in achieving fair outcomes and a speedy process."

Erik Vollebregt
Managing Director STV (2001-current)
April 2008.

The negotiated terms during the spin-out process were regarded fair in terms of the commercial, legal and IP arrangements for all parties involved – including the parent organization Shell and the newly formed spinout company. The only problem that originated from the spin-out negotiations was that during the six months no formal agreements were signed regarding the volume of the mandatory orders the companies' shareholders in the consortium would make; only informal targets were agreed upon. This was a clear learning point for the parent organization, because as a consequence Avantium faced considerable uncertainty about future income streams during its first years. An assessment of the spin-out process of Avantium is summarized in Table 3.

---------- Insert Table 3 about here ----------

Phase 2: Set-up and management of a spinout

The set-up and management phase of Avantium can best be analyzed on the basis of a model consisting of five key dimensions we identified earlier, i.e. *product*, *market*, *people*, *finance*, and *governance*, which is created by elaborating on the insights of different scholars. Most notably the dimensions *product, market, people, finance* are derived from a Corporate Venture Capital context (see Mason & Rohner, 2002) and the *governance* dimension is added to this by the authors of this article as this dimension is especially paramount given the nature of the special spinout/parent relationship (Lord et al, 2002, Govindarajan and Trimble, 2005; McElroy, 2003).This phase succeeds the successful spin-out negotiations with interested parties. It however also relates to the strategic decision phase, as high-level decisions in the set-up and management phase determine to what degree the strategic advantages the parent organization strives for are achieved. For the purpose of this study we focus on the

higher-level set-up decisions and subsequent strategic management interventions. Hence, day-to-day interventions and tactical management of the spinout are for that reason excluded from the overview presented in this phase. This section will describe the strengths, weaknesses and strategic interventions of the five key set-up and management dimensions by Avantium's management, which are summarized in Table 4.

---------- Insert Table 4 about here ----------

The *product* dimension was set-up relatively successful by Avantium, mainly thriving on the strengths of the inherited IP. Firstly, the technical characteristics and advantages of the products and services commercialized by the spinout led to a strong competitive position. Secondly, future income-streams based on the initial IP were already identified during the set-up phase. This enabled a successfully executed diversification strategy during the period 2003-2007.

> "The quality of the IP that Avantium inherited from Shell was excellent, and helped us to build-up a strong, competitive offering. Probably out of excitement about the possibilities of our IP, many applications to commercialize Avantium's technology were intensively explored in our first years of existence."
>
> **Dr. Chris John**
> **Principal Scientist Avantium (2005-2008)**
> May 2008.

On the other hand, a weakness of the original set-up was the initial lack of a focused technology strategy to create an even stronger competitive position by further

reducing technical risks. Spinouts usually burn cash on explorative R&D during the first months and years after their establishment in order to generate the technical knowledge needed to define a technology strategy. However, Avantium was already developing its technology as an internal project within Shell for six years (1994-2000) and the appointed CEO of Avantium was also the project leader when the project was running inside Shell. The absence of a clear technology strategy in the first years of the company led to a relative high cash burn rate as too many technical applications were explored at the same time. Later on, the spinout management coped with this lack of focus. Avantium's current CEO, who took control over the company in 2005, made a simple and focused technology strategy his primary focus in the first months of his tenure. This, in turn, alleviated part of the company's initial hunger for cash.

> "When I became CEO in 2005 it was my key priority was to further rationalize expenditure and bring focus in our approach to commercialize the IP. The business plans used up to that point were visionary, but often lacked commercial grounding. It was time for Avantium to become a more mature and commercially competitive company."
>
> **Tom van Aken**
> **CEO Avantium (2005-current)**
> June 2008.

With regard to the *market* dimension a different story unfolded during the set-up of Avantium. Key marketing aspects such as clear sales and marketing strategy - reflected in a business plan that sets achievable and motivating targets to guide stable growth - was initially not of primary concern for the company. Only the marketing towards current investors was well established and led to large investment from its shareholders – something that was also needed to facilitate the relative high cash-burn rate in the company's first years. The business plans used for attracting finance rounds

can by hindsight called visionary at best, but were certainly not realistic in terms of growth expectations at that time. It can thus be concluded that the commercial focus of the spinout was initially very low. This is illustrated by the fact that only in 2002 – two full years after the start of the spinout – Avantium hired its first commercial employees. Re-adjustment of the initial set-up of the market dimension was something that happened slowly but steadily between 2002 and 2004. The change materialized first by attracting more people with a commercial background into the company, and second by allowing a VC to enter as a key shareholder of the spinout in 2003. These interventions led to an increased commercial focus by means of a proper sales and marketing strategy. This renewed focus on the market dimensions gradually improved the financial results of the venture and in 2005 the spinout became profitable for the first time.

In terms of setting-up of the *people* dimension, Avantium again did relatively well. Firstly, the spinout's new board was successfully recruited, and consisted of people with relevant, complementary fields of expertise, which enabled the successful interventions described in this study. Secondly, recruiting employees for the spinout went well as the technology focus and Shell-reputation provided a strong employee value proposition, and enabled the spinout to attract world-class researchers. Thirdly, Avantium's appointed CEO had much knowledge of technology and was extremely charismatic, but he had limited commercial skills. Another, more commercially oriented CEO was selected from Avantium's internal ranks in 2005. He effectively addressed the issue of Avantium's high cash burn rate and poor commercial focus. Fourthly, ten secondees were attracted by the spinout from Shell under a general agreement that fostered initial progress – especially in the product dimension – but over time also indirectly lowered the entrepreneurial spirit in the spinout. This was

due to the fact that this relative large sub-group within Avantium did not face the same entrepreneurial uncertainty that the rest of the spinout experienced. Hence, it was decided in 2004 that all ten employees under the Shell-secondment agreement should make a choice to either start working under the same conditions as Avantium staff did, or leave the company. Only one employee working under the secondment-agreement took the offer and remained employed by Avantium.

In setting-up the *finance* dimension of the spinout, Avantium achieved a mixed set of results. Firstly, in terms of securing capital, sufficient financial means for further de-risking of the technology and new business development was obtained through financing rounds. This is a key hurdle to take for any new venture, and Avantium passed this milestone with honors. However, this in turn also led to a situation in which the spinout management was tempted to opt for a very aggressive – and thus also more expensive – growth strategy. Although the aggressive growth schedule was never realized, there also needs to be articulated that the decision was taken in a time (2000, 2001) in which VC firm backed technology companies boomed as never before. On the other hand there still can be concluded that budgetary prudence and strict financial controls in order to monitor and control expenditure were not in place, which are two elements that facilitated Avantium's initial excessive cash burn rate. A key strategic intervention in the finance dimension can be pinpointed to 2003, after which gradually more and more financial prudence was introduced, and financial monitoring processes were introduced and strictly applied. Furthermore, a downsize of the spinout in 2005 (roughly 25% of employees were made redundant) was successfully executed to conclude efforts to achieve an operating mode with a much stronger commercial basis.

"When spinouts mature, financial controls to monitor and control expenditures are becoming more important. Since the 2003, step by step more financial prudence and control was introduced at Avantium."

Frank Roerink
CFO Avantium (2007-current)
November 2008.

Finally, the *governance* dimension of Avantium was initially set-up quite poorly, but got high priority in the strategic interventions in the years thereafter. Directly after its set-up the governance relationship between Shell as parent organization and the spinout led to some benefits for Avantium in the form of borrowing technical expertise through Shell-seconded employees, next to legal and safety related advice in the early years of the company (2000-2004). The governance relationship between the consortium of shareholders and the spinout worked out less successful in the first years of the spinout. After concluding the negotiation phase the consortium of shareholders was represented in a large board that was governing Avantium. Within this governance body it soon became clear that it was hard to align the different views, partly because there were initially many shareholders invited in the consortium owning the spinout. This led to a reduced feeling of ownership for Avantium's success by the (many) shareholders, and tensions between shareholders due to diverging expectations. As a consequence a lack of focus in the technical and commercial direction occurred, as every shareholder had slightly different objectives with the spinout. Another issue was that the governance relationship with Shell did not lead to business deals between the parent organization and spinout or the establishment of any form of active sponsorship of the technology commercialized by Avantium. After the first years of business Avantium focused on the adaptation of the

initial set-up decisions in the governance dimension which led to much stronger governance.

> "The governance relationship between the consortium of shareholders and Avantium did not work successful in the first years of our existence. This was a clear focus area for me when I took over as CEO. Both the invitation of a Venture Capital firm and Avantium as a consequence of the financing rounds having less shareholders helped us to resolve the complicated governance structure that was inherited from our initial set-up."
>
> **Tom van Aken**
> **CFO Avantium (2005-current)**
> November 2008.

More specifically, several financing rounds took place during the period 2003-2007, in which many of the original stakeholders (including Shell) phased out their stake in Avantium, while others used these opportunities to increase their stake. In 2003 also a VC firm used these financing rounds to obtain a significantly large stake in Avantium; a step that strongly helped the spinout to become more commercially oriented and financially disciplined. Over time these financing rounds led to a much smaller group of shareholders, and hence increased uniformity of shareholder expectations, which in its turn eased the governance of the spinout. Finally, strategic interventions from Avantium's management and renewed initiatives from both Shell as parent organization and Avantium led to much stronger ties between the two organizations. In 2007, Shell became a main customer of the technology services and products commercialized by its spinout.

CONCLUSION AND DISCUSSION

Spinouts are becoming increasingly popular among large industrial companies as an external path to market for technologies that do not fit into the corporate growth strategy. The literature is relatively silent about how to spin out a venture successfully, despite the apparent popularity of spinouts among large industrial corporations. Evidence is scattered and based on a few case studies. In this study, we provided a model to decide on, set up and manage a spin out. The spinout model underlines the requirement to connect the strategic rationale for a spin-out by the parent organization – as discussed in-depth in the theory section – with the more practical negotiation-, set-up and management phases of the spinout.

This study contributes in different ways to our current understanding of the spin out process. Firstly, it creates a coherent overview of advantages and disadvantages of using spinouts in a strategic way as an alternative to internal innovation projects to valorize and monetize the commercial potential of a technology. Analyzing the condition under which monetizing technology through spinouts is superior to internal paths to the market have thus far not received a lot of attention in the literature (Klepper, 2009).

Secondly, the phased approach shows the critical steps that have to be taken by actors in the decision, set-up and management phases of a spinout. The model we use provides a structured approach to decide about when to spin out a project and how to manage the negotiation, set-up and management phases. We have illustrated how the model works applying it to one of Royal Dutch Shell's spinouts. The model has shown that a staged approach is important to structure the spin-out process: It creates a platform to discuss key success factors of current and future spinouts in any VC or corporate portfolio. The analysis of the spinout process into a selection,

transfer, set-up, and management phase led to the creation of an assessment methodology to analyze spinouts that can be generically applied and easily depicted in a visual format. Such an assessment model has not been offered before in the literature on spinouts.

Moreover, the 5 dimensions in the set-up phase are critical in setting up and managing a spinout in its first years. We have illustrated this for Avantium, a spinout of Royal Dutch Shell, but it is beyond doubt that each spinout can benefit from carefully implementing the 5 dimensions in a systematic way after it is established. Although spinouts might benefit from its corporate parent after it is established, it is nevertheless critical that it focuses on its own managerial challenges. A closer look at the 5 dimensions also reveals that the spinout DNA may still be too much a reflection of its parent's DNA. As most spinouts stem from an internal R&D project in large corporations, they frequently have a strong technology push focus – this was also the case in Avantium. A systematic analysis of the 5 dimensions would have revealed that Avantium's strategic direction was too much technical oriented and that the range of applications was too broad. The subsequent strategic interventions corrected these management problems, but they could have been avoided if the shareholders – including Shell – carefully implemented the 5 dimensions in the set-up stage.

Managerial implications

This study offers managers a relatively simple model that can be systematically applied in practice. In doing so we have provided managers with a phased approach showing the critical steps that have to be taken in the decision, set-up and management phases of a spinout. With respect to the decision phase, research shows that spin-out success is determined by carefully weighing the various advantages and

disadvantages and then making conscious decisions about valorizing and monetizing the commercial potential of a technology by means of a spinout. As such, the overview discussed in our paper can be an important source for managers who are guiding business decisions on whether or not to spin out. Looking at the set-up and management phases, it is argued by Siegel et al. (2007) that most attention has been focused on spinout creation and not on their further development into a sustainable venture. As spinouts become more popular we expect managers not only to set-up but also manage spinouts in a highly structured way, thereby enhancing the development of sustainable ventures.

Finally, given that an assessment model of the spinout process has not been created before in scholarly literature, our study helps managers to develop insights with respect to the necessary practices and mechanisms needed to carry out the different phases effectively. Implementing the model (including the 5 dimensions) can enhance management's capability to increase the likelihood of successful spinouts thereby creating an important complement to their internal innovation model.

Limitations and future research

The contributions of this paper also come with limitations, which should be kept in mind. Firstly, there should be noted that an individual spinout-case is useful for establishing an overview of the issues faced by the spinout, and provide a good starting point for a discussion, but should not be mistaken for a precise measurement of performance, as only two categories (positive or negative) are used to qualify the different management challenges. This quantification should not be considered as a formal rating or assessment of the spinout. Future analyses can quantify the rating of the management challenges.

Secondly, the solutions created on basis of all gathered insights are specific to Shell and Avantium and should, as a consequence not be uniformly transferred to other situations, without considering the specific context for which these solutions are created, such as the type of industry, the reasons for Shell to create spinouts, the type of relationship between Shell and its spinouts and the presence of a CVC unit.

Thirdly, as aforementioned in the Methodology section, the case-study of Avantium is created by reconstruction of corporate history on the basis of documentation and via semi-structured interviews. As a consequence the conclusions and best practices on how to set-up and manage a spinout, as derived from rich data in the case study of Avantium, can only be seen as hypothesis-generating at best. However, the goal of the case-study was not to aim for achieving most scientific rigor, but to generate hypotheses on how to set-up manage a spinout over time. Furthermore, the case study also was provided a real-life assessment of the spinout model introduced by the authors, and how it can be applied to both reviewing and learning from former spinouts, and proactively managing and assessing current spinouts.

Finally, we focused on a narrow set of management challenges leaving out many other issues that will pop up during the spinout management process. For instance, we did not analyze in detail other external paths to the market such as licensing or selling technology to other large companies. Next, to keep the analysis tractable we did not analyze in detail the role of the (syndication of) venture capitalists that invest in the spinout: a full blown analysis requires that their objectives are included in the overall management equation.

This study also allows us to identify areas for further research. Firstly, more research can be conducted on the internal project phase of spinouts, as the characteristics of internal projects in this phase before the actual spin-out are likewise to have

explanatory power in determining the value of a spin-out; for instance, the presence of strongly motivated, charismatic internal project leaders at internal projects of Shell is one of the critical success factors of the spinouts. Secondly, more attention should be paid at the interesting finding that indirect and longer-term strategic advantages to use spinouts seem not to be considered by parent organizations that use an ad-hoc, opportunity driven spinout process.

Next, more attention should be paid to the observation that at technology-oriented parent organizations the management of a spinout tends to have a strong focus on the technical product capabilities and the interrelated technology de-risking strategy, negatively influencing commercial success of the spinout. Finally, more research is needed to produce validated insights why exactly spinouts can be used as an alternative to the internal paths to market to monetization of firm's technology. This type of research would be of vital importance for many large industrial companies that intend to use spinouts as a strategic vehicle to monetize technology.

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Table 1. Advantages and disadvantages of setting-up spinouts for the parent organization.

Advantage	**Source**
1. Spinouts are used to speed up the internal innovation cycle	Chesbrough (2003a, 2003b)
2. Spinouts are used to stimulate an entrepreneurial culture	Block & Macmillan (1993), Ito (1995), Chesbrough (2003a, 2003b)
3. Spinouts are used as it is a valuable experience for managers	Ito (1995), McElroy (2003)
4. Spinouts are used for recruitment and to retain researchers	Chesbrough (2003a), McElroy (2003)
5. Spinouts are used for efficient governance	Burgelman et al. (2004), Ito (1995), McElroy (2003)
6. Spinouts are used to pursue disruptive technologies	Burgelman et al. (2004), Christensen (1997), Drucker (1974), Gompers (2002)
7. Spinouts are used to create strategic coherence	Burgelman et al. (2004), Chesbrough (2003a, 2003b), Ito (1995), McElroy (2003)
8. Spinouts are used to explore potential future markets	Chesbrough (2003a), Dahlstrand (1997), McElroy (2003)
9. Spinouts are used to create synergies with the parent firm's products or services	Iansiti and Levien (2004)
10. Spinouts are used as a final option to monetize technology	Chesbrough (2003a, 2003b), Ledbetter & Zipkin (2002), McElroy (2003)
Disadvantage	**Source**
1. Spinouts often fail (for various reasons)	Lord et al. (2002), McElroy (2003)
2. Spinouts can hollow out the parent organization	Davenport et al. (2002)
3. Spinouts make choices which are unbeneficial for the parent	Chesbrough (2003a)

Table 2. Advantages and disadvantages of setting-up spinouts for the spinout venture.

Advantage	**Source**
1. Spinouts decrease the level of overheads and bureaucracy	Davenport et al. (2002), Ito (1995), McElroy (2003)
2. Spinouts allow a different business model	Chesbrough (2003a), McElroy (2003)
3. Spinouts stimulate a strong entrepreneurial culture.	Davenport et al. (2002), Ito (1995), Ledbtter and Zipkin (2002), McElroy (2003)
4. Spinouts benefit from corporate backing in terms of resources, assistance and reputation.	Chesbrough and Tucci (2004), Ernst et al. (2005)
Disadvantage	**Source**
1. Spinouts can lose key infrastructures	Govindarajan and Trimble (2005), McElroy (2003)
2. Spinouts can be kept too tight to the parent	Lord et al. (2002), McElroy (2003)

Table 3. Spinout process assessment of Avantium

Dimension	**Assessment (positive / neutral / negative)**
Negotiation	+: The spin-out process went smoothly, within 9 months partners were selected and terms negotiated
Negotiation	+ : Negotiated spin-out terms were fair regarding IP sale, licensing fees and legal protection for the parent organization, spinout shareholders and spinout
Negotiation	- : Informal Agreements on spinout partners shareholders to act as guaranteed customers were not formally formalized
Negotiation	- : Too many spinout shareholders were selected, causing problems in the governance dimension due to diverse expectations.

Table 4. Set-up assessment of Avantium

Dimension	**Assessment (positive / neutral / negative)**
Product	+ : IP characteristics and technology led to a strong competitive position. Technical characteristics and advantages of product led to a strong competitive position
Product	+ : Successors and future income-streams based on the original technology identified
Product	- : Initially the company had a low focus on a specific technology direction to create a stronger competitive position
Product (2003)	Clear technology strategy created, focusing on technology de-risking in specific technical areas
Market	+ : Visionary business plan created that appealed to shareholders and attracted sufficient funds
Market	- : Commercial capabilities of the spinout stayed underdeveloped during its first years
Market	- : Business plan was not realistic in terms of growth targets and stated expectations
Market (2002)	Structural recruitment of commercial employees to improve sales & marketing capabilities
Market (2003)	Awareness of low commercial capabilities led to aim for including a VC as shareholder
People	+ : Appointed board consisted of people with relevant, complementary fields of expertise, enabling successful interventions
People	+ : Recruitment of staff went well, as having a technology focus and Shell-reputation attracted high-quality researchers
People	- : Initial CEO had much knowledge of technology and was very charismatic, but had little commercial focus / skills
People	- : Secondees secured through Shell fostered progress, but indirectly lowered entrepreneurial spirit and created a sub-culture within the company
People (2004)	To unify the corporate culture all secondees were asked to become full employees of the spinout, or leave the company
People (2005)	New CEO recruited from the spinouts internal ranks to increase focus on commercial aspects of running a company
Finance	+ : Sufficient finances were successfully secured for further de-risking and new business development
Finance	- : Due to legion available resources a relatively high cash burn rate (given the size and strategy of the spinout) was facilitated
Finance	- : Initially insufficient budgetary prudence and financial control was in place to curb the set cash-burn rate

Table 4 continued

Finance (2003)	Gradually more financial prudence and financial monitoring processes were introduced and strictly applied
Finance (2005)	A downsize of spinout (-25% employees) is executed to achieve a modus operandi with a stronger commercial foundation.
Governance	+ : Required technical support by 10 Shell-secondees was set-up quickly, next to legal & safety support, which fostered progress
Governance	- : It proved challenging for the spinout to align its many governance partners represented in the board due to diverse expectations
Governance	- : Shell acted relatively inactive as a customer and sponsor of the new technology commercialized by its spinout
Governance (2003)	Bringing in a Venture Capitalist firm as a key shareholder was a good decision as it increased focus and commercial discipline
Governance (2003-2007)	Alignment between involved parties improved since 2005 by gradually phasing out smaller shareholders of the spinout through subsequent investment rounds
Governance (2007)	Renewed initiatives from both sides strengthened the relationship between Shell and its spinout, leading to Shell becoming a main customer of Avantium in 2007

Figure 1. Framework for assessing the set-up and management of spinouts