

MASTER

New business development at ASML

towards a framework for identifying, selecting, and developing new business opportunities

Arts, B.J.M.

Award date:
2012

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Eindhoven, December 2012

**New business development at ASML:
Towards a framework for identifying,
selecting, and developing new
business opportunities**

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TUE. School of Industrial Engineering
Series Master Theses Innovation Management

Subject headings: innovation, entrepreneurship, strategy, design science, design principals,
creativity, opportunity, opportunity identification, venturing

The total amount of energy in an isolated system remains constant over time

ACKNOWLEDGEMENTS

Maybe the best description for how I experienced last year is rather cliché: a roller-coaster. Another description would be one of an effectual process of bumping and bouncing, just to continue the line of reasoning in this report. Last year's experiences wouldn't have been possible without a number of people, who I would like to thank here.

First of all, I would like to thank the people closely involved in this project. Isabelle Reymen, thank you for guiding me through the process of writing my thesis. You have showed me the true meaning of the word mentor, and I am very grateful for that. Fred Langerak, thank you for your valuable feedback and flexibility towards this project. Krishna Sreerambhatla, thank you for offering me the chance to pursue my thesis project at the strategy and new business development department at ASML. Your critical feedback wasn't always easy to cope with, but pushed me to think critically about my assumptions.

Second, I would like to thank a number of people who made my stay at the TU/e a lot of fun! Hans Berends, thank you for thinking about me when Ksenia walked in with a job opening. Ksenia Podoyntsyna, thank you for having the trust in me to pursue a number of projects last year. I've learned a lot, and had a lot of fun during the minor Entrepreneurship & Innovation, co-authoring the NVAO report, and setting up the Sustainable Energy Entrepreneurship Certificate program. Furthermore, I would like to thank all colleagues from the Innovation, Technology Entrepreneurship, and Marketing department of the TU/e. A special thanks for everyone in the AIO garden!

Last, but not least, I would like to thank my family and friends. Thank you for watching Senn while I was pursuing this project! Diana Macco, I love you! Thank you for always being there for me!

MANAGEMENT SUMMARY

This thesis focuses on the identification, selection, and development of (new business development) opportunities in established organizations in general, and for ASML in specific. With a market share of about 75% to 80% ASML knows how to stay ahead in the semiconductor industry; however, ASML tried to spread risk by developing new business opportunities, but without success. Existing literature does not provide an overview on how organizations should approach new business development (NBD). Therefore the goal of this thesis is to: **“Provide an overview of how ASML can develop new business opportunities.”** The next sections describe the research methodology, design & test, conclusions & implications, and contributions & limitations and further research.

Research methodology

A science-based design approach is taken (Van Burg, Romme, Gilsing, & Reymen, 2008; Romme & Endenburg, 2006). A systematic literature review and research synthesis gives an overview of the literature. Design principles (see Chapter 3 and Appendix II) are formulated following CIMO logic (Denyer, Tranfield, & Aken, 2008), which form the basis for the design solution. The design solution is tested in a preliminary alpha-test via a case in the ABC industry, in which the researcher places the design principles for selecting and developing (new business development) opportunities via a design solution (tools) in its original context (Van Aken, 2004, 2005; Romme & Endenburg, 2006; Romme, 2003).

Design & test

The design solution involves the identification, selection, and development of (NBD) opportunities. The identification of opportunities (Figure 7) includes preparation for

identifying opportunities, creating the opportunity and involving the right people. Once identified, opportunities should be selected. The selection of opportunities is at least a two stage process, including an initial opportunity screen (Figure 8) and a more thorough opportunity evaluation (Figure 9). Once selected, opportunities should flow into the most appropriate opportunity development mode (Figure 10).

Conclusions & managerial implications

This thesis takes a first step, in providing an overview of the NBD process. Managers should design their NBD process based on the science-based design principles (Table 3, Table 4, and Table 7), which may include using the set of tools designed to help managers approach NBD (Figure 7, Figure 8, Figure 9, and Figure 10). A promising venue for ASML is to reflect on the design principles put forward in this report, and look carefully at their existing NBD processes. The NBD case in the ABC industry used as a preliminary alpha test is a promising opportunity for ASML to pursue. However, underlying assumptions when evaluating the opportunity should be further researched. ASML should compose a technical team which is going to pursue a thorough technical analysis of the opportunity, the required patents and knowledge, and the potential synergies with ASML.

Contributions & limitations and further research

This thesis contributes to existing literature in three ways: by providing an overview of the NBD process for established organizations; by deriving science-based design principles from an extensive literature review and research synthesis; and by developing and testing tools for the identification, selection, and development of (NBD) opportunities. Furthermore, two unique contributions to existing literature are added: process dimensions for the opportunity identification process; and selection criteria for selecting the most appropriate development mode for (NBD) opportunities. Limitations include: research is mostly not tested in a NBD context, how NBD managers actually approach their NBD activities remains unknown, the focus on a single project evaluation neglecting a portfolio perspective, the absence of two selection criteria for the opportunity development mode, restriction to a preliminary alpha test, and test by the researcher based on a single report. Future research opportunities include: a large scale empirical research among NBD managers, testing the process dimensions for the opportunity identification process and the selection criteria for selecting the most appropriate development mode. Furthermore, the design solution, including its tools, needs some further development and testing (i.e. underlying theories, measures, and calibration).

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1

INTRODUCTION

“A prudent question is one-half of wisdom.”

Francis Bacon

This thesis focuses on the identification, selection, and development of (new business development) opportunities in established organizations. In order to stay competitive organizations need to innovate, which is the successful introduction of novelty (Schumpeter, 1934). Nowadays, innovation has become an integral part of most organizations. Considering the discontinuity of innovations, markets and technologies become obsolete at some point in time when they will be replaced. Organizations therefore have to create and sustain a competitive advantage while simultaneously exploring new innovation opportunities (Sirén, Kohtamäki, & Kuckertz, 2012) by combining exploration and exploitation (March, 1991) in ambidextrous organizations (e.g. Benner & Tushman, 2003; He & Wong, 2004; Mayle, 2006; O’Reilly & Tushman, 2004; Tushman & O’Reilly, 1996). New business development is geared towards developing new business opportunities aimed at exploring radical (or really new) innovation opportunities for long term survival of the firm (Burgers, Van Den Bosch, & Volberda, 2008). New business development opportunities include a new market, new technology, or both and are thereby radical (or really new) from the perspective of the organization, and may include a product, service or business model innovation (Edquist, Hommen, & McKelvey, 2001; Teece, 2010).

This thesis provides an overview of the new business development process. New business development is essential for organizational survival, but existing literature does not provide an overview on how organizations should approach new business development. While being essential for organizational survival, knowledge on new business development remains limited. While being present in literature¹ for more than three decades (1979 till now), publications on new business development in top journals remains limited to a few. Searching the Web of Science database on new product development (a relative mature field) resulted in more than 3,000 results compared with only 75 results for new business development². While being almost absent in top journals, searching for new business development in Google delivered nearly 1.8 billion search results, a job search on Intermediar resulted in almost 100 vacancies in the Netherlands alone³. Another trend is the academic attention strategic entrepreneurship gets, which can be seen by the staggering impact factor of the “Strategic Entrepreneurship Journal,” an impact factor of 2.053 which is high since the journal was launched in 2007 and only became ISI in 2011.

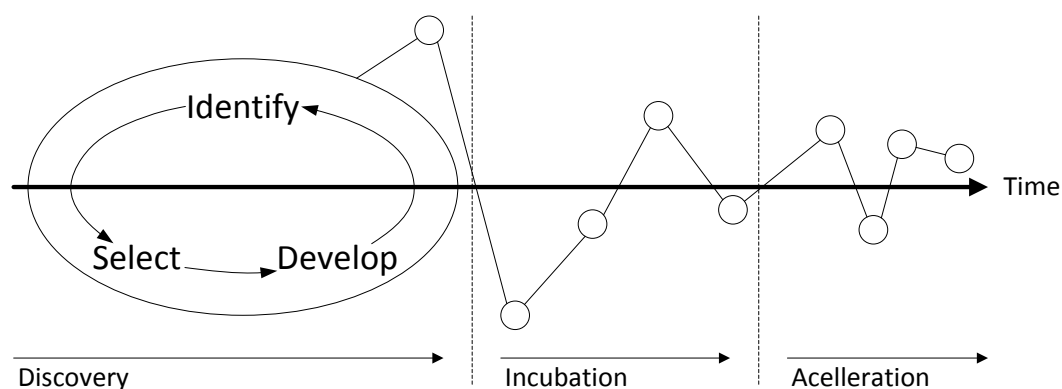


Figure 1: Bumping and bouncing: identifying, selecting, and developing opportunities in the discovery phase of new business development

Rather than being a linear process, new business development is a process of experimenting by bumping against limitations and bouncing back with better ideas (Chesbrough, 2010; McGrath, 2010). While not being a linear process, at least three phases can be identified: discovering the opportunity, incubating the opportunity into a viable new

¹ Searching for literature on “new business development” (on December 12th 2012) resulted in 28,103 results in ABI Inform, 75 results in Web of Science, and 7,970 results in Google Scholar.

² Web of Science search on “new product development” resulted in 3,295 results on December 12th 2012.

² Web of Science search on “new product development” resulted in 3,295 results on December 12th 2012.

³ Searching for new business development on December 12th 2012 resulted in 1,780,000,000 results in Google, and 98 results on Intermediar (a Dutch vacancy site: <http://www.intermediar.nl>)

business, and accelerating the opportunity by divesting or integration into a parent organization (O'Connor & DeMartino, 2006). The discovery phase of new business development is a process of exploration from the idea to a sound business case (Bröring & Herzog, 2008). The discovery phase of new business development consists of the identification, selection, and development of (new business development) opportunities in established organizations (Short, Ketchen, Shook, & Ireland, 2010), which is the main topic of this thesis (see Figure 1). New business opportunities are developed in organizations by entrepreneurial activities, as Eckhardt & Shane (2003: 336) define: *“the discovery, evaluation, and exploitation of future goods and services.”*

ASML tried to spread risk by developing new business opportunities, but without success, therefore, this report explores how ASML could identify, select, and develop (new business development) opportunities. ASML knows how to stay ahead in the semiconductor industry, with a market share of about 75% to 80% they are the best at what they do (ASML Holding N.V., 2011). However, ASML is facing the risks of the cyclical nature of the semiconductor industry, the dependence on a limited number of products, and the large dependence on capital expenditures by semiconductor manufacturers (ASML Holding N.V., 2011). The core competences of ASML are very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. Being a specifically tailored machine for its purpose, ASML would like to explore new business development opportunities. Therefore the goal of this thesis project is to:

Provide an overview of how ASML can develop new business opportunities.

This thesis project takes a science-based design approach to realize the goal of this research by answering the overall research question:

How can ASML develop new business opportunities?

To be able to answer the research question, several sub-questions are formulated:

- **What are approaches available in literature towards new business development?**
- **How can ASML identify new business opportunities?**
- **How can ASML select new business opportunities?**
- **How can ASML develop new business opportunities?**

This thesis project provides ASML with a framework useful to structure their new business development process. This thesis project takes a science based design approach (chapter 2),

in which design principles are derived from a systematic literature review and research synthesis (chapter 3), which are tailored in a specific design solution for ASML (chapter 4) which is preliminary tested (chapter 5). Conclusions, implications and limitations are drawn in chapter 6. An overview can be found in Figure 2.

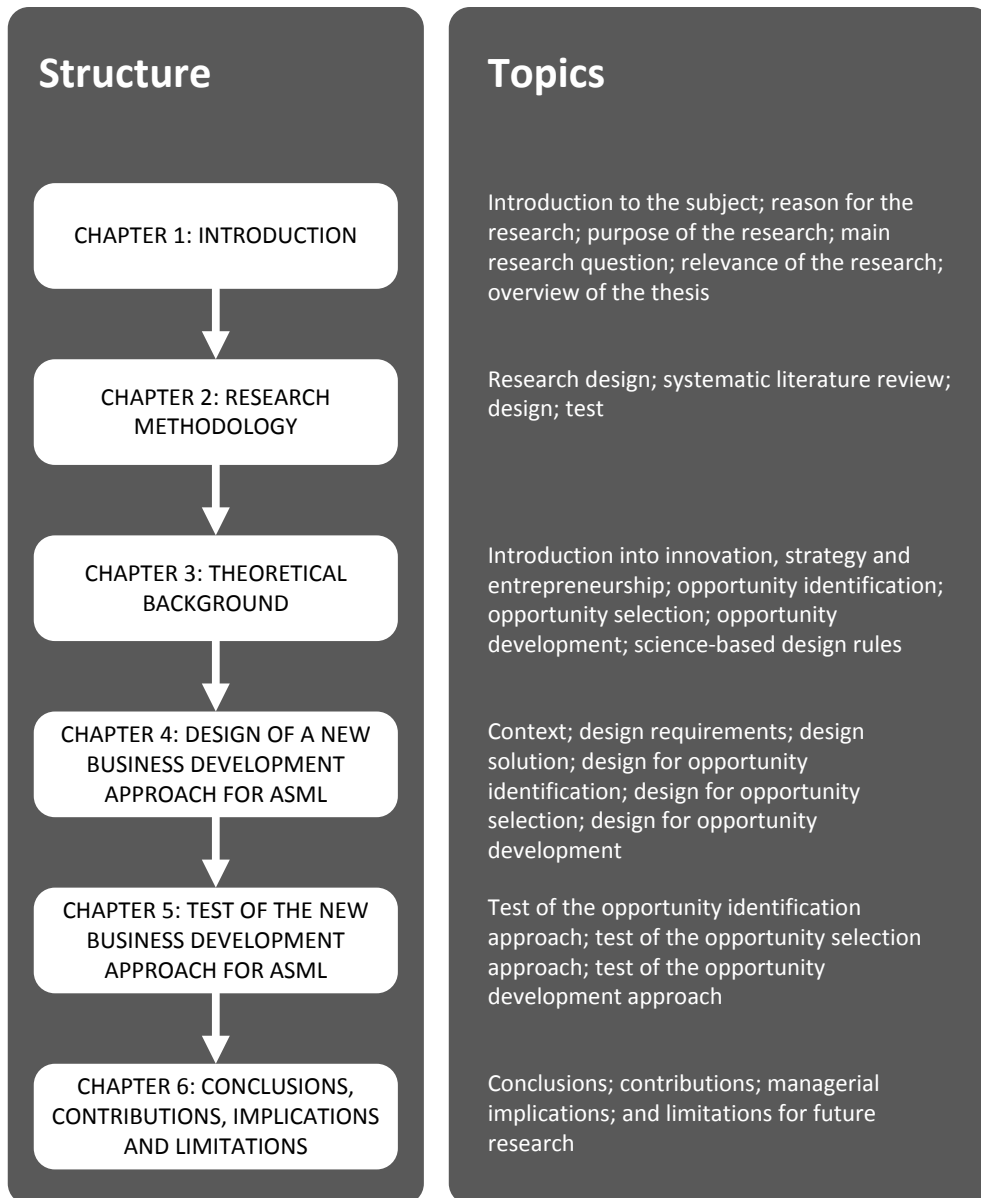


Figure 2: Overview and structure of the report

2

RESEARCH METHODOLOGY

“No amount of experimentation can ever prove me right; a single experiment can prove me wrong.”

Albert Einstein

A science-based design approach is followed in order to derive design principles from a systematic literature review and research synthesis, which function as a basis for developing and testing the design solution. The following sections explain the research design, the systematic literature review and research synthesis, design, and the preliminary alpha-test.

2.1 Research design

By calling the creation of the artificial the science of design, Herbert Simon (Simon, 1988, 1996) popularized design science for the scientific study of the artificial. Scholars formalized design methodologies to management studies (e.g. Van Aken, 2004; Romme, 2003). This study follows a science-based design approach, in which research in the field of innovation, entrepreneurship and strategy is connected to managerial practice. More generally, science-based design connects research to practice via design principles and design solutions by contextualizing research findings via deliberate design (Van Burg et al., 2008; Romme & Endenburg, 2006). Van Burg et al. (2008: 116) make a clear distinction between design principles and design solutions: *“Design principles involve a coherent set of normative ideas and propositions, grounded in research, that serve to design and construct detailed solutions,”* and design solutions are: *“representations of the practices being redesigned with*

help of the design principles.” This study applies a science-based design approach to derive principles and design solutions from research (see Figure 3). The design solution includes practical tools, which help ASML with identifying, selecting, and developing (new business development) opportunities. Following the reflective cycle (Van Aken, Berends, & Bij, 2007), after preliminary α -testing (testing the tools with a case from ASML) this study reflects on the design solution, design principles and research findings.

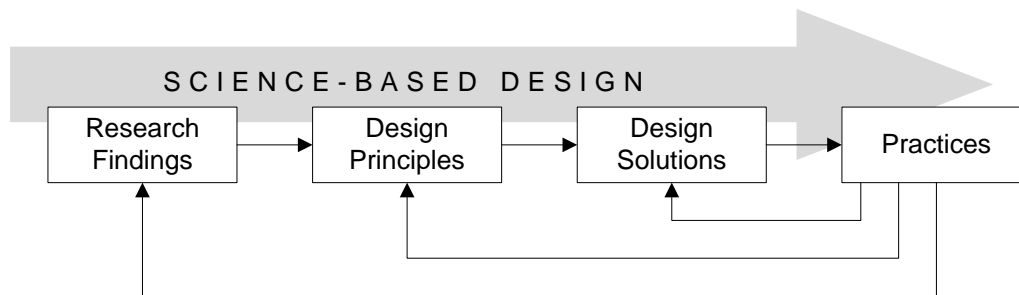


Figure 3: The research-design-development cycle from a science-based design perspective (Based on: Van Burg et al., 2008; Romme & Endenburg, 2006)

2.2 Systematic literature review and research synthesis

The literature does not have a readily available answer to the research question identified. To be able to gain insights into the relevant aspects of the research question and sub-questions, the literature is reviewed systematically. The innovation, strategy, and entrepreneurship literature is reviewed and synthesized. For that new business development is a widespread topic, entailing several components from many diverse fields in literature, the literature had to be reviewed in a systematic matter. Relevant search terms were identified ranging from: *new business development, new business initiation, opportunity identification, opportunity creation, opportunity selection, opportunity evaluation, opportunity development, new ventures, corporate new venture, corporate venturing, strategic alliance, mergers and acquisitions, licensing, joint ventures, venture capital, exploitation, exploration, ambidexterity, diversification, radical innovation, s-curve, innovation portfolio, sources of opportunities, opportunity identification process, opportunity creation process, open innovation, brainstorming, business model innovation, business-plan competition, creative processes, crowdsourcing, design-driven innovation, employees as a source of ideas, funding new ventures, leveraging core competences of the firm, market orientation, technology push, governance, etc.* In addition, many combinations were searched to explore opportunities to gain insights into the new business development process.

The Thomas Reuters Web of Knowledge database, the Proquest database, and Google scholar have been used to identify the most influential publications on the topics. To select the most influential publications per topic, publications with the highest individual citation score and papers published in the most influential journals in the respective field were selected. Furthermore, the most influential journals in the field were also searched for relevant publications. The most influential journals searched are⁴: Academy of Management Journal (5.250), Academy of Management Review (6.720), Administrative Science Quarterly (3.684), Entrepreneurship Theory and Practice (2.272), Journal of Business Venturing (2.149), Journal of Management (3.758), Journal of Management Studies (3.817), Journal of Product Innovation Management (2.079), Management Science (2.221), Organization Studies (2.339), Research Policy (2.508), Strategic Entrepreneurship Journal (2.026), and Strategic Management Journal (3.583). In addition, once identified, snowballing resulted in more relevant publication on the topic.

This thesis follows a design oriented research synthesis based on Denyer et al. (2008), which leans heavily on the narrative synthesis put forward by Popay et al. (2006). The first phase of the research synthesis develops an initial model of how, why and for whom interventions for developing (new business development) opportunities for diversification in established organizations work. Next, the preliminary model is tested, revised and refined by synthesizing supplementary literature. Research articles are selected according to the “fit for purpose” criterion developed by Boaz and Ashby (2003), which suggests that the researcher judges whether or not the literature adds to the research phenomenon. Based on a systematic literature review and synthesis, design principles are formulated which form the basis for the design solution. Design principles follow CIMO logic in order to describe how to change existing situations into desired ones: in context C, use intervention I to invoke generative mechanisms M that produces outcome(s) O (Denyer et al., 2008).

2.3 Design

Design generally follows the regulative model cycle: (1) problem definition/ identification, (2) diagnosis/ analysis, (3) design/ plan, (4) intervention (implementation in practice), and (5) evaluation (Van Aken et al., 2007). The design (step 3, the design / plan phase in the

⁴ Citation indexes are mentioned between brackets. The citation indexes are extracted from the “ISI Web of Knowledge” journal citation reports, of the 2010 JCR Social Science Edition.

regulative model cycle) follows a design process approach which consists of: requirement definition, solution direction definition, design parameters determination, parameter value definition, a detailed design, and iterative testing. The requirements for the design are formulated according to SMART requirements: specific, measurable, acceptable, realistic, and time-based. There are four types of design requirements: functional requirements, user requirements, boundary conditions, and design restrictions (Van Aken et al., 2007). This thesis designs a solution for developing (new business development) opportunities for established organizations in general, and for ASML more specific. The design includes practical tools for the identification, selection, and development of (new business development) opportunities. The practical tools (design solution) are tested with a new business development case for ASML (preliminary alpha-test).

2.4 Preliminary alpha-test

A preliminary alpha-test describes the application of the design solution in its original context, in order to illustrate the application and provide feedback on the design. Design emphasizes on finding solutions by building on design principles grounded in organization science and tested in pragmatic experiments (Romme, 2003). Design principles obtained from academic research should be justified through testing in its intended context (Van Aken, 2005). Design principles cannot be tested in practice but tailor made solutions based on design rules can (Romme & Endenburg, 2006). Van Aken (2004) distinguishes between two types or stages of testing, α -testing and β -testing. While α -testing analyzes a rule's effectiveness in its original context, in subsequent β -testing rules are tested in other contexts, used by third parties, assessed on their effectiveness and finally improved. Researchers themselves perform α -testing through a series of cases, and subsequently third parties perform β -testing which may counteract the "unrecognized defenses" of the researchers (i.e. blindness of the researchers to see flaws and limitations in their own rules) (Van Aken, 2005). While in many cases conclusive proof or at least conclusive internal validity seems impossible due to the heuristic nature of design principles (Van Aken, 2005), alpha and beta testing may lead to theoretically saturated supporting evidence (Eisenhardt, 1989). This thesis describes a preliminary α -test, for that full α -testing and subsequent β -testing is out of the scope of this project. The practical tools developed for the selection and development of (new business development) opportunities are tested in a new business development case for ASML.

3

THEORETICAL BACKGROUND

“Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn’t really do it, they just saw something. It seemed obvious to them after a while. That’s because they were able to connect experiences they’ve had and synthesize new things.”

Steve Jobs

The systematic literature review presented in this chapter is geared towards answering the literature research question: **“How to identify, select, and develop (new business development) opportunities in established organizations?”** To gain insights into the **new business development process**, the literature on **Innovation, Strategy** and **Entrepreneurship** is consulted. Core topic in this area is opportunity, which is dealt with after a short introduction of the basic literature streams is given.

3.1 Introduction

This literature review gives an overview of the literature related to the new business development process in an established organization, in particular, and more specifically towards diversification opportunities. As the answer to this question seems to lie somewhere on the verge of innovation, strategy and entrepreneurship, the basics of these literature streams are covered first.

3.1.1 Innovation

In order to stay competitive companies need to innovate, which is the successful introduction of novelty (Schumpeter, 1934). Nowadays, **innovation** has become an integral part of most companies. Two important types of innovation are **product or service innovation and process innovation** (Edquist et al., 2001), some authors consider the **business model** as a third type of innovation (Teece, 2010). Garcia and Calantone consider a definition of innovation that captures the essence of innovations from an overall perspective: *“innovation is an iterative process initiated by the perception of a new market and/or new service opportunity for a technology based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention”* (2002: 112). Two important distinctions are addressed: (1) a technological invention is combined with a successful market introduction through adoption and diffusion of the innovation, and (2) the innovation process is iterative by its nature, which implies a differing degree of innovativeness or degree of newness. The **degree of newness** has been operationalized from different perspectives on both **macro and micro level**, e.g. new to: the world, the adopting unit, the industry, the market, the consumer (Garcia & Calantone, 2002). However, the degree of newness has consistently been operationalized as the degree of discontinuity in marketing and/or technological factors.

Based on an extensive literature review and by devising Boolean logic on the two identified levels of **macro versus micro and marketing versus technology perspectives**; Garcia and Calantone (2002) reduce the plethora of ambiguous definitions and typologies of innovations to five typologies: (1) **radical innovation**, (2) **really new innovations**, (3) **discontinuous innovations**, (4) **incremental innovations**, and (5) **imitative innovations**. Radical innovations, really new innovations and incremental innovations are based on innovativeness (see Figure 20, Appendix I) as Garcia and Calantone define: *“Radical innovations are innovations that cause marketing and technological discontinuities on both a macro and micro level. Incremental innovations occur only at a micro level and cause either a marketing or technological discontinuity but not both. Really new innovations cover the combinations in between these two extremes”* (Garcia & Calantone, 2002: 120). Radical innovations are rare as Garcia and Calantone (2002) found that only 12.5% of all innovations were radical, 50% were really new, and the remaining 37.5% were incremental innovations. The distinction between radical and incremental innovation exists for a long time, whereas scholars described this different, as Leifer et al. (2000) points at James March’s (1991) debate of **exploration** and **exploitation**. As **incremental innovation** is dependent on

exploitation competences of the firm and **radical innovation** is directed toward exploration in order to develop new business (Leifer et al., 2000). Discontinuous innovations are game changers which may be radical or really new innovations. Christensen (1997) makes the distinction between sustaining and disruptive technologies, which is in similar line with discontinuous innovation as representing a paradigm shift that can generate new wealth while transforming or displacing parts of an established market. Rice et al. (1998: 52) presents a demarcated definition of **discontinuous innovations** as having the potential “(1) for a 5-10 times improvement in performance compared to existing products; (2) to create the basis for a 30-50% reduction in costs; or (3) to have new-to-the world performance features.” Innovation only occurs when a firm launches a product into the market, when another firm launches a similar product at a later moment in time it’s called an **imitative innovation**. The imitator may not be aware of its imitation as the rival innovation may have completed a similar R&D trajectory almost chronologically.

3.1.2 Strategy

Strategic management aims at answering the question as to how organizations create and sustain a competitive advantage while simultaneously exploring new innovation opportunities (Sirén et al., 2012). Foster (1986) introduces the **S-curve**, a useful concept in identifying different types of innovation (see Figure 21, Appendix I). At first, technological innovations progresses slow and technological increases require huge amounts of research and marketing efforts. Then, performance increases at a fast paste, after which it diminishes again and reaches it limits. The old technology is replaced by a new innovation and a new S-curve is initiated. Garcia and Calantone (2002) follow a similar reasoning and define market S-curve as an analogy of the technology S-curve. Considering the discontinuity of innovations, markets and technologies become obsolete at some point in time when they will be replaced. In order to gain a sustainable competitive advantage firms need to innovate to prevent becoming obsolete. Authors agree that a firm needs a balanced innovation approach with different types of innovations forming a **balanced innovation portfolio**, by combining **exploration and exploitation** (March, 1991) in **ambidextrous organizations** (e.g. Benner & Tushman, 2003; He & Wong, 2004; Mayle, 2006; O’Reilly & Tushman, 2004; Tushman & OReilly, 1996). In their efforts for creating breakthrough innovations, organizations should be careful not to fall for one of the inhibiting organizational pathologies as Ahuja and Lampert (2001) identify in their longitudinal study:

the familiarity trap (favoring the familiar), the maturity trap (favoring the mature), and the propinquity trap (favoring search for solutions near to existing solutions).

Innovation efforts can be geared towards commercializing innovations, diversification of the established firm, and organizational strategic renewal (e.g. Phan, M. Wright, Ucbasaran, & Tan, 2009; Sharma & Chrisman, 1999). While innovation efforts towards commercializing innovations are focused on strengthening the organization's current strategy, innovation efforts towards organizational strategic renewal opt for strategic change, which requires the organization to adapt its current competences to changes in the environment. Instead of strengthening or renewing the current strategy, innovation efforts towards diversification of the established firm makes an addition to the current strategy. Lichtenthaler (2005: 698) defines diversification as: *"an increase in products and markets of a company."* Corporate diversification can be related or unrelated to the company's current competences, ranging from technology to distribution channels and including all areas of the value chain. Competencies are a *"complex combination of tangible and intangible assets, people, and processes that organizations use to transform inputs into outputs"* (Collis & C A Montgomery, 1998: 73). Different perspectives in literature shed light on diversification: e.g. agency perspective, market power perspective, and the resource based view. These perspectives contribute to the debate between related and unrelated diversification on firm performance. However, it seems that related diversification is more prevalent than unrelated diversification, also related diversification generally outperforms single business –and unrelated diversification strategies (Neffke & Henning, 2012).

3.1.3 Entrepreneurship

Following Venkataraman (1997), Eckhardt & Shane (2003: 336) define **entrepreneurship** as: *"the discovery, evaluation, and exploitation of future goods and services,"* which involves the study of **opportunities**. In **corporate entrepreneurship** research, scholars focus on ways how firms can create positive changes by **new businesses -and new product development** (Narayanan, Y. Yang, & Zahra, 2009). **Strategic entrepreneurship** is a relatively new research stream, which explores the connection between entrepreneurship and strategic management literature (Kuratko & Audretsch, 2009). As firms need to become entrepreneurial to prosper in the global marketplace, strategic entrepreneurship research is becoming increasingly important (Dunlap-Hinkler, Kotabe, & Mudambi, 2010). The core elements of strategic entrepreneurship are **opportunity-seeking (exploration) and**

advantage seeking (exploitation) (Sirén et al., 2012). Short, Ketchen, Shook & Ireland (2010) reveal a varying number of different processes related to opportunities (i.e. creation, discovery, recognition). Many scholars (e.g. Dutta & Crossan, 2005; Short et al., 2010) adopt the definition of opportunities by Eckhardt and Shane (2003: 336): “*situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships.*”

Several authors review the literature on: **entrepreneurship** (Busenitz et al., 2003; Hoskisson, Covin, Volberda, & R. A. Johnson, 2011; Ireland & Webb, 2007; Shane & Venkataraman, 2000), **corporate entrepreneurship** (Ireland, Covin, & Kuratko, 2009), **strategic entrepreneurship** (Ireland, Hitt, & Sirmon, 2003; Kuratko & Audretsch, 2009), **international entrepreneurship** (M. V. Jones, Coviello, & Tang, 2011; Keupp & Gassmann, 2009; Kiss, Danis, & Cavusgil, 2012), **entrepreneurial orientation** (Covin & Lumpkin, 2011), **corporate venturing and value creation** (Narayanan et al., 2009), and **opportunities** (Short et al., 2010).

3.1.4 New business development

New business development is geared towards developing new business opportunities aimed at exploring radical (or really new) innovation opportunities for long term survival of the firm (Burgers et al., 2008). New business development consists of three stages: discovery, incubation, and acceleration (O'Connor & DeMartino, 2006). This thesis focuses on the discovery phase of new business development, which is a process of exploration from the idea to a sound business case (Bröring & Herzog, 2008). These new business opportunities should first be **identified** (§3.2), then **selected** (§3.2.6), and finally **developed** in order to reap their benefits (§3.3.3), see Figure 4.

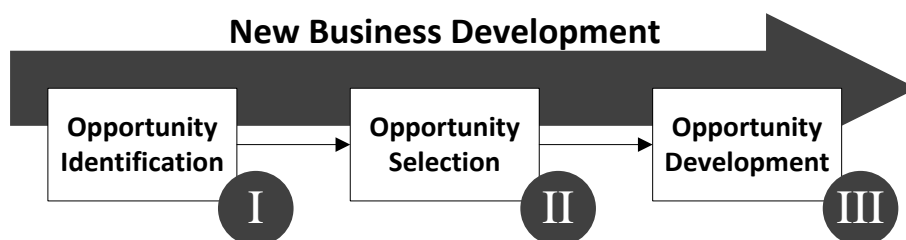


Figure 4: New business development process

3.2 Opportunity identification

Despite that the opportunity concept is recognized as being a central concept in the entrepreneurship literature (Short et al., 2010), the variety of conceptualization of the opportunity concept itself and the processes around it has led to fragmentation (Hansen, Shrader, & Monllor, 2011a, 2011b). The Schumpeterian (Schumpeter, 1934) view on entrepreneurship propagates the discovery of inter-temporal opportunities based on disequilibrium generating activities of entrepreneurs. In contrast, research based on the work of Kirzner (1978) believes that opportunities stem from the discovery of pre-existing discrepancies. While previous research contrasted the view on entrepreneurial opportunities to be identified (Kirzner, 1978) or created (Schumpeter, 1934), recent scholars believe that they should not to be contradictory but act as complementary modes over time (Hoskisson et al., 2011).

Short et al. (2010: 54) explain the relatedness of ideas and dreams to opportunities: “ideas lead to potential opportunities only if carefully vetted and developed,” and “dreams are aspirations whose connection to bona fide opportunities remains undefined.” The relatedness of ideas and opportunities offer a rich opportunity for future research, as idea generation has a rich history in the new product development literature which seems to have synergy with the opportunity concept found in the entrepreneurship literature.

First, different types of opportunities are explained to gain a better understanding of the opportunity concept. Second, opportunities are explained in the light of an open innovation context. Then it is explained how organizations should prepare for identifying opportunities, create opportunities, and which people organization should involve into the opportunity identification process.

3.2.1 Types of opportunity

By categorizing opportunities, scholars provide organizations with a general framework to identify pre-existing discrepancies or to create opportunities by disequilibrium generating activities (Drucker, 1985; Eckhardt & Shane, 2003). In Drucker’s (1985) approach to purposeful innovation, change always provides the opportunity for innovations as Drucker defines (1985: 35): “*Systematic innovation therefore consists in the purposeful and organized search for changes and in the systematic analysis of the opportunities such changes might offer for economic or social innovation.*” Drucker defines seven sources which should be monitored for innovative opportunity. Four sources originate from within the

organization, enterprise or industry: the unexpected; the incongruity; innovation based on process need; and changes in industry structure or market structure. Three sources involve changes outside the organization, enterprise or industry: demographics; changes in perception, mood, and meaning; and new knowledge.

Based on seminal work of Drucker (1985), Kirzner (1978), Schumpeter (1934), Venkataraman (1997) and others, Eckhardt and Shane (2003) identify three ways in which types of opportunities are categorized by: the locus of the changes generated by the opportunity, the source of the opportunity, or the initiator of the change. Changes can occur in a variety of parts of the value chain, as Schumpeter (1934) identifies the locus of change by: the creation of new products or services, the discovery of new geographical markets, the creation or discovery of new raw materials, new methods of production, new ways of organizing. Eckhardt and Shane (2003) identify four sources of opportunities: information asymmetry vs. exogenous shocks, supply vs. demand side changes, productivity-enhancing vs. rent-seeking opportunities, and identifying the catalysts of change that generate opportunities. According to Eckhardt and Shane (2003), researchers have identified three different types of initiator of changes: non-commercial entities, existing commercial entities in an industry, and new commercial entities in an industry (see Table 1).

Table 1: Sources of opportunity identification

Author(s)	Sources of opportunity identification
Eckhardt & Shane (2003)	<p>Locus of changes:</p> <ul style="list-style-type: none"> • Those that stem from the creation of new products or services • Those that stem from the discovery of new geographical markets • Those that emerge from the creation or discovery of new raw materials • Those that emerge from new methods of production • Those that are generated from new ways of organizing <p>Sources of opportunities:</p> <ul style="list-style-type: none"> • Information asymmetry vs. exogenous shocks • Supply vs. demand side changes • Productivity-enhancing vs. rent-seeking opportunities • Identifying the catalysts of change that generate the opportunity <p>Initiator of the change:</p> <ul style="list-style-type: none"> • Non-commercial entities (e.g. governments, universities) • Existing commercial entities in an industry (e.g. incumbents, suppliers, customers) • New commercial entities in an industry (e.g. independent entrepreneurs, diversifying entrants)

3.2.2 Opportunities in an open innovation context

While opportunities can be identified and explored within the boundaries of the organization, open innovation describes the shift towards a more open approach on innovation. First, the necessity for companies to open up their innovation process is delineated and open innovation is defined. Then, the shift towards a more open approach of a traditional stage-gate model is described. Finally, different inbound and outbound open innovation processes are described.

The necessity for companies to innovate was described by Shumpeter (1934), and is of general knowledge nowadays. With decreasing new product development cycles and an increasing distribution of knowledge, companies need to open up their innovation processes. Open innovation is the new paradigm pioneered by Chesbrough (Chesbrough & Rosenbloom, 2002; Chesbrough, Vanhaverbeke, & J. West, 2006; Chesbrough, 2003a, 2003a, 2003b). Open innovation is defined as: *“Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.”* (Chesbrough et al., 2006: 2)

Traditionally companies innovate inside the company where they are in control. Many ideas start at the innovation process and go through a funnel, after some screening and filtering a few ideas make it to the market (see Figure 22, Appendix I). Many companies employ a stage-gate process to get ideas through this funnel and into the market (Cooper, 1994). The stage-gate process builds in check-points (gates) where is decided whether to continue through the next stage or to stop with the project. In open innovation, the boundaries of the funnel open up (see Figure 23, Appendix I). An open stage-gate process – which can be applied here – allows profit generation throughout the stage-gate process by licensing, spinning out, or divesting a project and not only at the end in the market (Van Der Meer, 2007).

Open innovation can be split up into inbound and outbound open innovation (see Table 2). Inbound open innovation is an outside-in process, which implies opening up the innovation process to knowledge exploration (U. Lichtenthaler, 2011), which many firms already apply. Inbound open innovation is the inflow of knowledge by sourcing and acquiring (Dahlander & Gann, 2010) ideas and inventions from: suppliers, customers, competitors, consultants, universities, public research organizations, etc. (Chesbrough, 2003a). Firms collaborate with external partners, like other companies, universities,

governments, suppliers, or users, to gain knowledge insights. A major problem here is the “Not Invented Here” syndrome, which is the anxiety of an inward focusing company to exploit a technology not produced inside the company (Katz & T. J. Allen, 1982). Outbound open innovation is an inside-out process, which implies opening up the innovation process to knowledge exploitation (U. Lichtenthaler, 2011). Many ideas do not make it through the funnel and into the market. Often, these ideas do not fit into the current business model of the respective firm, or are not applicable or useful at the time being. However, there might be opportunities of exploiting these ideas outside the company. Outbound open innovation is based on the outflow of knowledge by revealing and selling ideas (Dahlander & Gann, 2010), technology and inventions through spin-off initiatives, licensing and establishing open domains (Chesbrough, 2003a). Similarly to the not invented here syndrome, there is the “Not Sold Here” syndrome, which is the anxiety of selling ideas outside the own sales channels. Firms also combine inbound and outbound open innovation processes, which is also referred to as a coupled process of open innovation, in for example alliances (Enkel, Gassmann, & Chesbrough, 2009). In addition to knowledge exploration and knowledge exploitation, knowledge is increasingly retained outside the boundaries of the organization (U. Lichtenthaler & E. Lichtenthaler, 2009). In this dynamic perspective interorganizational relationships are seen as extensions of a firm’s internal knowledge base.

Table 2: Inbound and outbound open innovation

Author(s)	Inbound and outbound open innovation
Chesbrough (2003a) and Lichtenthaler (2011)	Inbound open innovation (outside-in), sourcing and acquiring ideas and inventions from e.g.: <ul style="list-style-type: none"> • Suppliers • Customers • Competitors • Consultants • Universities • Public research organizations Outbound open innovation (inside-out), revealing and selling ideas, technology and inventions through: <ul style="list-style-type: none"> • Spin-off initiatives • Licensing • Establishing open domains Coupled process (e.g. working in alliances with complementarities)

3.2.3 Prepare for opportunity identification

It is known that opportunities are identified or created, which can act as complementary modes over time. Opportunities come from outside or inside the company (U. Lichtenthaler, 2011), and are usually based on a market or technology disruption, or both (Garcia & Calantone, 2002). Eckhardt and Shane (2003) categorize opportunities by: the locus of change, the source of the opportunity or the initiator of the change. Their categorization can guide organizations in their search process for opportunities, as to what organizations should look for (see Table 1). The open innovation literature describes the change of a closed innovation cultural paradigm towards a more open innovation paradigm, where opportunities can flow inside and outside an organization throughout the whole innovation process by outbound or inbound processes (see Table 2).

The literature remains unclear about what organizations should do to identify opportunities, and an overview of the process remains absent. This section describes how an organization should prepare for identifying opportunities for new business development by: identifying intrapreneurs, delineating the core competencies and identifying appropriate markets. The next section describes how an organization can identify opportunities, and the last section delineates who should be involved into the opportunity identification process.

Intrapreneurs

Entrepreneurial orientation scholars (e.g. Covin & Lumpkin, 2011; Lumpkin & Dess, 1996; Lyon, Lumpkin, & Dess, 2000) describe the entrepreneur's unique capabilities for identifying opportunities, as opportunities are identified by entrepreneurs (Van Burg, Podoyntsyna, Beck, & Lommelen, 2012). Ardichvili et al. (2003) also recognize that the entrepreneur has a central role in the recognition and development of opportunities. The recognition and development process is cyclical and iterative of its nature and is influenced by: entrepreneurial alertness; information asymmetry and prior knowledge; social networks; personality traits, including optimism, self-efficacy, and creativity; and type of opportunity itself (Ardichvili et al., 2003). Organizations should therefore use entrepreneurs for identifying, selecting, and developing new business development opportunities; entrepreneurs in an organizational context are also called intrapreneurs.

Principle 1. In order to develop new business opportunities, established organizations should identify people who are entrepreneurial minded and have the right absorptive capacity because they are best capable to identify, select, and develop opportunities.

BOX 1**INTRAPRENEURSHIP AT DSM**

“The process of turning an idea into a development project depends upon a change in mindset, a transformation from a ‘scientific’ to an ‘entrepreneurial’ view. DSM Venturing & Business Development embodies a ‘scientific’ mindset in which individual reputation is paramount. Scientists are focused upon technology for its own sake and wish to receive recognition for spreading knowledge widely and helping other to reproduce their work. Scientists are very good at generating ideas. But turning these ideas into viable projects requires a completely different, ‘intrapreneurial’ mindset.” (Kirschbaum, 2005: 27)

Core competencies

According to Lichtenthaler (2005), creating a corporate vision and identifying core competencies is a necessary prerequisite for a successful search for related opportunities. Opportunities related to the core competencies of the organization, enable the organization to spread their risk. Core competencies are the most important tangible and intangible assets, people and processes that the organization uses to transform inputs into outputs (Collis & C A Montgomery, 1998). Core competencies can range from technology to distribution channels and including all areas of the value chain. Core competencies must at least fulfill the conditions of: not easy for competitors to imitate, re-usable widely for many products and markets (companies have many competencies, a core competences must be usable for more than a single instance) and must contribute to end customer’s experienced benefits (Prahalad & Hamel, 1990). Organizations should determine their corporate vision as innovations geared towards commercializing innovations, diversification of the established firm, or organizational strategic renewal, are very different from each other (e.g. Phan et al., 2009; Sharma & Chrisman, 1999). Furthermore, it is important to maintain a balanced innovation portfolio with projects which can be commercialized now, in the near future, and in the future. As core competencies are time-based, opportunities should reflect on the current, near future, and future competencies. In order to delineate or frame search activities, the organizations’ core competencies should be identified. Therefore, the strategic department of a large established organization should identify the core competencies of the firm to which a new business development opportunity should relate to.

Principle 2. In order to develop new business opportunities, established organizations should identify the core competences of the organization to which a new business development opportunity should relate to, because they are a prerequisite for successful related opportunity search which enables organizations to spread risk, and delineating opportunity search activities increase search effectiveness.

BOX 2

CORE COMPETENCIES AT CANON

Product	Competencies			Product	Competencies		
	Precision mechanics	Fine optics	Micro-electronics		Precision mechanics	Fine optics	Micro-electronics
Basic camera	X	X		Plain paper copier	X	X	X
Compact fashion camera	X	X		Colour copier	X	X	X
Electronic camera	X	X		Laser copier	X	X	X
EOS autofocus camera	X	X	X	Colour laser copier	X	X	X
Video still camera	X	X	X	Still video system	X	X	X
Laser beam printer	X	X	X	Laser imager	X	X	X
Colour video printer	X		X	Cell analyzer	X	X	X
Bubble jet printer	X		X	Mask aligners	X		X
Basic fax	X		X	Stepper aligners	X		X
Laser fax	X		X	Excimer laser aligners	X	X	X
Calculator			X				

“The above list of competencies and related products in Canon are taken from Prahalad and Hamel (1990)“ ... ”In the late 1950s the time had come for Canon to apply its precision mechanical and optical technologies to other areas (than cameras), such as business machines. By 1964 Canon had begun by developing the world’s first 10-key fully electronic calculator, followed by entry into the coated paper copier market with the development of an electro fax copier model in 1965, and then into the revolutionary Canon plain paper copier technology unveiled in 1968. Following these successes of product diversification, Canon’s product lines were built on a foundation of precision optics, precision engineering and electronics.” (Tidd, Bessant, & Pavitt, 2005: 182)

Appropriate markets

An appropriate market should be identified in which the search for opportunities should take place (E. Lichtenthaler, 2005). An appropriate market is a market in which the organization can use its core competencies to create synergies and enable the organization to spread its risk. Lichtenthaler (2005) takes a closer look at the corporate diversification process, and prescribes large established organizations to define search fields from a competency or market driven search. According to Phan et al. (2009), large established

organizations have quite comprehensive environmental scanning capabilities in order to identify opportunities, like described in market-orientation literature (e.g. Kohli & Jaworski, 1990; Langerak, Jan Hultink, & Robben, 2004; Narver & Slater, 1990). Therefore, organizations should delineate their opportunity search activities by identifying appropriate markets.

Principle 3. In order to develop new business opportunities, established organizations should identify appropriate markets, because delineating opportunity search activities increase search effectiveness.

BOX 3

APPROPRIATE MARKETS AT KODAK

“Faced with developments in digital imaging technology, Kodak redefined its business as ‘pictures, not technology’, stressing that the market competencies (competencies related to the photography market) were still relevant to the digital photographic markets... Kodak pursued a two-tier strategy for new business development. For the medical imaging business, Kodak acquired a number of specialist digital technology firms, including Imation Corporation, which had developed a hybrid dry laser imaging technology... For the consumer imaging market, Kodak... moved developments to the new Digital and Applied Imaging division, which had routines more suited to the needs of emerging technologies and markets. A series of successful products followed, and by 2004 Kodak had 20% of the global market share in digital cameras.” (Tidd et al., 2005: 334)

3.2.4 Create the opportunity

Several processes a company can undertake may lead to the identification or creation of opportunities, which can be either: (1) intuitive or logical, (2) individual or a group activity, (3) competitive or collaborative, (4) an open call or a selected group, and (5) in an online or offline environment. It is well recognized that the identification or creation of an opportunity is a creative process (Kirzner, 1978). One of the most well-known creative processes is brainstorming, however, many more exist (e.g. Paulus & H. C. Yang, 2000). While literature describes processes that may lead to opportunities, they are not yet recognized as such, and an overview or classification remains absent. This thesis takes a first step in identifying processes that may lead to the identification of new business

development opportunities, and classifying these processes by: process structure, group size, competitiveness, openness, and environment.

Opportunities can be identified by either an intuitive or a logical process (process structure). Shah, Kulkarni, and Vargas-Hernandez (2000) made a classification of creative processes for idea generation in conceptual engineering design, which can be either intuitive or logical (see Figure 24, Appendix I). While giving an extensive overview of idea generation processes in general the list is not complete in the realm of developing new business, as opportunity generation processes may have a more specific focus on product, service or business model innovation. For instance following the recent interest into business model innovation (e.g. Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; M. W. Johnson, Christensen, & Kagermann, 2008; Linder & Cantrell, 2000; Morris, Schindehutte, & J. Allen, 2005; Osterwalder, 2005). Business-model innovation allows a company to map how they appropriate value from their business, by translating internal and external resources via the value proposition to the customer. Re-mapping or innovating the business model follows a specific process which also may lead to the generation of opportunities.

Opportunities can be identified by either an individual or by a group of people (group size). In literature, there is still a debate between individual and group creativity (e.g. Woodman, Sawyer, & Griffin, 1993; Yetton & Bottger, 1982). Proponents of group creativity opt that people are more creative as a group for that their different backgrounds and beliefs make that intersections are easier identified through interaction. However, proponents of the individual creativity opt that group creativity encourages free riding, and thus individual creativity forces individuals to contribute which should make the sum of all parts larger than creativity in a group.

Besides the more traditional collaborative process of opportunity identification, there is another trend based on a competitive process (competitiveness). Business-plan competitions and idea competitions are an example of such a competitive process, in which a competition is set-up to come up with the best business-plan or idea (e.g. Van Burg et al., 2008; Der Foo, Kam Wong, & Ong, 2005; Huffman & Quigley, 2002; Shane & Venkataraman, 2000). Business-plan competitions are ideally suited for an organization to bridge the gap from opportunity up to the actual appropriation of value from the opportunity, for that an owner of the opportunity is identified. Idea competitions allow an organization to involve many people to come up with an idea to solve a specific problem.

Opportunities may be identified through a process which involves a selected group of people or via an open call which allows everyone to join (openness). Literature on

crowdsourcing (e.g. Schweitzer, Buchinger, Gassmann, & Obrist, 2012) explains the process of involving “the crowd” in the problem solving process via an open call, which is the opposite of involving a selected group like in most creativity sessions. An open call allows involving many people from whom you might not even know they existed; on the contrary selecting a group has the advantage of involving specialists on the topic.

Opportunities may be identified in an online or offline environment (environment). Especially literature on crowdsourcing makes use of the internet as a communicative medium, as it allows many people all over the world to communicate and come to an understanding (e.g. Schweitzer et al., 2012). If proximity is no issue, direct communication in an offline environment allows direct interaction which stimulates creativity.

Principle 4. In order to develop new business opportunities, established organizations should identify opportunities by a process that can be: (1) intuitive or logical, (2) individual or a group activity, (3) competitive or collaborative, (4) an open call or a selected group, (5) in an online or offline environment, because these dimensions delineate the available approaches for identifying opportunities for new business development and thereby help organizations choose an appropriate process.

BOX 4

IDEA COMPETITION AT SIEMENS

“Between February and November 1996, an idea competition was held in our Corporate Technology Department as part of a company-wide innovation initiative. Fourteen-hundred employees from Munich, Erlangen and the Siemens Corporate Research in Princeton, New Jersey were asked to submit ideas for new products, systems, processes or services that could be realized within two or three years. The prize would be seed money for the best and most promising projects. In addition, the idea owners themselves would have an opportunity to convince the project leadership to realize and implement their ideas. In the end, 245 ideas were submitted. Six of these ideas were awarded with seed money for an initial implementation or feasibility analysis. Actually, these projects are still ongoing, and four of the six ideas have already received commitments from business groups for further product development.” (Schepers, Schnell, & Vroom, 1999: 27)

3.2.5 Involve the right people

In order to identify opportunities, organizations should involve the right people both inside and outside the organization. The next sections explain why organizations should involve employees and when organizations should involve outsiders.

Employees

It is well known that employees can act as a source of ideas or innovation (Santos & Spann, 2011; Soukhoroukova, Spann, & Skiera, 2012). Organizations tap into employees as a source of innovation by stimulating entrepreneurship among employees, which is also called intrapreneurship. Some organizations, like for instance 3M, let employees spend a dedicated amount of time to creativity and innovation, or offer prizes for best business ideas (Garud, Gehman, & Kumaraswamy, 2011). Therefore, organizations should involve employees into the opportunity identification process.

Principle 5. In order to develop new business opportunities, established organizations should involve the right employees in the opportunity identification process because they are a well-known source of innovation.

BOX 5

INVOLVING EMPLOYEES AT SHELL

“Shell’s GameChanger was established in 1996 with the initial objective of spending 10% of Shell’s upstream technical budget on innovative, “venturing” ideas. A stage-gate process was developed through which employees from anywhere within the Shell group could submit ideas for consideration, and could then, if successful, receive staged funding to develop and commercialize the venture. The process was subsequently adopted in a number of other areas within Shell. By mid-2002, GameChanger had screened 400 ideas, commercialized 32 new technologies, and established 3 new businesses.” (Hill & Birkinshaw, 2008: 426)

People from outside the organization

Besides involving employees into the opportunity identification process, organizations can also involve people outside the organization. The open innovation paradigm proclaims the paradigm shift towards a more open approach to innovation (Chesbrough et al., 2006; Chesbrough, 2003a, 2003b, 2006; Huizingh, 2011). However, open innovation is not the answer to everything, as it may become counterproductive beyond a certain threshold value

or may not function at all (Huizingh, 2011). In their search for opportunities, organizations should recognize the value of involving people from outside their own organization, especially in case of unknown markets or technologies (E. Lichtenthaler, 2005). Afuah and Tucci (2012) take this concept one step further in their search for crowdsourcing as a distant search, as they recognize that some opportunities are not recognized by others as they are too far away. Involving others in radical innovation is well recognized by design-driven innovation (e.g. Dell’Era, Marchesi, & Verganti, 2010; Dell’Era & Verganti, 2007, 2009, 2010; Pisano & Verganti, 2008; Verganti, 1997, 2008, 2009, 2011), by identifying a group or other persons outside your organization with a similar problem, significantly increases the chance on a radical innovation.

Principle 6. In order to develop new business opportunities, established organizations should involve people from outside organizations (with similar problems) in case of unknown markets or technologies, especially when the knowledge distance is large, because they are capable of identifying opportunities that are distant from the organization.

BOX 6

INVOLVING OUTSIDERS AT XEROX PARC

“Xerox developed many technologies in its laboratories in Palo Alto which did not easily fit their image of themselves as ‘the document company’. These included Ethernet (later successfully commercialized by 3Com and others) and PostScript language (taken forward by Adobe Systems). Chesbrough (2003a) reports that 11 of 35 rejected projects from Xerox’s labs were later commercialized with the resulting businesses having a market capitalization of twice that of Xerox itself.” (Tidd et al., 2005: 361) If Xerox would have involved people outside the organization, they would have been able to identify these opportunities.

3.2.6 Design principles for opportunity identification

The design principles, examples of empirical studies and examples of underlying theories for identifying (new business development) opportunities can be found in Table 3.

Table 3: Design principles for opportunity identification

Design Principles for Opportunity Identification	Examples of empirical studies the principle is grounded in	Examples of underlying theories
1. In order to develop new business opportunities, established organizations should identify people who are entrepreneurial minded and have the right absorptive capacity because they are best capable to identify, select, and develop opportunities.	Covin & Lumpkin (2011), Lumpkin & Dess (1996), Lyon, Lumpkin & Dess (2000), Van Burg et al. (2012), Ardichvili et al. (2003)	Entrepreneurial orientation (Covin & Lumpkin, 2011; Lumpkin & Dess, 1996; Lyon et al., 2000)
2. In order to develop new business opportunities, established organizations should identify the core competences of the organization to which a new business development opportunity should relate to, because they are a prerequisite for successful related opportunity search which enables organizations to spread risk, and delineating opportunity search activities increase search effectiveness.	Lichtenthaler (2005), Phan et al. (2009)	Diversification (Collis & C A Montgomery, 1998; E. Lichtenthaler, 2005; Neffke & Henning, 2012), core competencies (Collis & C A Montgomery, 1998; Prahalad & Hamel, 1990)
3. In order to develop new business opportunities, established organizations should identify appropriate markets, because delineating opportunity search activities increase search effectiveness.	Lichtenthaler (2005), Phan et al. (2009)	Diversification (Collis & C A Montgomery, 1998; E. Lichtenthaler, 2005; Neffke & Henning, 2012), market orientation (Kohli & Jaworski, 1990; Langerak et al., 2004; Narver & Slater, 1990)
4. In order to develop new business opportunities, established organizations should identify opportunities by a process that can be: (1) intuitive or logical, (2) individual or a group activity, (3) competitive or collaborative, (4) an open call or a selected group, (5) in an online or offline environment, because these dimensions delineate the available approaches for identifying opportunities for new business development and thereby help organizations choose an appropriate process.	Kirzner (1978)	Creativity (Shah et al., 2000; Woodman et al., 1993; Yetton & Bottger, 1982), business model innovation (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; M. W. Johnson et al., 2008; Linder & Cantrell, 2000; Morris et al., 2005; Osterwalder, 2005), business-plan or idea competitions (Van Burg et al., 2008; Der Foo et al., 2005; Huffman & Quigley, 2002; Shane & Venkataraman, 2000), crowdsourcing (Afuah & Tucci, 2012; Schweitzer et al., 2012)
5. In order to develop new business opportunities, established organizations should involve the right employees in the opportunity identification process because they are a well-known source of innovation.	Santos & Spann (2011), Soukhoroukova et al. (2012)	Intrapreneurship (Antoncic & R. D. Hisrich, 2001; R. Hisrich, 1990; Zahra, 1991)
6. In order to develop new business opportunities, established organizations should involve people from outside organizations (with similar problems) in case of unknown markets or technologies, especially when the knowledge distance is large, because they are capable of identifying opportunities that are distant from the organization.	Afuah & Tucci (2012), Verganti (2008)	Open innovation (Chesbrough et al., 2006; Chesbrough, 2003a, 2003b, 2006; Huizingh, 2011), crowdsourcing (Afuah & Tucci, 2012; Schweitzer et al., 2012), design-driven innovation (Dell'Era et al., 2010; Dell'Era & Verganti, 2007, 2009, 2010; Pisano & Verganti, 2008, 2008; Verganti, 1997, 2008, 2009, 2011)

3.3 Opportunity selection

Once opportunities are identified, selection should reduce the plethora of opportunities since available resources to develop opportunities are limited. Scholars have divided attention to opportunity identification and development, however, opportunity selection has remained largely ignored (Haynie, Shepherd, & McMullen, 2009). While research on

opportunity selection remains limited in the field of entrepreneurship in general and in the strategic or corporate entrepreneurship in specific, venture capital –and especially new product development literature have a richer history on the topic. While lessons may be learned from these literature streams, careful consideration is needed, for that venture capital literature focuses on investments into new ventures. Also, new product development literature focuses solely on the development of new products and disregards new service development or changes to the business model.

The opportunity identification process often results in many opportunities; however, selecting good ones is a difficult multistage process. The selection already begins in the early stages of opportunity identification, like for instance in brainstorming where idea generation and selection are separated in order to facilitate the generation of as many ideas as possible without preliminary judgment. Once opportunities are identified, an initial screen determines whether further investigation should lead to an uncertainty reduction by proving assumptions right. After the initial screen, selected opportunities are often moulded into a business case or a full-fledged business plan, which may or may not result in a new venture, and eventually might be incorporated into the corporate parent. The selection of the opportunity depends thus on the stage or type of opportunity. In similar vein, Hall and Hofer (1993) compared different stages of venture capitalists' management processes identified by scholars, and found that the venture evaluation process consists of at least two distinct phases: an initial screening, and a more thorough evaluation. The first section discusses the initial screen of an opportunity and the second section describes the subsequent thorough evaluation of an opportunity.

It is important that organizations make a clear distinction between evaluating a single project and portfolio evaluation, as Cooper (2001) puts forward, projects are evaluated in relation to each other in portfolio evaluation in order to compose a compelling portfolio of projects. Another critical note put forward by Rice, Kelley, Peters, and O'Connor (2001) who recognize that evaluating radical innovation opportunities is extremely tricky for that the commercial value of a radical innovation may be unknown. Rice et al (2001) borrow from the new product development literature, in defining the fuzzy-front-end of innovation as being the most challenging and uncertain part of the life-cycle of an innovation. Rice et al. (2001) suggest a first step for overcoming this problem is using a first screen for opportunities which allows larger degrees of uncertainty in a business' case underlying assumptions, and consequently organizations should help initiators of the idea building their business case.

Principle 7. In order to develop new business opportunities, established organizations should perform at least two opportunity screens: (1) an initial screen to determine further investigation, and (2) a thorough evaluation once the opportunity is developed into a business-case, because they prevent radical innovation opportunities from being ignored, and make sure that only the best opportunities are selected.

Principle 8. In order to develop new business opportunities, established organizations should make the distinction between evaluation of a single project and portfolio evaluation, because they are both important but very different evaluations.

BOX 7

OPPORTUNITY EVALUATION AT LUCENT

“Lucent Technologies was created in 1996 from the break-up of the famous Bell Labs of AT&T. Lucent established the New Venture Group (NVG) in 1997 to explore how better to exploit its research talent by exploiting technologies which did not fit any of Lucent’s current businesses... while simultaneously ...protect the mainstream research and innovation processes within Lucent from the potential disruption NVG might cause. To achieve this balance, at the heart of the process are periodic meetings between NVG managers and Lucent researchers, where ideas are ‘nominated’ for assessment... If the nominated idea is not supported or resourced by any of the businesses, the NVG can develop a business plan for the venture. The business plan would include an exit strategy for the venture, ranging from an acquisition by Lucent, external trade sale, IPO (initial public offering), or license. The initial evaluation stage typically takes two to three months and costs US\$50 000 to \$100 000. Subsequent stages of internal funding reached \$1m. per venture, and in later stages in many cases external venture capital firms are involved to conduct ‘due diligence’ assessments, contribute funds and management expertise. By 2001, 26 venture companies had been created by the NVG, and included 30 external venture capitalists who invested more than \$160m. in these ventures.” (Tidd et al., 2005: 445)

3.3.1 Screen the opportunity

An initial opportunity screen determines whether to proceed with an opportunity by reducing uncertainties through further investigation. The initial opportunity screen will be consecutively approached from an entrepreneurial and a new product development perspective, which will be concluded with a synthesis. Finally, different tools and techniques for the initial screening process are compared.

Screen criteria

From the perspective of the entrepreneur, on average, opportunities with higher expected value are chosen to exploit, in particular as Shane and Venkataraman (2000) identify: when expected demand is high, industry profit margins are high, the technology life cycle is young, the density of competition in a particular opportunity space is neither too low or too high, the cost of capital is low, and population-level learning from other entrants is available. Common decision heuristics used by entrepreneurs in relation to decision making about opportunities are: the degree of fit with the core strategy, knowing the market, trusting the other party, trusting one's gut, and assessing the worst case scenario (Bryant, 2007).

The new product development literature describes that the initial opportunity screen often consist of rough heuristics or rules of thumb (Crawford & Benedetto, 2010). One suggested way to do this, as McGrath (1995) describes is by evaluation: market worth, firm worth, and competitive insulation. Haynie et al. (2009) suggest that the opportunity evaluation process should focus on: attractiveness (i.e. the potential to create a competitive advantage), future-focus (i.e. future gains in case the opportunity would be exploited), first-person assessment (i.e. whether the opportunity is attractive to me, in relation to existing skills, abilities and resources). Based on tenets of the resource based view, Haynie et al. (2009) develop five attributes by which opportunities should be evaluated: rarity, value, limits on competition, imitability, and relatedness.

Synthesizing previous presented literature, three major themes may be identified from both entrepreneurship and new product development scholars. Following McGrath (1995), all authors agree that the opportunity should be screened on: market worth, relatedness (firm worth), and competitive protection (competitive insulation). Market worth is the value which may be appropriated from the opportunity (e.g. future gains, rarity, high expected demand, high industry profit margins, young technology lifecycle, etc.). Relatedness refers to the relatedness to the current competences and strategy of the firm (e.g. attractiveness to existing skills, abilities and resources; relatedness to the firm; learning

potential, etc.). Competitive protection refers to the ability of the organization to gain and sustain a competitive advantage by protecting their business from potential competitors (e.g. imitability).

Principle 9. In order to develop new business opportunities, established organizations should evaluate the opportunity during the initial screen on: market worth (value which may be appropriated from the opportunity), relatedness (relatedness to the current competences and strategy of the firm), and competitive protection (the ability to gain a competitive advantage and sustain it by protecting the business from potential competitors), because these selection criteria have proved to select only the best opportunities.

BOX 8

COMPETITIVE PROTECTION AT AMERICAN TELEPHONE AND TELEGRAPH (ATT)

“On 10 March 1875 Alexander Graham Bell called to his assistant, ‘Mr. Watson, come here, I want you’ – the surprising thing about the exchange being that it was the world’s first telephone conversation. Excited by their discovery, they demonstrated their idea to senior executives at Western Union. Their written reply, a few days later, suggested that ‘after careful consideration of your invention, which is a very interesting novelty, we have come to the conclusion that it has no commercial possibilities . . . we see no future for an electrical toy . . .’ Within four years of the invention there were 50 000 telephones in the USA and within 20 years there were 5 million. In the same time the company which Bell formed, American Telephone and Telegraph (ATT) over the next 20 years grew to become the largest corporation in the USA, with stock worth \$1000/share. The original patent (number 174455) became the single most valuable patent in history.” (Tidd et al., 2005: 470)

Screen process

Several authors in the new product development literature present techniques or tools to be used with the initial screen or evaluation of the opportunity. Cooper (Cooper, 2001) makes a distinction between: benefit and measurement techniques; economic models; and portfolio selection and management models. Due to the lack of sufficient financial data in the “fuzzy front end” of innovation, subjective measures like benefit and measurement tools are better suited than economic models or portfolio selection and management models for initial screening of an opportunity (Cooper, 2001). Crawford and Di Benedetto (2010) agree

with Cooper's (2001) argumentation, and suggest checklists, profile sheets, or scoring models for initial screening.

Principle 10. In order to develop new business opportunities, established organizations should use subjective models or objective models if possible, for the initial screen like checklists, profile sheets or scoring models, because they have proved most effective for the initial opportunity screen.

3.3.2 Evaluate the opportunity

Once developed into a full-fledged concept, Crawford and Di Benedetto (2010) advise companies to do a full screen on their opportunities because: it helps to decide whether to go further or to quit, it helps to manage the process, and it encourages cross-functional communication. The next sections discuss the criteria and the tools which can be used for the full opportunity screen.

Evaluation criteria

Haynie, Shepherd and McMullan (2009) recognize the important role resources play in opportunity evaluation decisions. The evaluation of an opportunity involves the assessment of a future decision on whether to explore the opportunity, and should therefore involve both an evaluation of existing resources and resources needed in the future. Hall and Hofer (1993) categorize venture capitalists' investment decision criteria in: venture capital firm requirements, characteristics of the proposal, characteristics of the entrepreneur/team, nature of the proposed business, economic environment of proposed industry, and strategy of the proposed business (the criteria can be found in Table 10, Appendix I). Not all criteria venture capitalists use are relevant for an established firm to evaluate their opportunities because venture capitalists usually invest in companies to gain significant financial returns when they sell their stocks in a venture after a few years, and thus omits strategic returns. Cooper (2001) makes up a well-crafted list of evaluation criteria based on a synthesis of criteria from leading companies, divided in the categories: strategic, product advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk versus return (see the full list in Table 11, Appendix I).

Principle 11. In order to develop new business opportunities, established organizations should evaluate the opportunity during the thorough evaluation on criteria from the categories: strategic, business (product or service) advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk return, because these criteria are recognized as being important for a thorough opportunity evaluation.

BOX 9

EVALUATING MARKET SIZE OF EMERGING BUSINESS OPPORTUNITIES AT IBM

At IBM it was not uncommon that emerging business opportunity teams evaluated the market size for business opportunities wrong. Projections were made widely optimistic which made market size a frequent issue. A common response to how market size was assessed was: *“Well, so far we’ve talked to three customers, and they really liked the product.”* As a response, corporate management pushed emerging business opportunity managers to prevent wishful thinking by careful assessing underlying assumptions (Based on: Garvin & Levesque, 2004).

Evaluation process

Tools and techniques for evaluating new product development opportunities have a rich history in literature. Tools and techniques identified by Whitney (2007) to select opportunities are: peer review, scoring, mathematical programming (optimization and simulation), economic models, decision analysis, interactive methods, artificial intelligence, and portfolio optimization. Crawford and Benedetto (2010) present an even more elaborated overview of the evaluation system, including common techniques for new product development (see Figure 25, Appendix I). As some authors mention (e.g. Cooper, 2001; Crawford & Benedetto, 2010), a distinction between must-meet and should-meet criteria can be made. However, scoring models offer a greater deal of flexibility as different weights can be assigned to the attributes, and once scored on a scale resulting in a relative score. Scoring models do not have the risk of killing a project when it scores badly on one criterion (Cooper, 2001). Crawford and Benedetto (2010) emphasize that the scoring should a multi-person evaluation in order to prevent a single person bias.

- Principle 12.** In order to develop new business opportunities, established organizations should use scoring models for the thorough evaluation of a project, because they have proved most effective by preventing opportunities from being killed based on a single criteria and allow comparison of different opportunities.
- Principle 13.** In order to develop new business opportunities, established organizations should make sure the thorough evaluation involves multiple persons, because this will prevent a single person bias.

BOX 10

EVALUATION AT NORTEL NETWORKS

“Nortel Networks is a leader in a high-growth, high-technology sector, and around a quarter of all its staff are in R&D, but it recognizes that it is extremely difficult to initiate new businesses outside the existing divisions. Therefore in December 1996 it created the Business Ventures Programme (BVP) to help to overcome some of the structural shortcomings of the existing organization, and identify and nurture new business ventures outside the established lines of business: ‘The basic deal we’re offering employees is an extremely exciting one. What we’re saying is “Come up with a good business proposal and we’ll fund and support it... The BVP selects the most promising venture proposals which are then presented jointly by the BVP and employee(s) to the advisory board. The advisory board applies business and financial criteria in its decision whether to accept, reject or seek further development, and if accepted the most appropriate executive sponsor, structure and level of funding. The BVP then helps to incubate the new venture, including staff and resources, objectives and critical milestones.” (Tidd et al., 2005: 426)

3.3.3 Design principles for opportunity selection

The design principles, examples of empirical studies and examples of underlying theories for selecting (new business development) opportunities can be found in Table 4.

Table 4: Design principles for opportunity selection

Design Principles for Opportunity Selection	Examples of empirical studies the principle is grounded in	Examples of underlying theories
7. In order to develop new business opportunities, established organizations should perform at least two opportunity screens: (1) an initial screen to determine further investigation, and (2) a thorough evaluation once the opportunity is developed into a business-case, because they prevent radical innovation opportunities from being ignored, and make sure that only the best opportunities are selected.	Hall & Hofer (1993)	Opportunity, venture capital, new product development (M. Rice et al., 2001)
8. In order to develop new business opportunities, established organizations should make the distinction between evaluation of a single project and portfolio evaluation, because they are both important but very different evaluations.	Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
9. In order to develop new business opportunities, established organizations should evaluate the opportunity during the initial screen on: market worth (value which may be appropriated from the opportunity), relatedness (relatedness to the current competences and strategy of the firm), and competitive protection (the ability to gain a competitive advantage and sustain it by protecting the business from potential competitors), because these selection criteria have proved to select only the best opportunities.	Shane & Venkataraman (2000), Bryant (2007), McGrath (1995), Haynie et al. (2009)	Entrepreneurship (Shane & Venkataraman, 2000), new product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
10. In order to develop new business opportunities, established organizations should use subjective models or objective models if possible, for the initial screen like checklists, profile sheets or scoring models, because they have proved most effective for the initial opportunity screen.	Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
11. In order to develop new business opportunities, established organizations should evaluate the opportunity during the thorough evaluation on criteria from the categories: strategic, business (product or service) advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk return, because these criteria are recognized as being important for a thorough opportunity evaluation.	Hall & Hofer (1993), Cooper (2001)	Venture capital (Hall & Hofer, 1993), new product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
12. In order to develop new business opportunities, established organizations should use scoring models for the thorough evaluation of a project, because they have proved most effective by preventing opportunities from being killed based on a single criteria and allow comparison of different opportunities.	Whitney (2007), Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
13. In order to develop new business opportunities, established organizations should make sure the thorough evaluation involves multiple persons, because this will prevent a single person bias.	Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)

3.4 Opportunity development

Once opportunities are identified and subsequently selected; they must be developed in order to enable the organization to reap its benefits. There are several ways in which opportunities can be developed, and selecting the best way to develop an opportunity is a difficult task. First, different types through which opportunities can be developed are described. Second, selection criteria which help organizations choose the best way to

develop an opportunity are presented. Finally, the last section discusses how to choose the best way to develop an opportunity.

3.4.1 Types of opportunity development

Corporate venturing stems from the verge of corporate entrepreneurship and strategic entrepreneurship, and is geared towards developing new business opportunities for the corporate parent in order to: renew the organizational strategy, diversify the established firm, and commercialize innovations (e.g. Phan et al., 2009; Sharma & Chrisman, 1999). As Dorf and Byers (2008) point out, returns from corporate venturing may be partly financial and partly strategic. The corporate parent may provide financial, physical, intellectual, or human resources to the new business (Dorf & Byers, 2008). Organizations exploit new business opportunities through internal and external processes, which are referred to as internal –and external corporate venturing (e.g. Bakker, W. Jones, & Nichols, 1994; Dunlap-Hinkler et al., 2010; Narayanan et al., 2009; Shane & Venkataraman, 2000; Sharma & Chrisman, 1999). Internal corporate venturing is the development of a business opportunity in an independent organizational unit inside the boundaries of the corporate organization. External corporate venturing refers to the creation of semi-autonomous organizational entities outside the boundaries of the existing organizational domain. External corporate venturing may include, or result from: corporate venture capital investments, licensing, strategic alliances / joint ventures / platforms, and acquisitions of entrepreneurial firms (Keil, 2002; Miles & Covin, 2002; Sharma & Chrisman, 1999). Besides being included in or being a predecessor from external corporate venturing, corporate venture capital, licensing, strategic alliances, joint ventures, platforms, and mergers & acquisitions are also other ways of realizing organizational renewal, diversification, or innovation. Spin-offs created by the parental organization (new ventures) are often included in the internal corporate venturing definition, with a varying degree of autonomy; however, they may also be included under the definition of external corporate venturing. Besides venturing, there is always the option of developing an opportunity inside the domain of an existing business unit. However, new business opportunities often do not fit into the structure and processes of existing business, and thus business units. Figure 5 gives an illustrative overview of the different ways in which opportunities can be developed by a corporate parent in order to create new business. The following sections elaborate on the different ways to develop opportunities: corporate venturing, corporate venture capital, licensing, strategic alliances / joint venture / platforms, and mergers & acquisitions.

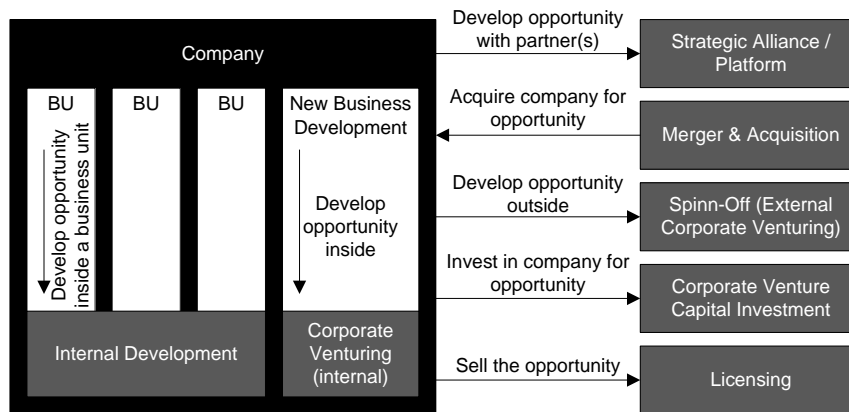


Figure 5: Opportunity development

Corporate venturing

Based on a synthesis of the literature, Sharma and Chrisman (2007: 93) define corporate venturing as: “*corporate entrepreneurial efforts that lead to the creation of new business organizations within the corporate organization. They may follow from or lead to innovations that exploit new markets, or new product offerings, or both. These venturing efforts may or may not lead to the formation of new organizational units that are distinct from existing organizational units in a structural sense (e.g. a new division).*” As becomes clear from the definition, a distinction between internal and external venturing is made, and thus corporate ventures may or may not reside within the domain of the corporation (Sharma & Chrisman, 2007). External corporate ventures remain outside the existing organizational domain as semi-autonomous or autonomous organizational entities (e.g. those formed resulting from joint ventures, spin-offs, venture capital initiatives). In contrast, internal corporate ventures are organizational entities which reside within the domain of the corporation. Internal corporate ventures although residing within the corporate differ from other corporate units on at least four dimensions as explained by Sharma and Chrisman (Sharma & Chrisman, 2007): structural autonomy, relatedness to existing businesses, extent of innovation, and nature of sponsorship.

Based on a review of the literature, Tsai, MacMillan and Low (1991) identify four factors that determine corporate venture success: culture, climate, and corporate support; structure and venturing efforts; planning, monitoring and evaluation; and strategy and environment. Burgelman (1983) recognizes that internal corporate venturing should be organized in a separate business unit. Internal corporate venturing development follows four process stages: conceptual, pre-venture, entrepreneurial, and organizational (Burgelman, 1983). According to (Block & MacMillan, 1995) for an organization to be able to continually identify and select opportunities and consecutively transform them into

profitable new businesses, three organizational elements are crucial: 1) leadership, a unifying vision and strategy; 2) innovation supportive organizational culture; and 3) venturing management skills. Institutionalizing corporate venturing requires the adaptation of the corporate environment and the design of the management of the venturing process, which include: lay the groundwork for venturing; choose ventures; plan, organize, and start the venture; monitor and control the venture; champion the venture; and learn from experience (Block & MacMillan, 1995).

Corporate venture capital

Venture capital is risk capital provided to companies with high potential returns (Barry, Muscarella, Peavy III, & Vetsuypens, 1990). Venture capital can be provided by venture-capital subsidiaries of commercial banks, corporations, and investment banks or by independent venture capitalists (Barry et al., 1990). Investments are usually made in early stage and high technology companies where information asymmetry is largest (Gompers, 1995). The goal of corporate venture capital programs is to extract strategic or financial returns from minority investments in entrepreneurial firms (Souitaris, Zerbinati, & Liu, 2012). Drawbacks from having corporate venture capital investments as a venture are a tight link, which may imply constraints from accessing other sources of funding (Park & Steensma, 2012). However, as Park and Steensma (2012) reason, money remains the same, different type of investors may have other demands and may vary in their ability to provide other non-financial resources which may substantially influence new venture performance. Park and Steensma (2012) found, that when a new venture requires specialized complementary assets, the benefits of a corporate venture capital investor outweigh the ability to access capital on the open market. Corporate venture capital programs are organizational subunits of corporations created to enter an environment with different norms (the venture capital industry). Being in two different “worlds” as Souitaris et al. (2012) explain is problematic due to having to resolve competing institutional forces of their parent, industry, or market of entry.

Licensing

Licensing is one of the most important technology transfer methods between firms, which can also be seen as a commercialization strategy for technology (Kollmer & Dowling, 2004). Licensing agreements are recommended to profit from technological innovations, especially in case of strong appropriability regimes (Teece, 1986). As Kollmer and Dowling (2004) recognize, licensing agreements are used by young firms to exploit technological innovations

in alliances with larger partner firms. The open innovation paradigm (Chesbrough, 2003a) reasons that in large established firms technological innovations often remain unused, from which value can be created via licensing. When a technology seems unusable for an organization, it might be useful for someone outside the company. License agreements are thus both a way of value creation, and a source of value creation.

Strategic alliances, joint ventures and platforms

Alliances can be defined as: “an association between two or more firms that agree to cooperate with one another to achieve mutually compatible goals that would be difficult for each to accomplish alone” (Byers, Dorf, & A. Nelson, 2010: 91). Alliances can be classified from a high level of interdependence to a low level of interdependence: joint ventures, minority holdings, joint R&D agreements, customer supplier relations, bilateral technology flows (e.g. cross licensing), and unilateral technology flows (e.g. licensing) (De Man, 2004). In a strategic alliance, while cooperating, corporations remain their distinct corporate identity (Van de Vrande, Vanhaverbeke, & Duysters, 2009). Joint ventures are strategic alliances, in which corporations collaboratively create a new corporate identity. Alliances create value, however, it is widespread recognized that the value creating process in alliances is inherently difficult, as evidenced by a large fraction of failing alliances (Anand & Khanna, 2000). Strategic alliances are according to the resource based view one way to fill resource gaps created by corporate entrepreneurial activities (Teng, 2007). Teng (2007) compares alternative approaches for filling these resource gaps: internal development, resource acquisition in factor markets, acquisitions (of entire firms), and strategic alliances (see Table 12, Appendix I). The most fundamental reason behind strategic alliances is accessing valuable and essential resources (Das & Teng, 2000) and creating relational rents (Dyer & Singh, 1998). In order to create value for corporate entrepreneurship, strategic alliances should meet the conditions of: heterogeneity, ex ante and ex post limitations to competition, and imperfect mobility. While there are many alliance types, Teng (2007) focuses on three common alliance types – joint ventures, R&D alliances, and learning alliances – in explaining the specific ways in which they help carry out the corporate entrepreneurship activities: innovation, corporate venturing, and strategic renewal. Rationales for strategic alliances and mergers & acquisitions are: sharing costs and risk associated with R&D, gaining access to complementary resources, reducing time-to-market, and having radar for new technologies (Van de Vrande et al., 2009). Pros and cons of strategic alliances or mergers & acquisitions are: a high level of flexibility (which is even larger for a strategic alliance), maintaining a high level of control (which is larger for joint ventures than for strategic alliances, and highest for

mergers & acquisitions). Furthermore, strategic alliances are highly reversible and do not require equity investments.

Mergers & acquisitions

Organizations acquire other companies in order to obtain resources, or get access to specific markets. Organizations can grow organically or by acquisitions (Delmar, Davidsson, & Gartner, 2003). Mergers and acquisitions are often used in one breath or sentence, for that the difference is hard to define. Mergers are two firms merging into one, when a firm is acquired it gets integrated into the parent firm. Being significantly different, news usually announces another merger while in fact a firm is acquired by another. There is always a power difference, as one organization inevitably turns out to be more influential, which is why some researchers treat mergers and acquisitions interchangeably (Ullrich, Wieseke, & Dick, 2005). Although mergers and acquisitions are very popular, many seem to fail (Barkema & Schijven, 2008). One of the frequently mentioned reasons of failure is the complexity of intertwined and complex sub activities such as: due diligence, negotiation, financing, and integration (Barkema & Schijven, 2008). Kogut (1991) reasons that firms create joint ventures as a real option to future market or technological developments. The option is often triggered by acquiring the venture in response to a market signal indicating a significant change in its valuation. Singh and Montgomery (1987) identify three motives for organizations to merge: unrelated diversification, pure consolidation, and related diversification. Trautwein (1990) goes a step further and identifies seven theories explaining motives for mergers: efficiency theory, monopoly theory, raider theory, valuation theory, empire-building theory, process theory, and disturbance theory. Wright, Kroll, Lado, and Van Ness (2002) sum up motives for acquisition: desire for synergy, value extraction because of inefficient management of target firm, managerial hubris (overestimation of executives that they can manage the firm more profitable), or expectation that the firm expansion will positively influence top management's compensation. Van de Vrande et al. (2009) reason that mergers and acquisitions are usually applied for: controlling market access or supply, reducing risks and costs, consolidating industry positions, filling strategic gaps in existing business, exploring new market and technologies, or rapid market entry. Pros and cons of mergers and acquisitions are: high level of control, low level of flexibility, irreversibility, and costly.

3.4.2 Selection criteria

There are several ways to develop an opportunity, as previously identified. Merely identifying the different ways in which an opportunity can be developed does not suffice when considering the most effective way to develop an opportunity. Scholars identified criteria for selecting the most appropriate way to develop an opportunity, however an overview of is still lacking, as most researchers only use one or two dimensions (see Table 14, Appendix I). The selection criteria for selecting the most appropriate opportunity development mode can be reduced to: corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives (see Table 5).

Table 5: Criteria for selecting the most appropriate way to develop an opportunity

Variable	Author(s)	Definition of variables
Corporate circumstances	Miles and Covin (2002)	Need for control of the venture, the ability and willingness to commit resources to venturing, the entrepreneurial risk acceptance propensity;
Operational relatedness	Burgelman (1984) Dorf and Byers (2008) Schildt, Maula and Keil (2005)	Unrelated, partly related, strongly related; Low, high; Industry relatedness, downstream relatedness, technological relatedness;
Strategic importance	Burgelman (1984) Dorf and Byers (2008)	Very important, uncertain, not important; Low, high;
Uncertainty	Van de Vrande, Vanhaverbeke and West (2009)	Endogenous uncertainty, exogenous uncertainty;
Venturing objectives	Schildt, Maula and Keil (2005) Hill and Birkinshaw (2008) Miles and Covin (2002)	Explorative learning, exploitative learning; Exploiting existing assets and capabilities or exploring new assets and capabilities; Organizational development and cultural change, strategic benefits and real option development, quick financial returns.

Corporate circumstances

Circumstances under which an organization has to decide which development mode is most appropriate are: the need for control of the venture, the ability and willingness to commit resources to venturing and the entrepreneurial risk acceptance propensity. When there is a low need for control, a low willingness or ability to invest resources into the venture, or a low acceptance to entrepreneurial risk, Miles and Covin (2002) conclude that it is better to make indirect investments into the venture via a venture capital fund instead of directly investing into the venture. If the corporate's need for control is high, direct investment into the venture is the most viable option. With a high willingness and commitment to commit resources to the venture or a high acceptance of entrepreneurial risk, both direct and indirect investments into the venture are viable options. When a corporate aims to develop

its organization or aims for cultural change and the propensity to accept entrepreneurial risks is low, the corporate should abandon corporate venturing at all.

Operational relatedness

Whether the opportunity is related to the operations of the corporate parent influences the development mode decision. As becomes obvious from the studies of Burgelman (1984) and Dorf and Byers (2008), the degree of strategic importance and the degree of operational relatedness are important in deciding which type of opportunity development suits the type of opportunity. Dorf & Byers (2008) suggest that in case of high operational relatedness to the organization, an independent corporate venture or a small exploratory project should be initiated. When the opportunity is operationally unrelated, companies should only proceed with an opportunity by spinning in off to a new company when it is really strategically important to the firm, else they should not proceed at all. In similar vein, Burgelman (1984) suggest that in case of high operational relatedness it is better to keep the opportunity development close to the company in the form of direct integration, or a new venture department. In case of an unrelated opportunity it is better to keep a larger distance to –or lower degree of integration with the corporate parent. Schildt, Maula and Keil (2005) emphasize that venture relatedness is an important characteristic in organizational learning and diversification, therefore they use three dimensions on which the external corporate venture may be related to the parent: industry relatedness, downstream vertical relatedness, and technological relatedness. Schildt et al. (2005) suggest that companies seeking to enhance their explorative learning need to find partners beyond their existing customers and with dissimilar technologies. Surprisingly, they found no effect of industry relatedness.

Strategic importance

Apparently, Burgelman (1984) and Dorf and Byers (2008) come to a different conclusion on how to organize the development of a new business opportunity when considering strategic importance. Burgelman (1984) suggests that a more integrated form of organizing is more appropriate when an opportunity is strategically important, e.g. special business unit versus complete spin-off, or direct integration versus nurturing and contracting (considering a strategic important versus a not strategic important opportunity respectively). On the contrary, Dorf and Byers (2008) find a less integrated governance form more appropriate in case of a strategic important opportunity, e.g. an independent corporate new venture or by spinning off to a new company. This difference might be due to the time lag between these

respective publications, as insights and preferences change over time. Furthermore, recent findings by open innovation scholars have indicated that firms should approach their innovation strategy in a more open way instead of doing everything themselves.

Uncertainty

Based on transaction cost economics and real options theory, Van de Vrande et al. (2009) reason how exogenous and endogenous uncertainty affect governance mode decisions. Exogenous uncertainty is unaffected by a firm's actions and largely resolves over time (e.g. environmental turbulence and technological newness). Endogenous uncertainty refers to uncertainty that can be decreased by a firm's actions. Endogenous uncertainty can be seen as relation-specific uncertainty, which is typically caused by dissimilarities among partners (e.g. different knowledge bases or prior cooperation).

Transaction cost economics focuses on minimizing costs of writing contracts and monitoring and enforcing performance (e.g. Coase, 1937; Williamson, 1998). According to the transaction cost theory (Williamson, 1998), transactions can be organized in the market place (external) or in hierarchies (internal). Later, alliances were added as a hybrid form between markets and hierarchies (Williamson, 1998). Scholars range external sourcing tools from full integration (hierarchies) to arms-length transactions (markets): mergers & acquisitions, joint ventures, minority holdings, corporate venture capital investments, and non-equity alliances (e.g. Gulati & Singh, 1998; Hagedoorn & Sadowski, 1999). The choice of governance mode, according to transaction cost economics is based on: 1) the frequency of the transaction, 2) the degree of asset specificity, and 3) the threat of opportunistic behavior. The higher the degree of uncertainty between partners (i.e. endogenous –or relation-specific uncertainty) the higher the need for administrative control. Thus when a firm is facing high degrees of endogenous uncertainty, hierarchies are preferred over market transactions.

The basic premises of real options theory opts that investment can be considered as the creation of an option, which might be exercised at a later point in time (e.g. Amram & Kulatilaka, 1999; McGrath, 1997, 1999; Ron Adner & Levinthal, 2004). New business opportunities are inherently uncertain, as the future value of opportunities is unknown. Real options theory reasons that initial investment decisions can be postponed under conditions of uncertainty, and so commitment to an opportunity can be postponed until the option becomes more tangible (Van de Vrande et al., 2009).

Venturing objectives

The objective to develop an opportunity can be of explorative or exploitative nature (Hill & Birkinshaw, 2008; Schildt et al., 2005) or aim to develop the organization and change its culture, for strategic benefits and real option development, or to gain quick financial returns (Miles & Covin, 2002). Schildt et al. (2005) found that the explorative learning is best facilitated by less integrated governance modes, for which companies should find technical unrelated partners outside of their current customers. For industry relatedness no significant relation to explorative learning was found, which might be explained by stagnation due to similarity which causes both learning enhancements and enforcements of existing organizational routines. Schildt et al. (2005) reason that while close integration between partners should facilitate explorative learning through social interaction due to absorptive capacity, there are several mechanisms which outweigh this effect. First, as explorative learning requires fast adaption to the environment, and less integrated governance modes have greater flexibility and adaptability to change, a less integrated governance mode may be preferred. Second, as unknown strategic importance and unknown operational relatedness (inherent properties of explorative learning) induce uncertainty, a firm should reduce its' asset investments which is in line with transaction cost reasoning. Schildt et al. (2005) conclude that less integrated governance modes are preferred for explorative learning versus exploitative learning which they explain by two mechanisms: first, companies are likely to select less integrated governance modes for risky explorative ventures; second, less integrated governance modes are likely to be less constrained by corporate agendas while tight integration might foster exploitative learning.

In their typology of corporate venture units, Hill and Birkinshaw (2008) make a distinction between an internal versus external locus of the opportunity, and exploration versus exploitation activities of the organization. While exploration and exploitation opportunities can originate from both inside as well as outside the organization, exploration activities are usually focused on traditional R&D, acquisitions, alliances or joint venture, while exploitation activities are usually found as licensing of patents and technologies or bargaining with customers and/or suppliers to increase margins. Hill and Birkinshaw (2008) found that the venture should ensure clear and consistent strategic objectives, and for achieving these objectives, ensure that its network of relationships, venture activities, and management systems are internally consistent. Because the better the venture's alignment of its strategic –and organizational elements, the better the venture's performance. Furthermore, Hill and Birkinshaw (2008) found that ventures geared towards exploitation

seem to have higher survival rates than explorative ventures, which is in line with the exploration exploitation tensions, where corporate top management tends to focus on short term gains from less uncertain exploitative actions.

Miles and Covin (2002) use the three most prominent corporate venturing objectives from their field study for building their framework: organizational development and cultural change, strategic benefits and real option development, and quick financial returns. When the objective of the corporate is to develop organizationally or to change culturally, sources of innovation should be looked for internally. For quick financial returns, external sources of innovation are better suited. If gaining strategic benefits or development of real options is the goal, both internal and external sources of innovation should be consulted.

3.4.3 Develop the opportunity

Established organizations should choose the most appropriate way to develop an opportunity. Established organizations should base their development mode decision on their corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives. Table 6 gives an overview of the selection criteria and how they relate to the development modes.

Principle 14. In order to develop new business opportunities, established organizations should select the most appropriate way to develop an opportunity (i.e. internal development inside a business unit, inside the company via (internal) corporate venturing, with partners via a strategic alliance/ joint venture/platform, acquiring a company, outside the company via a spin-off (external corporate venturing), investing in a company via corporate venture capital investments, or by selling the opportunity via licensing) based on corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives because these selection criteria have proved to be important for selecting the most appropriate opportunity development mode.

Table 6: Opportunity development

	Corporate circumstances			Operational relatedness	Strategic importance	Uncertainty				Venturing objectives		
	Need for control of the venture	Ability and willingness to commit resources to venturing	Entrepreneurial risk acceptance propensity			Environmental turbulence	Technological newness	Technological distance	Prior cooperation uncertainty	Organizational development and cultural change	Strategic benefits and real option development	Quick financial returns
Internal Development	+	-		+	+	-	-	-		x	x	
Corporate Venturing (Internal)	+	+		+	+	-	-	-		x	x	
Strategic Alliance / Joint Venture / Platform	+	+		0	+	+			-		x	x
Merger & Acquisition	+	+		0	+	-	-	-			x	x
Spinn-off (External Venturing)	+	+		0	+	+	+	+			x	x
Corporate Venture Capital Investment	-	-	-	0	+		+	+	-		x	x
Licensing				-	-							x

x relevant, or + high / 0 medium / - low

BOX 11

COMPACT DISC ALLIANCE BETWEEN PHILIPS AND SONY

“Philips had developed the prototype for the CD by 1978, after six years of development, but recognized that it would be difficult for the company to turn the concept into a world standard... Therefore in 1979 Philips approached Sony to form a strategic alliance. Sony was chosen because it had the requisite development and manufacturing capability, and provided access to the Japanese market... Philips had developed the basic prototypes of the recording technologies, but the two firms jointly developed the commercial chips necessary for the modulation, control and correction of the digital signal... In 1982 the CD

was launched in the Japanese market and in Europe and the USA in 1983. Sales of CD players and recording exceeded all forecasts: 3 million players in 1985, 9 million in 1986; a cumulative total of 59 million CD recordings by 1985, and 136 million by 1986.” (Tidd et al., 2005: 287)

3.4.4 Design principles for opportunity development

The design principle, examples of empirical studies and examples of underlying theories for developing (new business development) opportunities can be found in Table 7.

Table 7: Design principles for opportunity development

Design Principles for Opportunity Development	Examples of empirical studies the principle is grounded in	Examples of underlying theories
14. In order to develop new business opportunities, established organizations should select the most appropriate way to develop an opportunity (i.e. internal development inside a business unit, inside the company via (internal) corporate venturing, with partners via a strategic alliance/ joint venture/platform, acquiring a company, outside the company via a spin-off (external corporate venturing), investing in a company via corporate venture capital investments, or by selling the opportunity via licensing) based on corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives because these selection criteria have proved to be important for selecting the most appropriate opportunity development mode.	Miles & Covin (2002), Burgelman (1984), Dorf & Byers (2008), Schildt et al. (2005), Van de Vrande et al. (2009), Hill & Birkinshaw (2008)	Corporate venturing (Block & MacMillan, 1995; Burgelman, 1983; Sharma & Chrisman, 2007; Tsai et al., 1991), venture capital (Barry et al., 1990; Gompers, 1995; Park & Steensma, 2012; Souitaris et al., 2012), Licensing (Kollmer & Dowling, 2004; Teece, 1986), organizational collaboration (Anand & Khanna, 2000; Byers et al., 2010; Das & Teng, 2000; Dyer & Singh, 1998; de Man, 2004; Teng, 2007; van de Vrande et al., 2009), mergers & acquisitions (Barkema & Schijven, 2008; Delmar et al., 2003; Kogut, 1991; Singh & Cynthia A. Montgomery, 1987; Trautwein, 1990; Ullrich et al., 2005; van de Vrande et al., 2009)

4

DESIGN OF A NEW BUSINESS DEVELOPMENT APPROACH FOR ASML

“Once the problem was stated, its solution came to me in a flash”

Anton (Anthony) Fokker

This chapter describes the design of a new business development approach for ASML. Before designing a solution, the first section describes an exploration of the problem context. The second section describes the requirement for the design. Third, an overview of the design solution is presented. The design is based on the design principles (empirical studies and underlying theories can be found Appendix II) and the design parameters (their definition, value and application for ASML can be found in Appendix II). The design solution for the identification, selection, and development of (new business development) opportunities in established organizations is presented in section four, five and six respectively. At the end of these sections a specific description for ASML is presented.

4.1 Context

Started in 1984 as a joint venture between Royal Philips Electronics and Advanced Semiconductor Materials International (ASMI), ASML is one of the world’s leading providers of lithography systems for the semiconductor industry, manufacturing complex machines

that are critical for the production of integrated circuits or microchips⁵. ASML has its headquarters in Veldhoven, the Netherlands, and is traded on both Euronext Amsterdam and NASDAQ. Its mission is: “To provide leading-edge imaging solutions to continuously improve our customers’ global competitiveness.” By designing, developing, integrating, marketing, and servicing complex systems, ASML helps world’s major chipmakers in more than 55 locations in 16 countries reducing the size and increasing functionality of microchips, and consumer electronic equipment. With almost 8000 employees on its payroll (expressed in full time equivalents), ASML reports, after just closing the first quarter, to be on track for a EUR 2.4 billion net sales for the first half of 2012⁶. In 2011, ASML reports net sales of EUR 5651 million with a gross margin of 43% resulting in a profit of EUR 1467 million (ASML Holding N.V., 2011). By investing EUR 590 million in R&D, ASML strengthens its growth strategy for profitable growth by securing leadership in technology, cost of ownership and customer service, while maintaining a flexible cost structure, a high market share and a low break-even point.

In order to keep up the pace of Moore’s law with which the semiconductor industry is changing, ASML invests in their customer focus, technology leadership, and operational excellence. For the high valued products, customers expect the right product with excellent services, which ASML ensures by focusing on the long-term relationship. The lithography scanners need continuous improvement on the resolution, the speed, and the precision. To realize the high paced technological improvements, ASML invests significant long-term investments in R&D which are not significantly influenced by short-term cyclical swings in the market. ASML is able to realize the high paced technological improvements by securing its technological leadership in very precise engineering, which includes system engineering, system architecture, and nanometer fabrication. ASML’s business model focuses on value of ownership, which is based on outsourcing production of a significant part of components and modules used to partnerships. ASML’s value sourcing strategy is based on: maintaining long-term relationships with suppliers; sharing risks and rewards with suppliers; dual sourcing of knowledge, global together with partners; and single, dual or multiple sourcing of products, where possible or required.

ASML’s annual report of 2011 describes the main risks ASML is facing split-up by: strategic risks; risks related to the semiconductor industry; governmental, legal and

⁵ <http://www.ASML.com>

⁶ Pressrelease, April 18, 2012, <http://www.ASML.com>, entitled: “ASML Announces 2012 First Quarter Results; ASML Reiterates H1 2012 Expectation, Sees Stable Sales in Q3”

compliance risks; operational risks; financial risks; and risks related to ASML's ordinary shares (Table 9, Appendix I, gives an overview of risks faced by ASML). One of the most notable risks faced by ASML is the small number of products and the small number of clients from which most revenues are derived. The number of units sold in 2011 was 222 and for 2010 this was 197 with an average selling price of EUR 22 million and EUR 19.8 million respectively. In 2011 ASML's largest customer was good for 23.2 percent of net sales compared to 28.2 percent in 2010. Furthermore, the semiconductor industry is historically highly cyclical with sales depending for a large part on capital expenditures by semiconductor manufacturers.

ASML should develop new business opportunities in order to stay alive on the long run. With EUR 2.4 billion net sales in the first half of 2012 and almost 8000 employees on its payroll, ASML is considered a large established organization. ASML is a non-diversified international organization with only one product-market combination for that it provides leading-edge imaging solutions, by designing, developing, integrating, marketing, and servicing complex systems to help world's major chipmakers in more than 55 locations in 16 countries reducing the size and increasing functionality of microchips, and consumer electronics. Being a non-diversified large established organization, ASML has a strategy and new business development department (entrepreneurs do not have such a specialized department and are even more limited in their available budgets). ASML should not fully integrate new business development efforts throughout the whole organization, but start on a smaller scale with a specialized dedicated entrepreneurial team (on the contrary, diversified organizations, also called innovation powerhouses, have developed very effective ways to develop new business by integrating new business development efforts throughout the whole organization through established routines and operating procedures), as ASML is not aiming to become a major diversified organization with many products, but aspires to diversify a second strong leg beside its current business.

4.2 Requirements

One of the most noticeable risks ASML is facing is the small number of products and the small number of clients from which most revenues are derived (ASML Holding N.V., 2011). Furthermore, the semiconductor industry is historically highly cyclical with sales depending for a large part on capital expenditures by semiconductor manufacturers (ASML Holding N.V., 2011). ASML may be able to reduce these risks by developing new business

opportunities, which increases the number of products and clients and reduces the overall influence of the cyclicity in case of developing into another industry. The requirements for the new business development approach for ASML are therefore:

- 1. The design should give ASML an overview of approaches on how to develop new business opportunities;**
- 2. The design should be user friendly for new business development managers at ASML;**
- 3. The design should fit in the corporate culture and strategy of ASML;**
- 4. The design focuses on new business development, and not on commercializing innovation in the current product market combinations or on organizational strategic renewal;**
- 5. The design should provide an organization with tools to approach the identification, selection, and development of (new business development) opportunities, the tools will require careful consideration and interpretation by experts.**

4.3 Design solution

The design solution for new business development is structured according to the new business development process which consists of three steps (see Figure 6, the numbers correspond to the design principles on which the underlying processes are based): opportunity identification (prepare, create, involve), opportunity selection (screen, evaluate), and opportunity development (develop). The design solution consists of an approach for:

1. How opportunities should be identified: who should identify opportunities, in which markets, how the opportunity should be related to the organization, the processes the organization can apply, and whether to involve people from outside the organization;
2. How opportunities should be evaluated: when to evaluate the opportunity, which criteria should be used, and which methods can be applied;
3. How opportunities should be developed: which opportunity development mode is best suited in which situation.

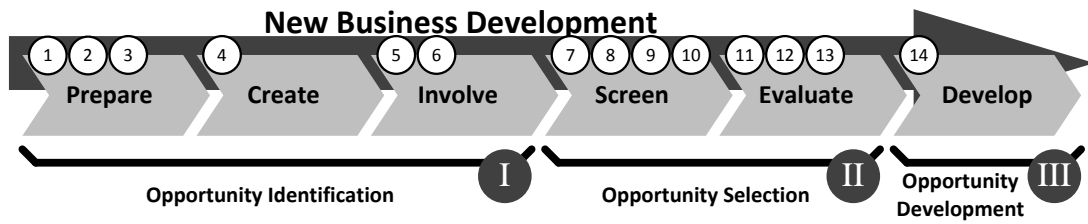
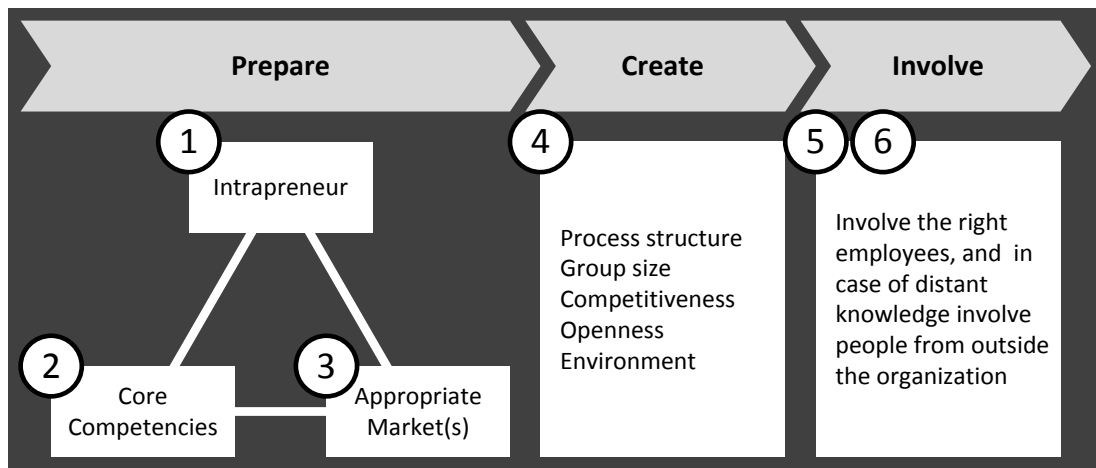


Figure 6: New business development process stages

4.4 Design for opportunity identification

Based on the design principles (see Table 3 in §3.2.6 or a complete overview in Appendix II), a solution is designed for identifying new business development opportunities in established organizations. Figure 7 shows the design for the opportunity identification process which consists of three sub processes: prepare, create and involve. The numbers in the figure correspond to the respective design principles.



First, the preparation involves identifying intrapreneurs, core competencies and appropriate market(s). Second, a process to identify opportunities is chosen based on the: process structure, group size, competitiveness, openness and environment. Third, the organizations should involve the right people.
Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.

Figure 7: Opportunity identification: prepare, create and involve

ASML SPECIFIC

DESIGN FOR OPPORTUNITY IDENTIFICATION

ASML should identify people with entrepreneurial skills and the right absorptive capacity to be able to identify, select, and develop opportunities. The core competences of ASML

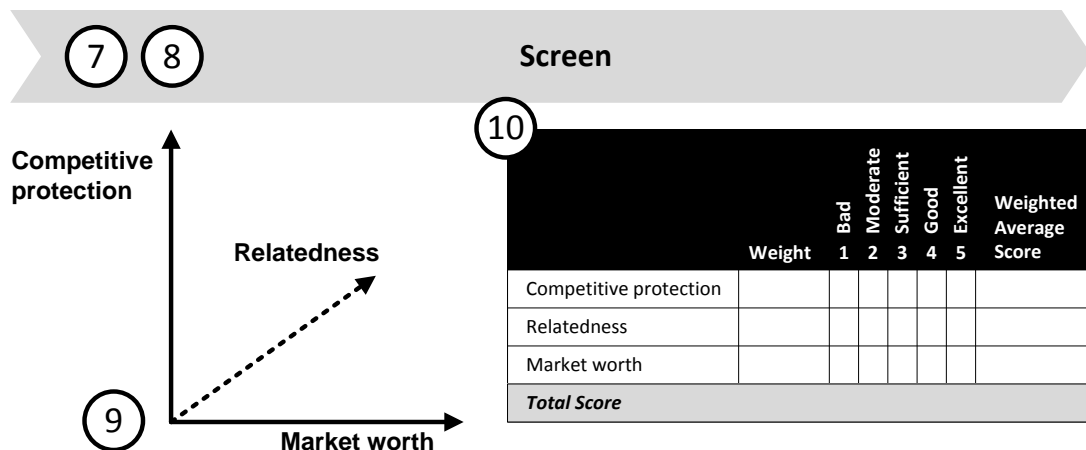
are very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. ASML should identify appropriate markets in which ASML is able to use its core competences when exploring a new business opportunity because this enables ASML to create synergies and spread risk.

ASML should use an intuitive process structure for that logical processes for new business development have not yet been developed, and existing logical processes are better suited for new product development than for new business development. ASML should use teams rather than individuals because entrepreneurial teams have proved to be more successful, and groups are more creative than individuals. ASML should start initially with a collaborative process, as competitive processes like a business-plan competition or idea competition require a certain entrepreneurial innovative sense among involved employees. Employees within a successful non-diversified company are likely to experience difficulties when trying to think outside the scope of their organization. In a later stage, when gained more experience with entrepreneurial processes, ASML could start with a small scale business-plan competition with a small selected group of highly talented entrepreneurial people. ASML should use a selected group of people instead of an open call, are better suited for specific problem solving, and in case of identifying opportunities, require a certain entrepreneurial sense among employees (which is higher for companies diversified into many businesses). ASML should use an offline environment, as online environments are better suited for crowdsourcing initiatives involving many people on diverse locations. Therefore, ASML should use a creative process which is intuitive, involves a small selected group of entrepreneurial people, in an offline environment. Initially, ASML should start with a collaborative process such as a brainstorm and in a later stage experiment with a small scale competitive process.

ASML should involve selected employees in their opportunity identification process, because employees are a well-known source of innovation, and have the best knowledge about the core competencies of ASML. When the distance to the required knowledge is large (which is likely for new business development), ASML should involve selected people from outside the organization who are experts on the required field of knowledge.

4.5 Design for opportunity selection

Based on the design principles (see Table 4 in §3.3.3 or a complete overview in Appendix II), a solution is designed for selecting new business development opportunities in established organizations. While thorough evaluation on both the portfolio level as well as on single project level is important (Cooper, 2001), this thesis takes the perspective of a single opportunity and not a strategic portfolio perspective because the focus is on new business development opportunities per se and not on the other activities of the organization. The opportunity selection process consists of two stages, an initial screen of the opportunity to determine further development, and sub sequential a more thorough evaluation. Figure 7 shows the design for the opportunity screen and Figure 9 show the design for the more thorough opportunity evaluation. The numbers in the figure correspond to the respective design principles.



Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. Multiply the relative weight with the score to obtain the weighted average score. Sum all individual weighted average scores to obtain the total score. The higher the score, the better the opportunity!

Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.

Figure 8: Opportunity selection: screen

7 8 11 12 13 Evaluate							
	Weight	Bad 1	Moderate 2	Sufficient 3	Good 4	Excellent 5	Weighted Average Score
Strategic:							
Degree to which project aligns with the business's strategy							
Strategic importance of project to the business							
Product/Service Advantage:							
Extent to which the new product...							
Offers unique benefits to users/customers (not available on competitive products/services)							
Meets customer needs better than competitive products							
Provides excellent value for money to the customer							
Market Attractiveness:							
Market size							
Market growth rate							
Competitive situation (tough, intense, prize-based competition is a low score)							
Synergies (Leverage Core Competencies):							
Leverages our business's marketing, distribution, and selling strengths/resources							
Leverages our technical know-how, expertise, and experience							
Leverages our manufacturing/operations capabilities, expertise, and facilities							
Technical Feasibility:							
Size of the technical gap (small gap is a high score)							
Complexity of the project, technically (less complex is a high score)							
Technical uncertainty of outcome (high certainty is a high score)							
Risk versus Return:							
Expected profitability (magnitude: NPV in \$)							
Percent return (IRR% or ROI%)							
Payback period (or BET) how fast you recover your initial expenditure/investment (years)							
Certainty of return/profit/sales estimates (from "pure guess" to "highly predictable")							
Degree to which project is low cost and fast to do							
Total Score							
Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. Multiply the relative weight with the score to obtain the weighted average score. Sum all individual weighted average scores to obtain the total score. The higher the score, the better the opportunity!							
<i>Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.</i>							

Figure 9: Opportunity selection: evaluate

ASML SPECIFIC

DESIGN FOR OPPORTUNITY SELECTION

ASML should perform at least **two screens** in order to prevent radical opportunities from being killed. By means of a scorecard, the opportunity is initially screened on competitive protection, relatedness, and market worth. **Competitive protection** measures the degree to which ASML is able to sustain their gained competitive advantage. If ASML is able to

acquire a large market share, but cannot sustain this by for example a large threat of imitation competitive protection scores one out of five. ASML scores a five out of five in its current industry, as ASML is able to sustain its competitive advantage very well.

Relatedness refers to the relatedness to the core competencies of ASML. ASML core competencies are very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. A low relatedness scores one out of five, and a high relatedness scores five out of five. A high relatedness to the core competencies of ASML is achieved when competition in the opportunity's industry is based on the same competencies as ASML's core competencies.

Market worth refers to the value which can be appropriated from the opportunity, a small market worth scores one out of five and a high market worth scores five out of five. Market worth is computed by market size (total sales) multiplied with market share (percentage expected market share). Market worth is equal to the potential profit a company can make. ASML aims for a second strong leg, therefore, a high score on market worth would be equal to the average net income of ASML which is \$650 million for the past 9 years (ASML's net income for the years 2003 till 2011 in dollars are -\$156.53M, \$318.95M, \$368.62M, \$824.47M, \$1B, \$449.84M, -\$216.54M, \$1.37B, \$1.9B). Therefore, a high score on market worth (five out of five) is equal to a future potential market worth of approximately \$ 650 million.

For ASML, relatedness is the most important factor which therefore gets a weight of 80% compared to the market worth (10%) and competitive protection (10%). However, high scores on all three factors are **must-meet** criteria instead of should-meet criteria for ASML to continue with an opportunity.

ASML should be careful to aim at a too large market worth (for that pursuing too mature markets is one of the most common mistakes among companies pursuing innovation, and for that the value of radical innovations will only become apparent after a while). Furthermore, long term opportunities may have a more uncertain market value than medium term opportunities because it may take further development and time before the actual value becomes apparent. Starting with new business development, ASML should perform a single project evaluation, as a diversification portfolio does not exist.

Once selected, the opportunity continues after further development to the more **thorough evaluation**. The thorough evaluation is also a scorecard based evaluation, but

is more extensive than the initial screen. Besides measuring market worth (market attractiveness), relatedness (synergies), and competitive protection (competitive situation, product/service advantage), it also measures strategic fit, technical feasibility, and risk versus return. The more thorough evaluation determines whether a project continues from the discovery phase to the actual incubation of the opportunity.

4.6 Design for opportunity development

Based on the design principles (see Table 6 in §3.4.4 or a complete overview in Appendix II), a solution is designed for selecting the most appropriate new business development opportunity approach for the established organizations. Figure 10 shows the design for the opportunity development process. The number in the figure corresponds to the respective design principle.

ASML SPECIFIC

DESIGN FOR OPPORTUNITY DEVELOPMENT

ASML should determine the best development option per opportunity based on the corporate circumstances, operational relatedness, strategic importance, uncertainty and venturing objectives. Opportunities scoring high on external corporate venturing modes, with or without partners or which may include acquiring a company, are most likely to lead to successful new business development on the medium or short term because opportunities fitting in the other development modes (opportunities developed via internal development or internal corporate venturing are likely to be found in current product market combinations instead of new business development opportunities, furthermore selling an opportunity via licensing is likely to yield licensee fees instead of starting with new product market combinations).

After the preliminary alpha-test in the ABC industry, two opportunity development mode selection criteria were added: availability and transaction costs.

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	Not important					Important					Weight	Weighted Average score	Internal Development	Corporate Venturing (Internal)	Strategic Alliance / Joint Venture / Platform	Merger & Acquisition	Spinn-off (External Venturing)	Corporate Venture Capital Investment	Licensing										
	1	2	3	4	5																								
Do you need control over the venture?													1	1	1	1	1	-1											
Do you have the ability and willingness to commit resources to venturing?														1	1	1	1	-1											
Are you willing to accept entrepreneurial risk?													-1						-1										
Is the opportunity operationally related to the company?													1	1	0	0	0	0	-1										
Is the opportunity strategically important for the company?													1	1	1	1	1	1	-1										
Is the environment of the opportunity turbulent?													-1	-1	1	-1	1												
Is the technology new?													-1	-1		-1	1	1											
Is the technological distant?													-1	-1		-1	1	1											
Are you uncertain about cooperation?															-1				-1										
What is your venturing objective?	A. Organizational development and cultural change												1	1															
													B. Strategic benefits and real option development																
													C. Quick financial returns																
Are there companies that you need? **													-1	-1	1	1	-1	1											
Are transaction costs too high? **													1	1	1	-1	1	1											
Total Score																													
<p>Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. The item: "What is your venturing objective?" is a multiple choice question; choose answer A, B or C which fits the opportunity best and use 5 as a score for this item. Multiply the relative weight with the score to obtain the weighted average score. Then, multiply each score with the factors of the opportunity development modes for each item. Negative factors are reverse scored factors. Sum these scores to obtain the total score for each development mode. The higher the score, the better the opportunity development mode is suited for the opportunity!</p> <p><i>Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.</i></p> <p>** These section criteria were added after the preliminary alpha test on a ASML specific case in the ABC industry</p>																													

Figure 10: Opportunity development: develop

TEST OF THE NEW BUSINESS DEVELOPMENT

APPROACH VIA A CASE FOR ASML

"I didn't fail the test, I just found 100 ways to do it wrong."

Benjamin Franklin

This chapter describes the preliminary alpha test of the new business development approach (the tools from the design solution presented in chapter 4) via a case for ASML. Due to the limited time and scope of this thesis project, a preliminary alpha test was performed by the researcher instead of full α -testing and subsequent β -testing. The ABC industry case for the preliminary alpha test is provided by ASML. Due to confidentiality, details about the new business development case for ASML are not disclosed, and therefore names and figures are changed. The opportunity identification approach cannot be tested via the case, because the researcher derived the opportunities from the provided new business development case. The underlying design principles for opportunity selection and opportunity development are tested by applying the tools from the design solution in a new business development case for ASML (see Figure 11). The test involves a thorough evaluation with limited information available from the case (and thereby illustrates the usage of the tool); while normally a more elaborated business case would have been developed because the thorough evaluation is normally performed at the end of the discovery phase preceding the incubation phase. While the design principles for the identification of opportunities cannot be tested, the first section presents a brief overview of how the tool could have been tested for identifying an opportunity. The second and third sections describe the tests of the opportunity selection –and opportunity development

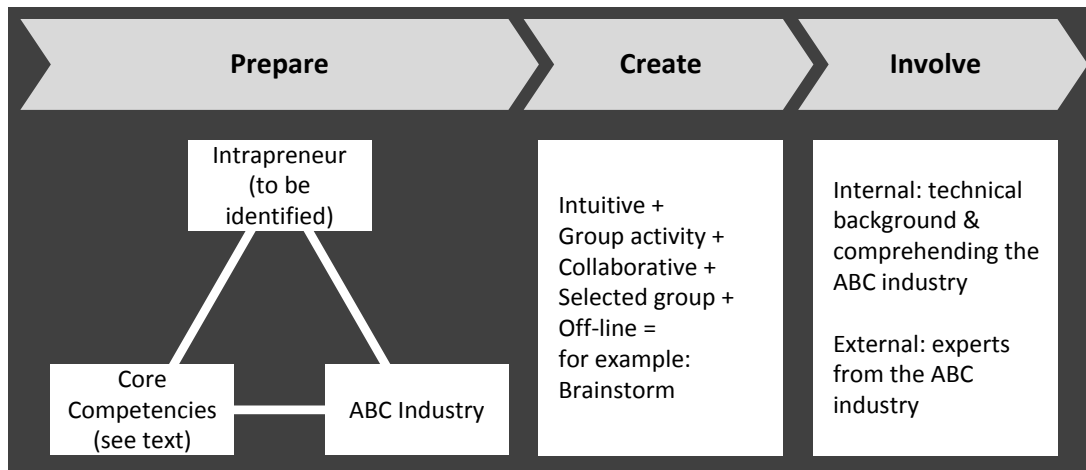
approach. At the end of each section, a short reflection on the new business development approach is presented.

New Business Development		
Design Principle 1		
Opportunity Identification Design Principles 2, 3, 4, 5, 6	Opportunity Selection Design Principles 7, 8, 9, 10, 11, 12, 13	Opportunity Development Design Principle 14

Figure 11: Testing the design principles via a case

5.1 Test of the opportunity identification approach

The approach for the opportunity identification approach was not actually tested via a case for ASML. Nevertheless, this section describes how the tool could have been used for approaching the identification of the opportunity (see Figure 12). The opportunity identification approach prescribes ASML to involve an intrapreneur (to be identified), who should identify an opportunity in the ABC industry which is related to the core competencies of ASML: very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. A brainstorm (or similar process from the same category) should be organized for reasons explained in the design (chapter 4). The brainstorm involves both selected internal people with the right technical background to comprehend the ABC industry, because both the ABC industry and the capabilities of ASML are very complex. The brainstorm also involves experts from the ABC industry because the knowledge distance between the ABC industry and the semiconductor industry is quite large.



First, the preparation involves identifying intrapreneurs, core competencies and appropriate market(s). Second, a process to identify opportunities is chosen based on the: process structure, group size, competitiveness, openness and environment. Third, the organizations should involve the right people.
Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.

Figure 12: Test of an opportunity identification approach: prepare, create and involve

REFLECTION

TEST OF THE OPPORTUNITY IDENTIFICATION APPROACH

The opportunity identification approach is not tested. However, it is described that the preliminary alpha test involves a brainstorm in order to test the design principles underlying the tool from the design solution.

5.2 Test of the opportunity selection approach

Two opportunities were identified from the ABC industry new business development case for ASML. The ABC industry can be segmented into three technology platforms: first generation instruments, second generation instruments, and third generation instruments. First generation instruments still have an installed base, but will these instruments will be replaced with second generation instruments. There are two types of instruments made based on second generation technology: big instruments and medium sized instruments (opportunity A). Third generation technology enables the production of small instruments (opportunity B) but is still in development and has not reached market yet. The opportunities will first be screened, and if passing the screening, continue to the more thorough evaluation.

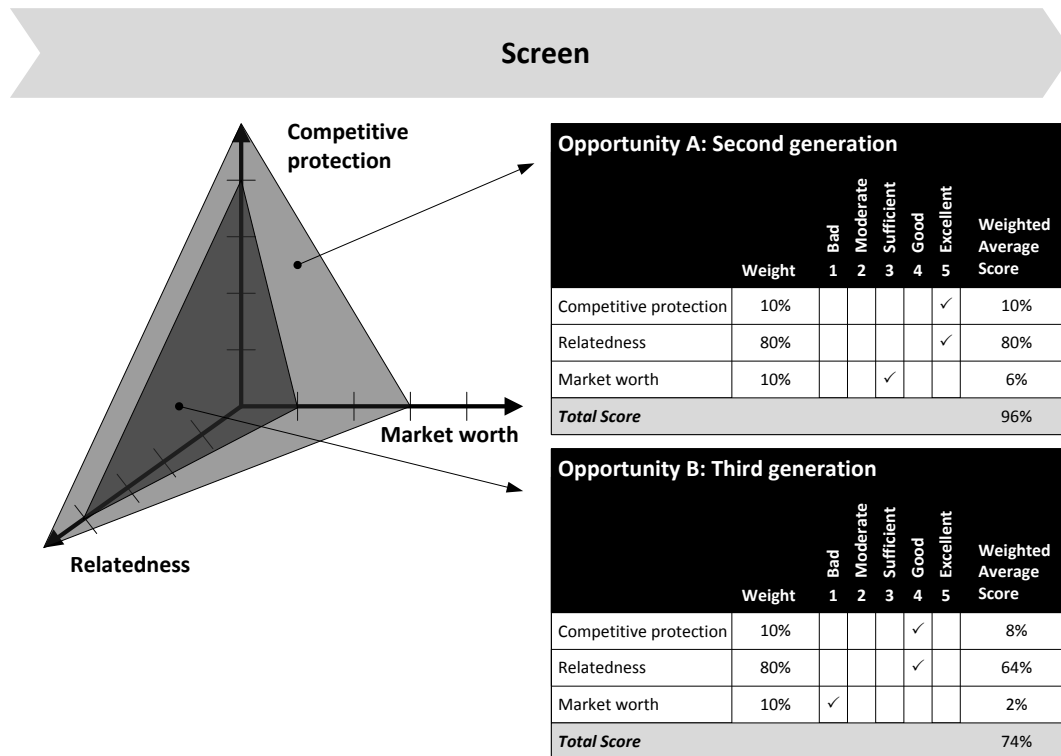
Screen the opportunities

Second generation instruments (**opportunity A**) have a really high reliability. Big instruments are more expensive but also have a higher production capacity, and are targeted at large customers. Medium sized instruments have a medium production capacity and are therefore targeted at medium sized customers. All customers in the second generation ABC industry are businesses, so the opportunity space is in the business to business market. Second-generation instruments can be protected well, which is mainly based on patenting in the ABC industry. The industry is dominated by three companies and so the thread of entry is low (**competitive protection: score five out of five**). Second generation instruments are based on a similar technological process which ASML applies. Therefore, ASML will be able to capitalize on its core competencies of very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. Furthermore, ASML is driven by resolution, speed and precision which is similar to the second generation ABC instrument industry, which is also in a business to business capital intensive equipment market (**relatedness: score five out of five**). The expected market for second generation big instruments is almost \$1.7 billion for 2016. If ASML is able to realize a market share of 20% (the market is currently dominated by three companies), the market would be worth \$ 340 million (**market worth: score three out of five**).

Third generation technologies (**opportunity B**) are still in development and are expected to shake up the industry by making instruments available to small customers. However, third generation technologies are not expected to disrupt the market for second generation technologies (at least in the foreseeable future), as reliability is much lower. Many companies are developing third generation technologies, and competition is expected to increase significantly. Competitive protection is also based on patenting in the third-generation ABC industry. However, the thread of entry is significantly larger, as many companies are actively developing third-generation technologies (**competitive protection: score four out of five**). The market for third generation ABC instruments is driven by selling many products for relatively low prices. Third generation technologies are different from ASMLs core technologies. However, ASML will be able to use to a lesser extent its core competencies of very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers (**relatedness: score four out of five**). Third-generation technologies will disrupt the ABC industry. Small instruments are expected to generate high profits in the future. However the expected

market size for third generation technology is only \$30 million for 2016. A market share of 20% would result in \$ 6 million (**market worth: score one out of five**).

Opportunity A (second generation technology) scores highest in the opportunity screen (see Figure 13). Therefore, opportunity A should continue to the thorough evaluation.



Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. Multiply the relative weight with the score to obtain the weighted average score. Sum all individual weighted average scores to obtain the total score. The higher the score, the better the opportunity!

Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.

Figure 13: Test of the opportunity selection approach: screen

Evaluate the opportunity

The opportunity screen selected opportunity A to continue to the thorough evaluation. Normally, an opportunity will be further explored and a business case will be prepared. Before continuing to incubation, the business case is first thoroughly evaluated. This test includes a thorough evaluation; however, a business case was not prepared. Therefore, the values in the test are subjective estimates by the researcher. Next, a short reasoning is presented for: strategic, product/service advantage, market attractiveness, synergies, technical feasibility, and risk versus return (see Figure 14).

Strategic: While not being the core business, the opportunity has a good alignment with corporate strategy for that ASML can spread its risk by developing a second strong leg

(score four out of five). The opportunity is strategically very important, as ASML is able to spread its risk (score five out of five).

Product / service advantage: Through its drive by resolution, speed and precision, ASML will be able to leverage its core competencies to significantly increase machines performance and thereby outperform its competitors (score five out of five), by offering a better product/service advantage (score five out of five) with an excellent value for customers (score five out of five).

Market attractiveness: The expected market for second generation big instruments is almost \$1.7 billion for 2016. If ASML is able to realize a market share of 20% (the market is currently dominated by three companies), the market would be worth \$ 340 million (score three out of five). The market for second generation instruments grows with a compound annual growth rate of 10%, which is good (score four out of five).

Synergies (leverage core competencies): ASML is driven by resolution, speed and precision which is similar in second generation ABC instrument industry. Second generation instruments are based on a similar technological process which ASML applies. Therefore, ASML will be able to capitalize on its core competencies of very precise engineering, which include: system engineering, system architecture, and nanometer fabrication (score five out of five). Both ASML and second generation ABC industry instruments are in a business to business capital intensive equipment market, and ASML is able to apply its skills for cooperation with a network of suppliers (manufacturing/operations: score four out of five). ASML has no knowledge of second generation ABC industry customers, and while having a business to business sales channel, ASML is still missing competencies here (score two out of five).

Technical feasibility: While the technological processes applied in the ABC industry are quite similar to those applied by ASML, ASML small technological gap due to missing some essential ABC industry skills (score four out of five). The project is complex, but due to synergies, only moderately complex for ASML (score four out of five). The technical outcome of the industry is pretty certain for second generation technologies, as the industry is already maturing (score five out of five).

Risk versus return: The expected market for second generation big instruments is almost \$1.7 billion for 2016. If ASML is able to realize a market share of 20% (the market is currently dominated by three companies), the market would be worth \$340 million (profitability score three out of five). The percent return is expected to be good (score four out of five) and the playback period is sufficient (score three out of five) due to upfront

investments (depending on development mode). The project is not low cost and fast to do, as it includes a relative mature industry (score one out of five). Sales estimates are sufficient, as the market already maturing, but not good as especially attainable market share is not reliably measured (score 3 out of five).

Based on the high score of 79.60%, ASML should continue with the opportunity. However, due to the lack of an extensive business case, many underlying assumptions still need further investigation.

Evaluate							
	Weight	Bad 1	Moderate 2	Sufficient 3	Good 4	Excellent 5	Weighted Average Score
Strategic: (10%)							
Degree to which project aligns with the business's strategy	5%				✓		4.00%
Strategic importance of project to the business	5%					✓	5.00%
Product/Service Advantage: (20%)							
Extent to which the new product...							
Offers unique benefits to users/customers (not available on competitive products/services)	7%					✓	7.00%
Meets customer needs better than competitive products	7%					✓	7.00%
Provides excellent value for money to the customer	6%					✓	6.00%
Market Attractiveness: (20%)							
Market size	7%			✓			4.20%
Market growth rate	7%			✓			4.20%
Competitive situation (tough, intense, prize-based competition is a low score)	6%				✓		4.80%
Synergies (Leverage Core Competencies): (25%)							
Leverages our business's marketing, distribution, and selling strengths/resources	5%		✓				2.00%
Leverages our technical know-how, expertise, and experience	15%					✓	15.00%
Leverages our manufacturing/operations capabilities, expertise, and facilities	5%				✓		4.00%
Technical Feasibility: (10%)							
Size of the technical gap (small gap is a high score)	2%				✓		1.60%
Complexity of the project, technically (less complex is a high score)	2%				✓		1.60%
Technical uncertainty of outcome (high certainty is a high score)	6%					✓	6.00%
Risk versus Return: (15%)							
Expected profitability (magnitude: NPV in \$)	3%					✓	3.00%
Percent return (IRR% or ROI%)	2%				✓		1.60%
Payback period (or BET) how fast you recover your initial expenditure/investment (years)	2%			✓			1.20%
Certainty of return/profit/sales estimates (from "pure guess" to "highly predictable")	2%			✓			1.20%
Degree to which project is low cost and fast to do	1%	✓					0.20%
Total Score (from 0% till 100%) 79.60%							
Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. Multiply the relative weight with the score to obtain the weighted average score. Sum all individual weighted average scores to obtain the total score. The higher the score, the better the opportunity! <i>Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.</i>							

Figure 14: Test of the opportunity selection approach: evaluate

REFLECTION

TEST OF THE OPPORTUNITY SELECTION APPROACH

A reflection is presented on the underlying design principles of the design solution (see Figure 11), which was tested in its original context via a new business development case for ASML.

Design principle 7: The opportunity screen was based on a lot of assumptions. While having very limited knowledge about ASML and about the opportunity in the ABC industry, the opportunity screen enabled the researcher to determine continuation of one opportunity and killing the other. While being effective for selecting the best opportunities for allocating resources for further investigation, deciding to continue to incubation needs a more thorough evaluation. It can therefore be concluded that the findings from the preliminary alpha test are in line with the design principle.

Design principle 8: The design for opportunity selection is based on a single project evaluation instead of a portfolio approach. While the opportunity screen and opportunity evaluation allows comparison between opportunities, they are not effective for evaluating portfolios. Besides comparing opportunities with each other, portfolio evaluations evaluate the portfolio as a whole. Portfolio evaluation is also important for companies, but is out of scope of this report. While the design for opportunity selection is not able to evaluate portfolios, there are other models available which are better suited for the task.

Design principle 9: It was difficult to measure relatedness, because of the limited understanding of the underlying processes at ASML. Defining core competencies better and more extensively would increase the reliability of measuring relatedness. Due to the limited knowledge, it was difficult to assess which market share ASML is able to gain. Therefore, market share is based on the assumption that ASML is able to gain a market share of 20%, which decreases reliability as it is a subjective estimation. ASML should be careful aiming at a too high market worth, because this is one of the fallacies large companies make when selecting opportunities: preferring the mature. Furthermore, market worth for radical innovation opportunities may become apparent only at later stages in its lifecycle.

Design principle 10: Scorecards are very effective, as they allowed both subjective and objective scoring depending on the information available. Because scoring seemed rather

difficult in some instances, measures should be defined better after further experimenting and testing.

Design principle 11: The categories represent the most important characteristics of the new business development opportunity pretty well.

Design principle 12: Scoring models work well for evaluation an opportunity. Making a subjective evaluation is much easier than objectifying the evaluation.

Design principle 13: The test was a single person evaluation of the opportunity based on little information. Because the assessment includes a subjective evaluation, and in some instances quantifying the evaluation by objective data is likely to remain impossible, a multi person assessment is necessary to increase reliability.

5.3 Test of the opportunity development approach

Now that the opportunity for second generation instruments in the ABC industry is selected, the opportunity development approach helps to determine the most appropriate way to develop the opportunity, see Figure 15. First, the opportunity development approach is tested first by applying the tool from the opportunity development design to the case. Second, two missing selection criteria for selecting the most appropriate opportunity development mode are explained. Third, the framework is tested with some typical cases for the different opportunity development modes. Fourth, a simplified flow diagram is used to determine the most appropriate opportunity development mode.

Develop the opportunity

In order to use the tool developed for the opportunity development approach (see Figure 15), several questions need to be answered and scored on a scale from one (not important) till five (important) in order to gain an advice for developing the opportunity. The questions cover the selection criteria identified in the systematic literature review: corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives. The test uncovered two missing selection criteria which were added later.

Corporate circumstances: The ABC market is driven by technology which is protected by patents. The market is ruled by a winner takes it all, so control over the technology is required. Furthermore, having control over the venture is important for ASML

in order to be able to gain a significant long term footprint in the ABC market (*control: score four out of five*). ASML is willing to invest in venturing for an opportunity with large potential (*willingness to venture: score four out of five*). ASML is not willing to take a large risks, however taking a calculated risk is acceptable (*risk acceptance: score three out of five*).

Operational relatedness: As previously described in the opportunity screen and opportunity evaluation, the opportunity has a high operationally relatedness to ASML (*operational relatedness: score four out of four*).

Strategic importance: The opportunity is important for ASML to capitalize, as it has the potential to diversify into another market next to the semiconductor industry and thereby reducing its risk (*strategic importance: score four out of five*).

Uncertainty: With the emergence of third-generation technology, the industry is getting much more competitive, and the thread of entry increases. However, third generation technologies are expected to enter the small instrument market, and due to limited reliability are not able to compete with second generation technology on medium sized instruments and big instruments. The environment for second generation instruments is not changing rapidly, as the market is already stable for a while (*environmental turbulence: score three out of five*). Second generation technology has been around for a few years, but there are still developments based on second generation technologies, for instance the emergence of medium sized instruments (*technological newness: score three out of five*). While being in a completely different industry, a large part of the technology is not distant for ASML, as the underlying technological process is quite similar (*technological distance: score two out of five*). Uncertainty about cooperation has a neutral score for that there are no previous experiences from collaboration with companies in the ABC industry (*cooperation uncertainty: score three out of five*).

Venturing objectives: The objective of the venture is to develop new business for strategic benefits, a second strong leg which mitigates risks (*venturing objective: strategic benefits and real option development*).

Missing selection criteria: ASML is missing competencies, which are very difficult to attain. Furthermore, as three companies dominate the ABC industry, their technological advancements are difficult to catch up with. Also, competitive protection is based on patenting in the ABC industry (*availability or companies that you need: score five out of five*). The three companies dominating the industry are very large companies, acquiring them would involve way too much transaction costs for the purpose of getting access to the required knowledge and patents (*transaction costs: score four out of five*).

Develop																		
	Not important					Important		Weight	Weighted Average score	Internal Development	Corporate Venturing (Internal)	Strategic Alliance / Joint Venture / Platform	Merger & Acquisition	Spinn-off (External Venturing)	Corporate Venture Capital Investment	Licensing		
	1	2	3	4	5	Weight	Weighted Average score											
Do you need control over the venture?				✓		5%	4%	1	1	1	1	1	1	-1				
								4%	4%	4%	4%	4%	4%	2%	3%			
Do you have the ability and willingness to commit resources to venturing?				✓		5%	4%		1	1	1	1	1	-1				
								3%	4%	4%	4%	4%	4%	2%	3%			
Are you willing to accept entrepreneurial risk?			✓			5%	3%	-1							-1			
								3%	3%	3%	3%	3%	3%	3%	3%	3%		
Is the opportunity operationally related to the company?				✓		10%	8%	1	1	0	0	0	0	0	-1			
								8%	8%	6%	6%	6%	6%	6%	4%			
Is the opportunity strategically important for the company?				✓		5%	4%	1	1	1	1	1	1	1	-1			
								4%	4%	4%	4%	4%	4%	4%	2%			
Is the environment of the opportunity turbulent?			✓			5%	3%	-1	-1	1	-1	1						
								3%	3%	3%	3%	3%	3%	3%	3%	3%		
Is the technology new?			✓			5%	3%	-1	-1			-1	1	1				
								3%	3%	3%	3%	3%	3%	3%	3%	3%		
Is the technological distant?		✓				5%	2%	-1	-1			-1	1	1				
								4%	4%	3%	4%	2%	2%	2%	3%			
Are you uncertain about cooperation?			✓			5%	3%			-1				-1				
								3%	3%	3%	3%	3%	3%	3%	3%	3%		
What is your venturing objective?	A- Organizational development and cultural change					20%	0%	1	1									
	B. Strategic benefits and real option development							20%	20%	1	1	1	1	1	1	1	1	
	C- Quick financial returns									0%	0%			1	1	1	1	1
								0%	0%			0%	0%	0%	0%	0%	0%	0%
Are there companies that you need?					✓	15%	15%	-1	-1	1	1	-1	1	1				
								3%	3%	15%	15%	3%	15%	9%				
Are transaction costs too high?				✓		15%	12%	1	1	1	-1	1	1	1				
								12%	12%	12%	6%	12%	12%	9%				
Total score								70%	71%	80%	75%	67%	75%	57%				
Total score on a scale of 0% till 100%								14%	14%	16%	15%	14%	15%	12%				

Fill in a percentage for the relative importance of each item (weight). Then score the items for a specific opportunity. The item: "What is your venturing objective?" is a multiple choice question; choose answer A, B or C which fits the opportunity best and use 5 as a score for this item. Multiply the relative weight with the score to obtain the weighted average score. Then, multiply each score with the factors of the opportunity development modes for each item. Negative factors are reverse scored factors. Sum these scores to obtain the total score for each development mode. The higher the score, the better the opportunity development mode is suited for the opportunity!

Note that the results only give an indication and are not absolute, careful consideration and interpretation by experts is required.

Figure 15: Test of the opportunity development approach: develop

Two missing selection criteria: availability and transaction costs

The first attempt to apply the opportunity development approach resulted in a wrong result. It appeared that two really important factors were missing: availability and transaction costs. Availability refers to the question whether there are companies that you need, availability therefore has a twofold implication. One, whether there are competencies or resources missing that are required to develop the opportunity, and two whether there are companies who have these competencies or resources. Transaction costs are costs that arise due to a transaction. Transaction costs can be too high in two situations, the transaction is inefficient or the price is too high. An example of an inefficient transaction is the situation that arises when necessary competences reside in a small part of a multinational company, acquisition would then entail too high transaction costs (because most part of the company is not needed, and the company is probably way too expensive). An example of a too high price is the situation when a disruptive technological breakthrough emerges, for instance acquisition of a company which found the cure for a life threatening disease.

Testing the framework with typical cases

Besides an ASML specific case test, the opportunity development framework was tested with typical cases for each opportunity development mode. The results can be found in Table 8, and a more thorough evaluation and description of the cases can be found in Appendix IV. The results in Table 8 show that the most appropriate development mode is closely predicted, but not yet reliable.

Table 8: Testing typical opportunity development cases

	Cases							
	A	B	C	D	E	F	G	H
Internal Development (Case A)	18%	18%	13%	13%	15%	13%	11%	12%
Corporate Venturing (internal) (Case B)	17%	18%	14%	13%	15%	13%	12%	11%
Strategic Alliance / Joint Venture / Platform (Case C)	11%	12%	17%	16%	14%	15%	16%	13%
Merger & Acquisition (Case D)	15%	15%	13%	18%	15%	17%	16%	14%
Spinn-off (External Venturing) (Case E & F)	13%	14%	15%	13%	16%	15%	14%	16%
Corporate Venture Capital Investment (Case G)	12%	11%	17%	15%	13%	15%	16%	16%
Licensing (Case H)	13%	13%	11%	12%	13%	13%	13%	18%

The letters of the typical cases are mentioned between brackets behind the development modes. The highest scores should match with the typical cases, which are the underlined percentages. The actual highest scores are bold.

Alternative approach for choosing the most appropriate development mode

Due to an unreliable prediction, the most appropriate development mode for the case for ASML is also determined with a flow diagram (see Figure 16). The flow diagram is based on

the findings from literature. The flow diagram predicts correctly that collaboration is the best alternative for developing the opportunity.

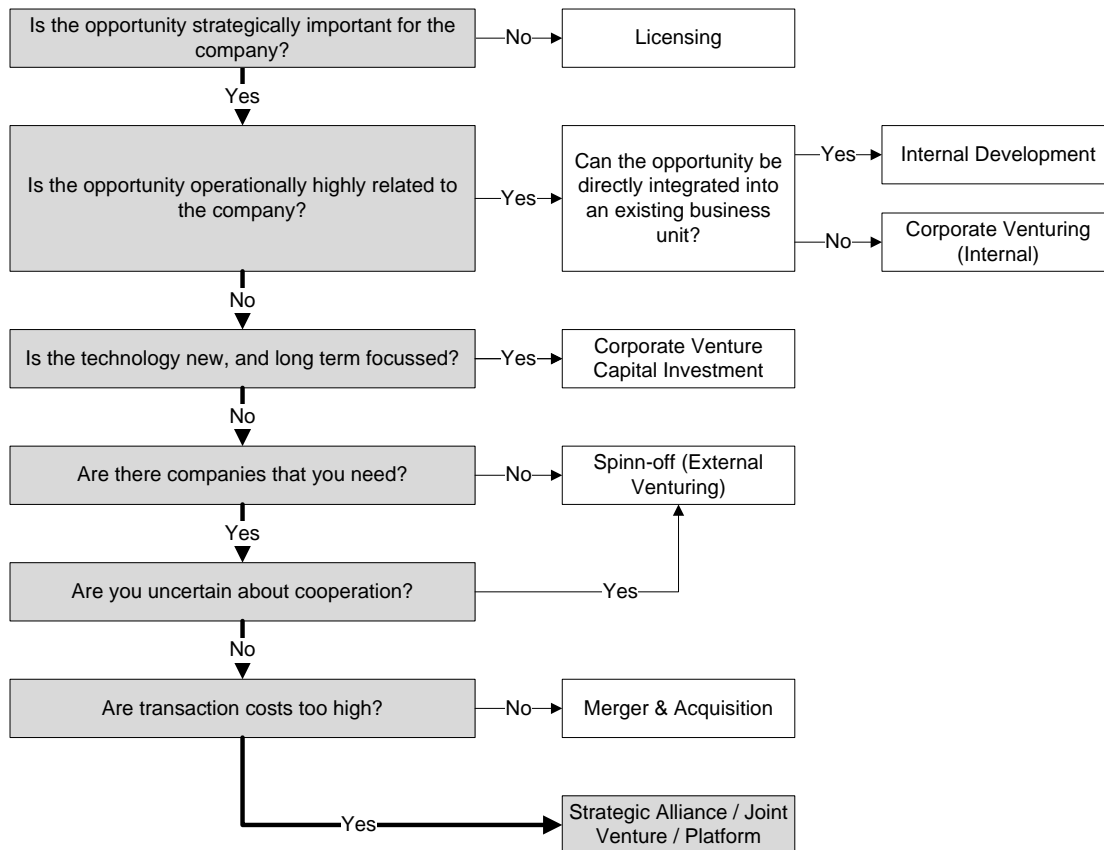


Figure 16: Choosing the most appropriate development mode

REFLECTION

TEST OF THE OPPORTUNITY DEVELOPMENT APPROACH

A reflection is presented on the underlying **design principle 14** of the design solution (see Figure 15), which was tested in its original context via a new business development case for ASML.

The opportunity development approach has the potential of becoming a very useful tool to help companies choose the most appropriate development mode for an opportunity. The test showed that two very important decision parameters were missing, availability and transaction costs. Unreliable results may be explained by a lack of knowledge on how individual decision parameters are correlated with each other. For instance, a company

willing to invest into venturing may be also willing to take entrepreneurial risk.

Also, the importance of individual decision parameters on the decision is unknown. For instance, strategic importance may be more important than operational relatedness on the development mode decision. In the current decision model, a positive effect, a neutral effect or a reversed effect is assumed for individual weights. This might also be different, as for instance strategic importance may have a larger decision impact on the choice for licensing than for other development modes.

The opportunity development approach needs calibration by testing actual opportunities and their chosen development modes through the model, and thereby adjusting the weights, individual weights and score calculation model. When calibrated, the model should also be evaluated by means of calculating the sensitivity of the decision parameters on the decision. This can be done by performing regression analysis on generated values from queries including all possible combinations. Regression analysis can then determine in what direction and how much the decision changes when adjusting one decision parameter and keeping all other decision parameters constant.

The tests were performed by the researcher with limited information. Therefore, many assumptions were posed in order to determine values for selection criteria. The new business development case for ASML still needs a lot of research, including: technical analysis of what ASML can do, how ASML is capable of leveraging its core competencies, analysis of companies active in the second generation ABC industry, exploration of potential collaboration, etc.

6

CONCLUSIONS, CONTRIBUTIONS, IMPLICATIONS, AND LIMITATIONS & FURTHER RESEARCH

“If we are all in agreement on the decision – then I propose we postpone further discussion of this matter until our next meeting to give ourselves time to develop disagreement and perhaps gain some understanding of what the decision is all about.”

Alfred P. Sloan

Once we have stated a prudent question (*Francis Bacon*), the solution came in a flash (*Anton Fokker*) by connecting literature creatively into science-based design principles (*Steve Jobs*), by experimenting (*Albert Einstein*) with a test on an ASML specific case we found that many research opportunities still remain (*Benjamin Franklin*) to gain full understanding of what new business development is all about (*Alfred P. Sloan*). In the next sections the conclusions, contributions, managerial implications, and limitations and further research opportunities are discussed.

6.1 Conclusions

New business development is right on the verge of innovation, strategy and entrepreneurship literature, which is sometimes referred to as strategic entrepreneurship. Strategic entrepreneurship is just emerging but is a highly promising field, as many corporations are struggling with new business development related issues. This thesis takes a first step, in **providing an overview of the new business development process.**

Established organizations should design their new business development process by applying the science-based design principles for opportunity identification (Table 3), opportunity selection (Table 4), and opportunity development (Table 7). Established organizations can apply the science-based design principles by using the set of tools designed to help them approach the identification (Figure 7), selection (Figure 8 and Figure 9), and development (Figure 10) of (new business development) opportunities. This thesis takes a next step in tailoring the tools for ASML, and testing the design solutions in a preliminary alpha test via the ABC industry new business development case for ASML (Figure 12, Figure 13, Figure 14, and Figure 15).

The tool for opportunity identification helps organization approach the identification of opportunities by preparing for opportunity identification, creating the opportunity, and involving the right people. The preparation includes identifying intrapreneurs, core competencies and appropriate markets. Opportunities are identified via a process defined by its: process structure, group size, competitiveness, openness, and environment. Organizations should involve employees and in case of distant knowledge, people from outside the organization.

The tools for selecting opportunities include a tool for the initial screen of an opportunity, and a tool for more thoroughly evaluating the opportunity. The tool for screening the opportunity is a scorecard which screens the opportunity on competitive protection, relatedness, and market worth. The tool for thoroughly evaluation of the opportunity evaluates strategic, product/service advantage, market attractiveness, synergies (leverage core competencies), technical feasibility, and risk versus return.

The tool for determining the most appropriate (new business development) opportunity development mode scores the corporate circumstances, operational relatedness, strategic importance, uncertainty, venturing objectives, availability, and transaction costs. The last two factors were missing, and were only added later while testing.

It can be concluded that new business development remains a challenging task. While the tools help managers, careful interpretation by managers using the tools is still needed. While continuously aiming for judgment substantiated by objective facts, it is not always possible and small differences in subjective judgment lead to different results.

6.2 Contributions

This thesis provides an overview of the new business development process for established organizations. New business development is essential for organizational survival, but existing literature does not provide an overview on how organizations should approach new business development. This thesis focuses on the discovery phase of new business development opportunities including the identification, selection, and development of opportunities. This thesis contributes to existing literature in three ways: **by providing an overview of the new business development process for established organizations; by deriving science-based design principles from an extensive literature review and research synthesis; and by developing and testing tools for the identification, selection, and development of (new business development) opportunities.**

While a very large diversity of literature streams were consulted for establishing the overview of the new business development process for established organizations, two unique contributions to existing literature are added: **process dimensions for the opportunity identification process, and selection criteria for selecting the most appropriate development mode for (new business development) opportunities.** The process dimensions for the opportunity identification approach include: process structure (intuitive or logical), group size (individual or group activity), competitiveness (competitive or collaborative), openness (open call or selected group), and environment (Online or offline environment). Selection criteria for selecting the most appropriate (new business development) opportunity development mode are: corporate circumstances, operational relatedness, strategic importance, uncertainty, venturing objectives, availability, and transaction costs.

6.3 Managerial implications

Managers should **design their new business development process based on the science-based design principles** (Table 3, Table 4, and Table 7), **which may include using of the set of tools** designed to help managers approach the identification (Figure 7), selection (Figure 8 and Figure 9), and development (Figure 10) of (new business development) opportunities.

A promising venue for ASML is to reflect on the design principles put forward in this report, and **look carefully at their existing new business development processes.** Furthermore, these design principles enable ASML to reflect on their previous new business

development experiences. Also, the new business development tools developed in this report may help ASML improve their new business development activities.

The new business development case in the ABC industry used as a preliminary alpha test is a **promising opportunity for ASML to pursue**. However, underlying assumptions when evaluating the opportunity should be further researched, as they are primarily based on one market research report, and include subjective judgment of the researcher. ASML should compose a technical team which is going to pursue a thorough technical analysis of the opportunity, analyzes required patents and knowledge, and potential synergies with ASML. Furthermore, ASML should analyze whether they need an organization in order to reap benefits of the opportunity, and if so, which companies are available for ASML to acquire, merger, or collaborate with.

6.4 Limitations and further research

First, limitations concerning the systematic literature review, design, and preliminary alpha test are explained. Second further research avenues are explored.

The **literature review and research synthesis** draws on a large variety of research streams, findings cannot always be generalized to the context of new business development. Being a promising research avenue for future research, many concepts available from the innovation, strategy, and entrepreneurship literature are not tested in a new business development context. This report provides an overview of the new business development process in established organizations, but how new business development managers actually approach their new business development activities remains unknown. The design principles are based on empirical studies and underlying theories, but in many instances, reasoning of other underlying theories behind the design principles is still lacking. For example, reasoning from a resource based view perspective how operational relatedness influences the most appropriate way to develop an opportunity. Or the rationale of Burgelman (1984) and Dorf and Byers (2008) for having a contradictory opinion about strategic importance in the context of selecting the most appropriate opportunity development mode. Selection criteria for selecting the most appropriate opportunity development mode were identified from literature, but whether these criteria are cross correlated remains unknown.

The **design** focuses on a single project evaluation and neglects portfolio evaluation. Using an opportunity screen with subjective evaluation of opportunities may prevent radical

innovation opportunities from being falsely killed, how organizations make sure this does not happen is not known. From the test, it appeared that selecting of opportunities by means of the opportunity screen and thorough evaluation and selecting the most appropriate development mode remain a difficult task, which may be explained by a lack of available measures and knowledge about their relative importance. The test also surfaced the absence of two important selection characteristics for selecting the most appropriate development mode, while added to the design further research is necessary to gain a sufficient foundation.

This thesis is limited by only describing a **preliminary alpha test**, for that full alpha testing and subsequent beta testing is out of the scope of this project. Furthermore, the test was performed by the researcher, and is therefore limited by not including employees or people from outside the organization, and by being a single person exercise. The tools for opportunity selection and opportunity development were tested, and therefore, a test of the opportunity identification approach is missing. Furthermore, the test was based on information from a single report while a business case normally involves many resources, also many assumptions were made. Also, after the initial screen, normally a business case would be prepared, which was not the case here, due to time restrictions and the scope of this project.

While this thesis provides an overview of new business development process for established organizations, **future research** should reveal what new business development managers actually do. A large empirical study among new business development managers can provide an overview of how new business development managers actually approach new business development. Furthermore, a large empirical study should provide insights into whether organizations apply the design principles identified in this thesis, and whether they are successful when applying them. Before having a large scale empirical study, qualitative interviews should provide more insights into what new business development managers actually do, and whether the design principles need to be adjusted accordingly. Another future research opportunity includes the testing of the process dimensions for the opportunity identification process. Are these dimensions correct, and what determines the type of opportunity identification? Figure 17 shows a preliminary model, underlying theories should first be developed before formulating hypothesis. Another promising research opportunity is the testing of the selection criteria for selecting the most appropriate development mode for (new business development) opportunities. Underlying theories

need to be explored (e.g. resource based view, transaction cost economics, etc.), and hypothesis need to be formulated. Figure 18 shows a preliminary model.

The **design** solution, including its **tools**, needs some further development and testing. The tool for selecting the most promising opportunity development mode needs to be calibrated by running actual opportunities through the model and comparing scores with actual choices made. Furthermore, underlying theories like transaction cost economics or the resource based view may be explored to gain a deeper understanding of the selection criteria, their effects on the development modes and on each other. Further research needs to define underlying measures for the design. A distinction may be made between must-meet and should-meet criteria, and between subjective and objective measures. The design can be strengthened by full alpha testing and subsequent beta testing. Also, the sensitivity of the decision parameters of the design may be tested by means of regression analysis on queries for all available decision parameters and outcomes.

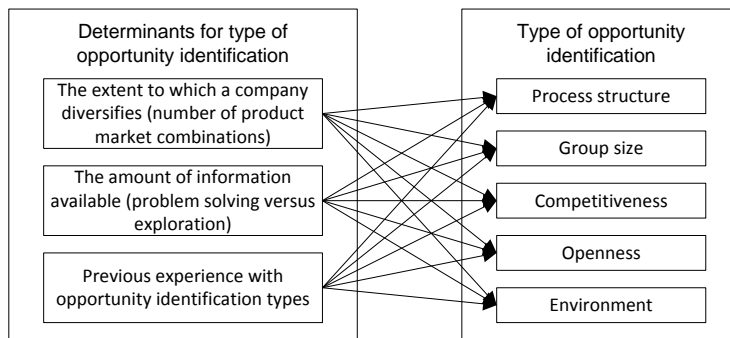


Figure 17: Future research: determining the type of opportunity identification

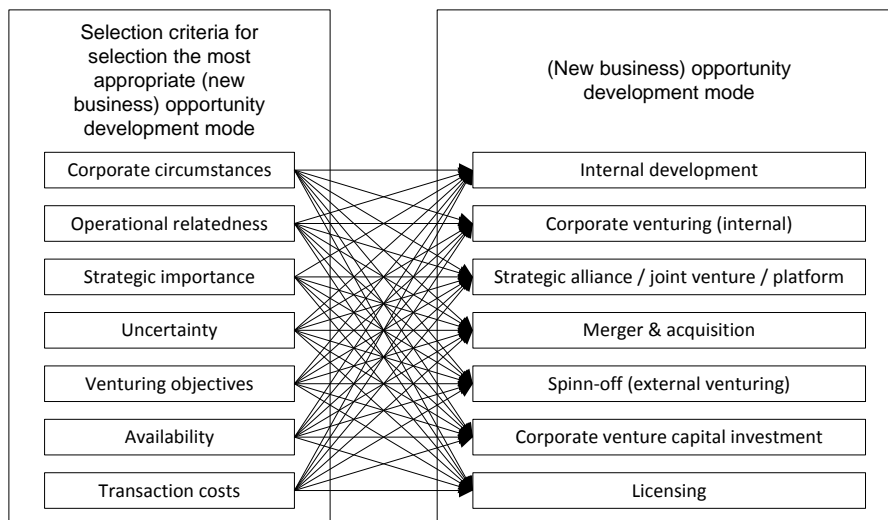


Figure 18: Future research: selecting the most appropriate (new business) opportunity development mode

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Appendix I

TABLES AND FIGURES

Table 9: Risk factors faced by ASML based on the annual report of 2011

Risk class	Risks
Strategic risks	<ul style="list-style-type: none">• ASML derives most of the revenues from the sale of a relatively small number of products;
Risks related to the semiconductor industry	<ul style="list-style-type: none">• The semiconductor industry is highly cyclical and ASML may be adversely affected by any downturn;• ASML business will suffer if ASML does not respond rapidly to commercial and technological changes in the semiconductor industry;• ASML faces intense competition;
Governmental, legal and compliance risks	<ul style="list-style-type: none">• Failure to adequately protect the intellectual property rights upon which ASML depends could harm ASML business;• Defending against intellectual property claims brought by others could harm ASML's business;• ASML is subject to risks in their international operations;• Because of labor laws and practices, any workforce reductions that ASML may seek to implement in order to reduce costs company – ASML may be delayed or suspended;
Operational risks	<ul style="list-style-type: none">• The number of systems ASML can produce is limited by their dependence on a limited number of suppliers of key components;• The pace of introduction of ASML's new products is accelerating and is accompanied by potential design and production delays and by significant costs;• ASML is dependent on the continued operation of a limited number of manufacturing facilities;• ASML may be unable to make desirable acquisitions or to integrate successfully any businesses ASML acquires;• ASML's business and future success depend on their ability to

	attract and retain a sufficient number of adequate educated and skilled employees;
Financial risks	<ul style="list-style-type: none"> • A high percentage of net sales is derived from a few customers; • Fluctuations in foreign exchange rates could harm ASML's results of operations;
Risks related to ASML's ordinary shares	<ul style="list-style-type: none"> • ASML may not declare cash dividends at all or in any particular amounts in any given year; • The price of ASML's ordinary shares is volatile; • Restrictions on shareholder rights may dilute voting power.

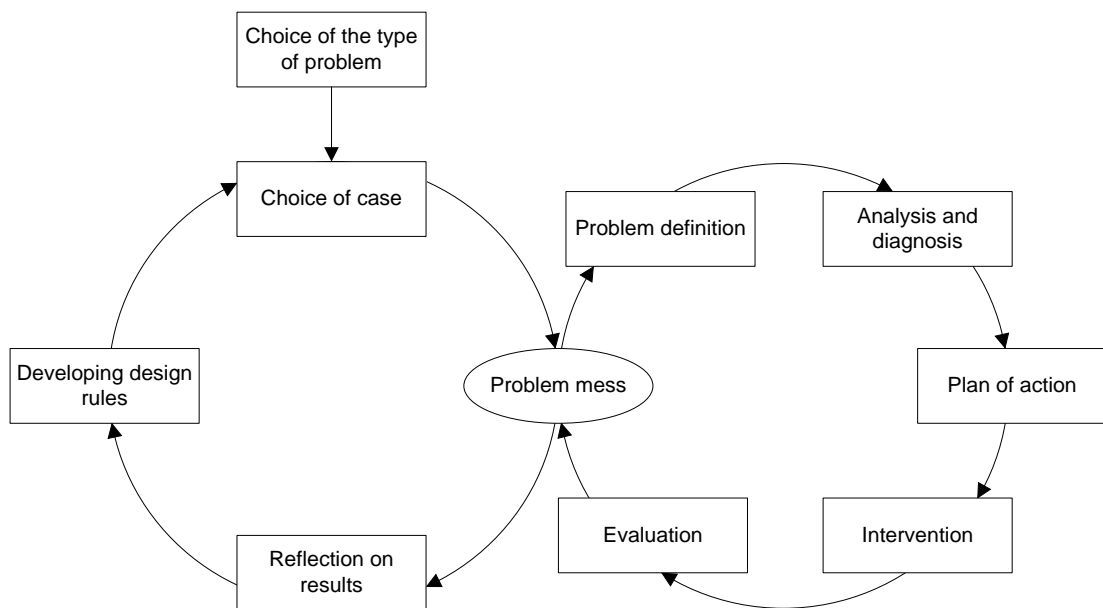


Figure 19: The regulative and reflective cycle based on Van Aken et al. (2007)

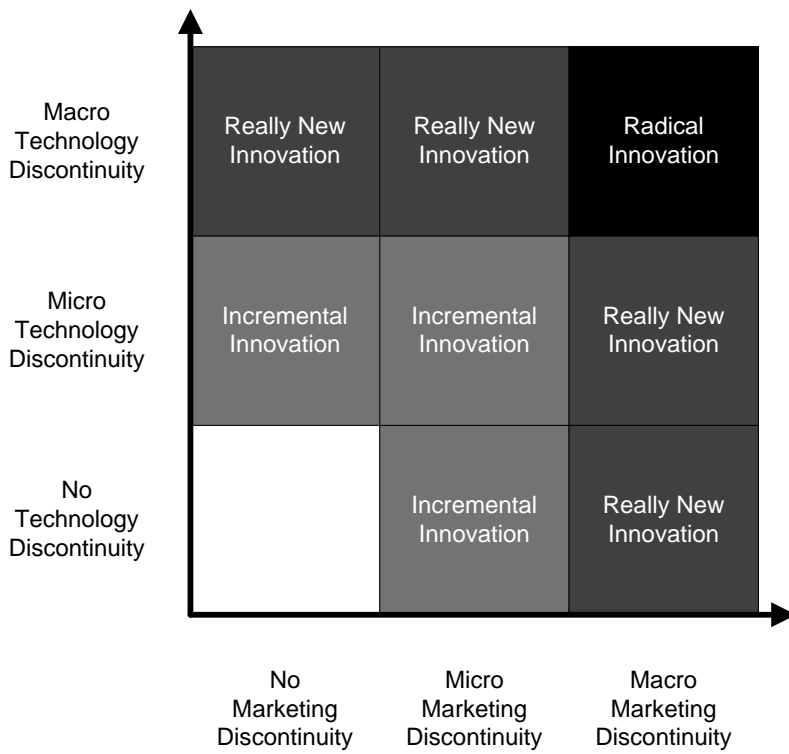


Figure 20: Innovation type based on Garcia & Calantone (2002)

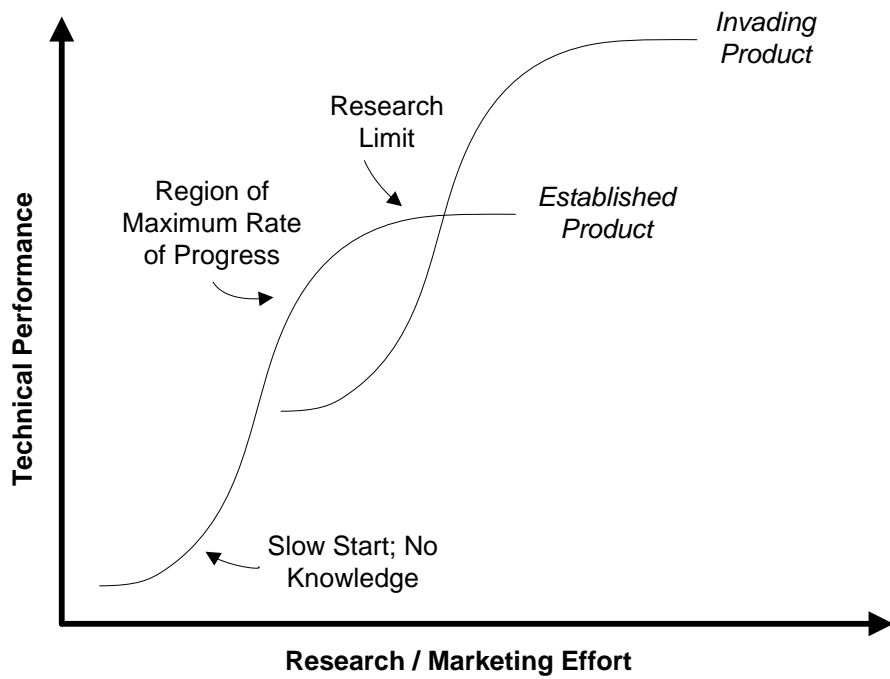


Figure 21: Technology-marketing s-curve (Foster, 1986)

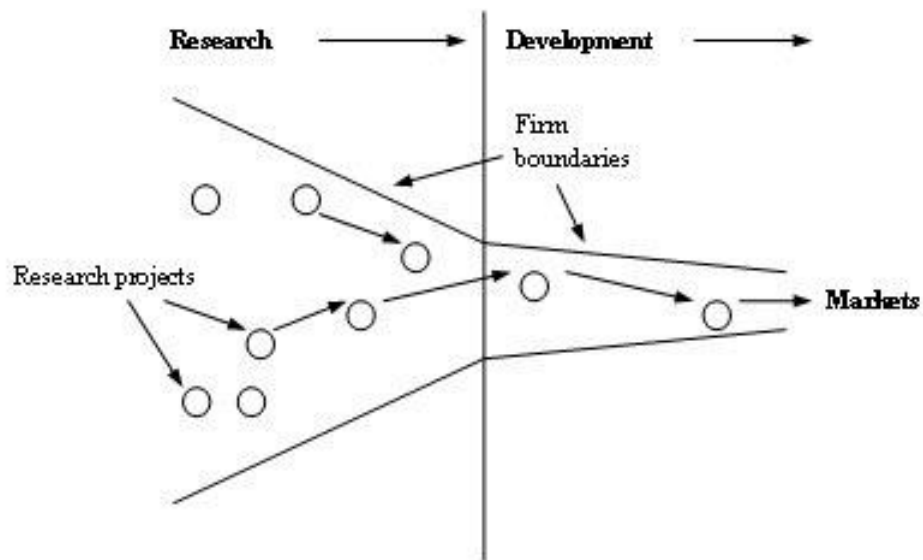


Figure 22: Closed innovation (Chesbrough, 2003a)

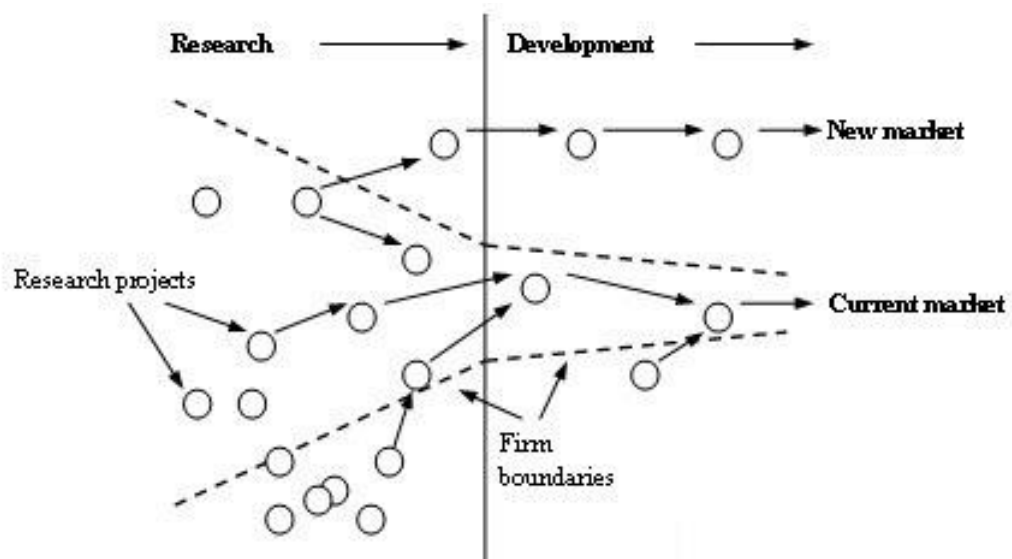


Figure 23: Open innovation (Chesbrough, 2003a)

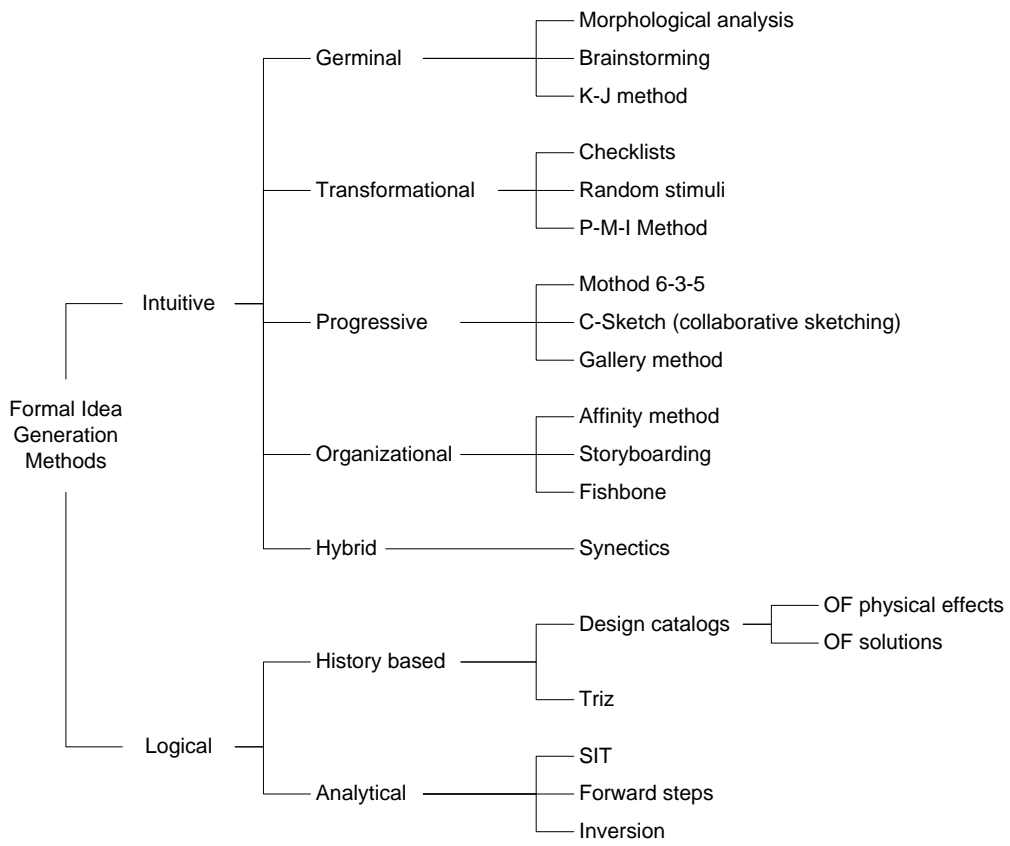


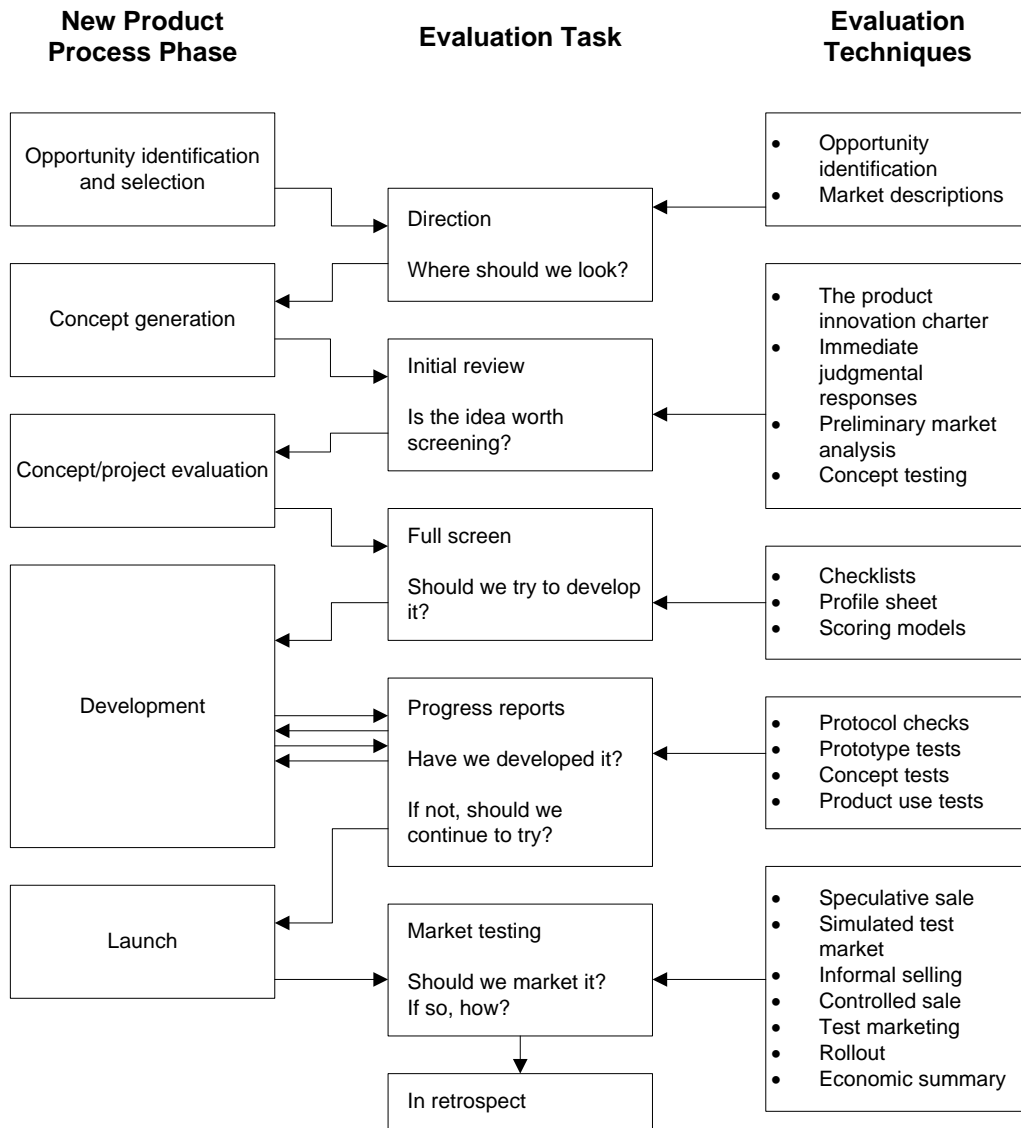
Figure 24: Classification of idea generation methods (Shah et al., 2000: 378)

Table 10: Venture capitalist's investment criteria (Hall & Hofer, 1993)

Investment criteria
<p>Venture capital firm requirements</p> <ul style="list-style-type: none"> • Cash out potential • Equity share • Familiarity with technology, product, market • Financial provisions for investors • Geographic location • Investor control • Investor group • Rate of return • Risk • Size of investment • Stage of development
<p>Characteristics of the proposal</p> <ul style="list-style-type: none"> • Requirement for additional material • Stage of plan
<p>Characteristics of the entrepreneur/team</p> <ul style="list-style-type: none"> • Ability to evaluate risk • Articulate re: venture • Background/experience • Capable of sustained effort • Managerial capabilities • Management commitment • References • Stake in firm
<p>Nature of the proposed business</p> <ul style="list-style-type: none"> • Product/market considerations
<p>Economic environment of the proposed industry</p> <ul style="list-style-type: none"> • Market attractiveness • Potential size • Technology • Threat resistance
<p>Strategy of the proposed business</p> <ul style="list-style-type: none"> • Product differentiation • Proprietary product

Table 11: New product development evaluation criteria (Cooper, 2001: 237)

Evaluation criteria
<p>1. Strategic:</p> <ul style="list-style-type: none"> • Degree to which project aligns with the business's strategy • Strategic importance of project to the business
<p>2. Product Advantage:</p> <p>Extent to which the new product...</p> <ul style="list-style-type: none"> • Offers unique benefits to users/customers (not available on competitive products) • Meets customer needs better than competitive products • Provides excellent value for money to the customer
<p>3. Market Attractiveness:</p> <ul style="list-style-type: none"> • Market size • Market growth rate • Competitive situation (tough, intense, prize-based competition is a low score)
<p>4. Synergies (Leverage Core Competences):</p> <ul style="list-style-type: none"> • Leverages our business's marketing, distribution, and selling strengths/resources • Leverages our technical know-how, expertise, and experience • Leverages our manufacturing/operations capabilities, expertise, and facilities
<p>5. Technical Feasibility:</p> <ul style="list-style-type: none"> • Size of the technical gap (small gap is a high score) • Complexity of the project, technically (less complex is a high score) • Technical uncertainty of outcome (high certainty is a high score)
<p>6. Risk versus Return:</p> <ul style="list-style-type: none"> • Expected profitability (magnitude: NPV in \$) • Percent return (IRR% or ROI%) • Payback period (or BET) how fast you recover your initial expenditure/ investment (years) • Certainty of return/profit/sales estimates (from "pure guess" to "highly predictable") • Degree to which project is low cost and fast to do



Caution: Keep in mind that the activities are never in such a neat sequence of steps as implied by this diagram.

Figure 25: The new product development evaluation system, including common techniques (Crawford & Benedetto, 2010: 191)

Table 12: Comparing alternative approaches in filling a resource gap (Teng, 2007: 124)

Determining factors	Internal development	Resource acquisition in factor markets	Acquisitions (of entire firms)	Strategic alliances
Possibility	<ul style="list-style-type: none"> • Internal ability • Timeframe 	<ul style="list-style-type: none"> • Traditionally (tangible) • Market availability 	<ul style="list-style-type: none"> • Target firm availability • Anti-trust restrictions 	<ul style="list-style-type: none"> • Partner firm availability
Cost	<ul style="list-style-type: none"> • High development cost 	<ul style="list-style-type: none"> • Low transaction cost 	<ul style="list-style-type: none"> • High purchase price 	<ul style="list-style-type: none"> • Relatively low start-up cost
Benefit	<ul style="list-style-type: none"> • Total control 	<ul style="list-style-type: none"> • Efficiency 	<ul style="list-style-type: none"> • Ownership of the entire value chain 	<ul style="list-style-type: none"> • Flexibility and speed • Shared costs and risk
Risk	<ul style="list-style-type: none"> • High risk of failure 	<ul style="list-style-type: none"> • Risk of not having competitive advantage 	<ul style="list-style-type: none"> • Risk with a lemon • Difficult to integrate • Inability to divest unneeded assets 	<ul style="list-style-type: none"> • Temporary resource access • Difficult to manage • Risk of opportunism

Table 13: Corporate entrepreneurship through strategic alliances: key issues (Teng, 2007: 132)

CE activities	Key features	Alliance types		
		Joint Ventures	R&D alliances	Learning alliances
		<ul style="list-style-type: none"> • Separate entities • Most formal structure • Aligned interests 	<ul style="list-style-type: none"> • Contribute R&D-related know-how • Knowledge exposure • Share R&D outputs 	<ul style="list-style-type: none"> • Open knowledge acquisition • Absorptive capacity is key
Innovation	<ul style="list-style-type: none"> • Common aspects of CE • Knowledge-oriented • Low success rate 	<ul style="list-style-type: none"> • Integrated structure means greater knowledge exposure • Equity may deter opportunism 	<ul style="list-style-type: none"> • Shared R&D cost and risk • Risk of losing distinctive competencies 	<ul style="list-style-type: none"> • Higher success rate through learning • Knowledge access maybe limited
Corporate venturing	<ul style="list-style-type: none"> • New units • New businesses • Some stability is needed 	<ul style="list-style-type: none"> • A form of external venturing • Managerial difficulty 	<ul style="list-style-type: none"> • Generate technologies for new businesses • Choose partners in related businesses 	<ul style="list-style-type: none"> • Learn to enter new businesses • Learning races lead to instability
Strategic renewal	<ul style="list-style-type: none"> • Re-deploying resources • Change of current business/ approach 	<ul style="list-style-type: none"> • Unload unwanted resources or obtain key resources • Joint ventures as experiments 	<ul style="list-style-type: none"> • Provide technological foundation for change • Shared technology means potential competition 	<ul style="list-style-type: none"> • Learn from partners' renewal or industry experience • Uncertain knowledge applicability

Table 14: Research summary opportunity development choice

Author(s)	Research summary
Burgelman (1984)	Burgelman (1984) distinguishes three levels of strategic importance (very important, uncertain, and not important), and three levels of operational relatedness (unrelated, partly related, strongly related) in deciding how organizations should design their corporate venturing (see Figure 27).
Dorf and Byers (2008)	Dorf and Byers (2008) distinguish four different ways through which an existing organization can exploit an opportunity through some form of a new business based on operational relatedness and strategic importance: establishing an independent corporate new venture (high, high), spinning off to a new company (low, high), proceeding with a small exploratory project (high, low), or by not proceeding at all (low, low) (see Figure 26).
Hill and Birkinshaw (2008)	Hill and Birkinshaw (2008) develop a typology of corporate venture units based on strategy-organization configurations. Four types of corporate ventures are identified based on two well established dimensions from the strategic management and corporate entrepreneurship literature: 1) the locus of the opportunity, which can be from inside the company or from outside the company; and 2) the focus of the corporate parent on exploiting existing assets and capabilities or exploring new assets and capabilities (see Figure 28). Based on these two dimensions, four types of corporate venturing units are established: 1) internal explorer, 2) internal exploiter, 3) external explorer, and 4) external exploiter.
Miles and Covin (2002)	Miles and Covin (2002) present a framework to assist corporate executives in selecting an appropriate corporate venturing mode based on venturing objectives and corporate circumstances. Based on Jolly and Kayama (1990), Miles and Covin (2002) classify corporate circumstances by: need for control of the venture, the ability and willingness to commit resources to venturing, and the entrepreneurial risk acceptance propensity. Miles and Covin (2002) define four types of venturing based on the source of funding and the origin of the innovation: direct-internal, direct-external, indirect-internal, and indirect-external (see Table 16). The source of funding may be only from the corporate (direct) or as part of a venture fund (indirect). The source of the innovation may be internal from within the organization (e.g. technology from the R&D department), or external from outside the organization (e.g. startup).
Schildt Maula and Keil (2005)	In their study, Schildt Maula and Keil (2005) examine how venture relatedness influences explorative versus exploitative learning outcomes in external ventures. Venture relatedness is an important characteristic in organizational learning and diversification, therefore Schildt, Maula and Keil (2005) use three dimensions on which the external corporate venture may be related to the parent: industry relatedness, downstream

	vertical relatedness, and technological relatedness.
Van de Vrande, Vanhaverbeke and West (2009)	Van de Vrande, Vanhaverbeke and West (2009) looked at the effect of uncertainty on governance mode choice for external technology sourcing. Based on transaction cost economics and real options theory, Van de Vrande et al. (2009) reason how endogenous and exogenous uncertainty influence the governance mode choice for external technology sourcing.

Operational relatedness to existing firm	High	4. Proceed with a small exploratory project	1. Establish an independent corporate new venture
	Low	3. Do not proceed	2. Spin off to a new company
		Low	High
		Strategic importance to existing firm	

Figure 26: Four types of new business opportunities and the best business arrangement for each opportunity (Dorf & Byers, 2008: 194)

		Strategic importance		
		Very important	Uncertain	Not important
Operational relatedness	Unrelated	Special business units	Independent business units	Complete spin-off
	Partly related	New product/ business department	New venture division	Contracting
	Strongly related	Direct integration	Micro new venture department	Nurturing and contracting

Figure 27: Organizational designs for corporate venturing (Burgelman, 1984)

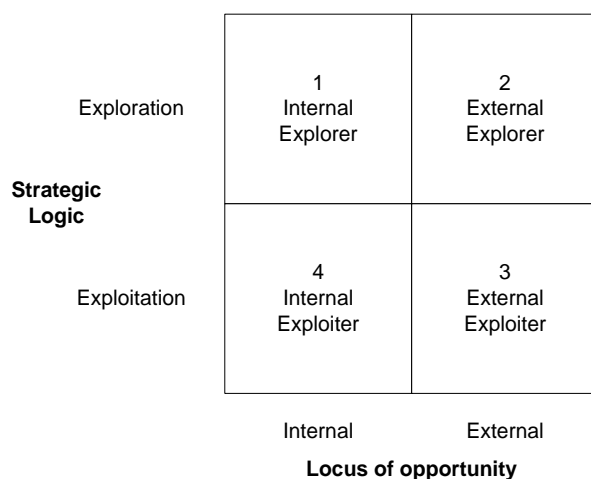


Figure 28: A typology of corporate venture units (Hill & Birkinshaw, 2008: 427)

Table 15: Preferred governance mode for external technology sourcing when faced with uncertainty (Van de Vrande et al., 2009)

Source of uncertainty	Preferred governance mode for external technology sourcing ⁷	
Environmental turbulence	<ol style="list-style-type: none"> 1. Strategic alliance 2. Corporate venture capital investment 3. Joint venture 	<ol style="list-style-type: none"> 1. Strategic alliance 2. Minority holding 3. Merger & acquisition 4. Joint venture
Technological newness	<ol style="list-style-type: none"> 1. Corporate venture capital investment 2. Strategic alliance / Minority holding 3. Joint venture / Merger & acquisition 	
Technological distance	<ol style="list-style-type: none"> 1. Corporate venture capital investment 2. Strategic alliance 3. Minority holding 	<ol style="list-style-type: none"> 1. Corporate venture capital investment 2. Joint venture / Merger & acquisition 3. Minority holding
Prior cooperation	<ol style="list-style-type: none"> 1. Minority holding Joint venture 2. Strategic alliance / Merger & acquisition 	<ol style="list-style-type: none"> 1. Minority holding 2. Corporate venture capital investment

⁷ The most preferred governance mode is 1; the second preferred governance mode is 2, etc. The governance modes in one list are preferred respective to the other governance modes in the list. Therefore, there is more than one list in three cases.

Table 16: Appropriate corporate venturing form in the corporate context (Miles & Covin, 2002)

Corporate management's needs & biases	Corporate venturing objectives		
	Organizational development & cultural change	Strategic benefits / real option development	Quick financial returns
Need for control of venture:			
• High	D-I	D-I, D-E	D-E
• Low	I-I	I-I, I-E	I-E
Ability & willingness to commit resources to venturing:			
• High	D-I, I-I	D-I, D-E, I-I, I-E	D-E, I-E
• Low	I-I	I-I, I-E	I-E
Entrepreneurial risk accepting propensity			
• High	D-I, I-I	D-I, D-E, I-I, I-E	D-E, I-E
• Low	None	I-I, I-E	I-E

D-I: Direct-internal venturing
D-E: Direct-external venturing
I-I: Indirect-internal venturing
I-E: Indirect-external venturing

Appendix II

DESIGN PRINCIPLES

Table 17: Design principles: examples of empirical studies and underlying theories

Design Principles	Examples of empirical studies the principle is grounded in	Examples of underlying theories
1. In order to develop new business opportunities, established organizations should identify people who are entrepreneurial minded and have the right absorptive capacity because they are best capable to identify, select, and develop opportunities.	Covin & Lumpkin (2011), Lumpkin & Dess (1996), Lyon, Lumpkin & Dess (2000), Van Burg et al. (2012), Ardichvili et al. (2003)	Entrepreneurial orientation (Covin & Lumpkin, 2011; Lumpkin & Dess, 1996; Lyon et al., 2000)
2. In order to develop new business opportunities, established organizations should identify the core competences of the organization to which a new business development opportunity should relate to, because they are a prerequisite for successful related opportunity search which enables organizations to spread risk, and delineating opportunity search activities increase search effectiveness.	Lichtenthaler (2005), Phan et al. (2009)	Diversification (Collis & C A Montgomery, 1998; E. Lichtenthaler, 2005; Neffke & Henning, 2012), core competencies (Collis & C A Montgomery, 1998; Prahalad & Hamel, 1990)
3. In order to develop new business opportunities, established organizations should identify appropriate markets, because delineating opportunity search activities increase search effectiveness.	Lichtenthaler (2005), Phan et al. (2009)	Diversification (Collis & C A Montgomery, 1998; E. Lichtenthaler, 2005; Neffke & Henning, 2012), market orientation (Kohli & Jaworski, 1990; Langerak et al., 2004; Narver & Slater, 1990)
4. In order to develop new business opportunities, established organizations should identify opportunities by a process that can be: (1) intuitive or logical, (2) individual or a group activity, (3) competitive or collaborative, (4) an open call or a selected group, (5) in an online or offline environment, because these dimensions delineate the available approaches for identifying opportunities for new business development and thereby help organizations choose an appropriate process.	Kirzner (1978)	Creativity (Shah et al., 2000; Woodman et al., 1993; Yetton & Bottger, 1982), business model innovation (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; M. W. Johnson et al., 2008; Linder & Cantrell, 2000; Morris et al., 2005; Osterwalder, 2005), business-plan or idea competitions (Van Burg et al., 2008; Der Foo et al., 2005; Huffman & Quigley, 2002; Shane & Venkataraman, 2000), crowdsourcing (Afuah & Tucci, 2012; Schweitzer et al., 2012)
5. In order to develop new business opportunities, established organizations should involve the right employees in the opportunity identification process because they are a well-known source of innovation.	Santos & Spann (2011), Soukhoroukova et al. (2012)	Intrapreneurship (Antoncic & R. D. Hisrich, 2001; R. Hisrich, 1990; Zahra, 1991)

Design Principles	Examples of empirical studies the principle is grounded in	Examples of underlying theories
6. In order to develop new business opportunities, established organizations should involve people from outside organizations (with similar problems) in case of unknown markets or technologies, especially when the knowledge distance is large, because they are capable of identifying opportunities that are distant from the organization.	Afuah & Tucci (2012), Verganti (2008)	Open innovation (Chesbrough et al., 2006; Chesbrough, 2003a, 2003b, 2006; Huizingh, 2011), crowdsourcing (Afuah & Tucci, 2012; Schweitzer et al., 2012), design-driven innovation (Dell'Era et al., 2010; Dell'Era & Verganti, 2007, 2009, 2010; Pisano & Verganti, 2008, 2008; Verganti, 1997, 2008, 2009, 2011)
7. In order to develop new business opportunities, established organizations should perform at least two opportunity screens: (1) an initial screen to determine further investigation, and (2) a thorough evaluation once the opportunity is developed into a business-case, because they prevent radical innovation opportunities from being ignored, and make sure that only the best opportunities are selected.	Hall & Hofer (1993)	Opportunity, venture capital, new product development (M. Rice et al., 2001)
8. In order to develop new business opportunities, established organizations should make the distinction between evaluation of a single project and portfolio evaluation, because they are both important but very different evaluations.	Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
9. In order to develop new business opportunities, established organizations should evaluate the opportunity during the initial screen on: market worth (value which may be appropriated from the opportunity), relatedness (relatedness to the current competences and strategy of the firm), and competitive protection (the ability to gain a competitive advantage and sustain it by protecting the business from potential competitors), because these selection criteria have proved to select only the best opportunities.	Shane & Venkataraman (2000), Bryant (2007), McGrath (1995), Haynie et al. (2009)	Entrepreneurship (Shane & Venkataraman, 2000), new product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
10. In order to develop new business opportunities, established organizations should use subjective models or objective models if possible, for the initial screen like checklists, profile sheets or scoring models, because they have proved most effective for the initial opportunity screen.	Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
11. In order to develop new business opportunities, established organizations should evaluate the opportunity during the thorough evaluation on criteria from the categories: strategic, business (product or service) advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk return, because these criteria are recognized as being important for a thorough opportunity evaluation.	Hall & Hofer (1993), Cooper (2001)	Venture capital (Hall & Hofer, 1993), new product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
12. In order to develop new business opportunities, established organizations should use scoring models for the thorough evaluation of a project, because they have proved most effective by preventing opportunities from being killed based on a single criteria and allow comparison of different opportunities.	Whitney (2007), Cooper (2001), Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)

Design Principles	Examples of empirical studies the principle is grounded in	Examples of underlying theories
13. In order to develop new business opportunities, established organizations should make sure the thorough evaluation involves multiple persons, because this will prevent a single person bias.	Crawford & Di Benedetto (2010)	New product development (Cooper, 2001; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995)
14. In order to develop new business opportunities, established organizations should select the most appropriate way to develop an opportunity (i.e. internal development inside a business unit, inside the company via (internal) corporate venturing, with partners via a strategic alliance/ joint venture/platform, acquiring a company, outside the company via a spin-off (external corporate venturing), investing in a company via corporate venture capital investments, or by selling the opportunity via licensing) based on corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives because these selection criteria have proved to be important for selecting the most appropriate opportunity development mode.	Miles & Covin (2002), Burgelman (1984), Dorf & Byers (2008), Schildt et al. (2005), Van de Vrande et al. (2009), Hill & Birkinshaw (2008)	Corporate venturing (Block & MacMillan, 1995; Burgelman, 1983; Sharma & Chrisman, 2007; Tsai et al., 1991), venture capital (Barry et al., 1990; Gompers, 1995; Park & Steensma, 2012; Souitaris et al., 2012), Licensing (Kollmer & Dowling, 2004; Teece, 1986), organizational collaboration (Anand & Khanna, 2000; Byers et al., 2010; Das & Teng, 2000; Dyer & Singh, 1998; de Man, 2004; Teng, 2007; van de Vrande et al., 2009), mergers & acquisitions (Barkema & Schijven, 2008; Delmar et al., 2003; Kogut, 1991; Singh & Cynthia A. Montgomery, 1987; Trautwein, 1990; Ullrich et al., 2005; van de Vrande et al., 2009)

Appendix III

NEW BUSINESS DEVELOPMENT DESIGN FOR ASML

Design principles and parameters can be found in Table 18, Table 19, and Table 20, for opportunity identification, opportunity selection, and opportunity development respectively. Following these tables, the design parameters are described according to their definition, their value, and application for ASML.

Table 18: Design principles and parameters for opportunity identification

Design principles	Design parameters
1. In order to develop new business opportunities, established organizations should identify people who are entrepreneurial minded and have the right absorptive capacity because they are best capable to identify, select, and develop opportunities.	• People
2. In order to develop new business opportunities, established organizations should identify the core competences of the organization to which a new business development opportunity should relate to, because they are a prerequisite for successful related opportunity search which enables organizations to spread risk, and delineating opportunity search activities increase search effectiveness.	• Core competences of the organization
3. In order to develop new business opportunities, established organizations should identify appropriate markets, because delineating opportunity search activities increase search effectiveness.	• Appropriate markets

Design principles	Design parameters
4. In order to develop new business opportunities, established organizations should identify opportunities by a process that can be: (1) intuitive or logical, (2) individual or a group activity, (3) competitive or collaborative, (4) an open call or a selected group, (5) in an online or offline environment, because these dimensions delineate the available approaches for identifying opportunities for new business development and thereby help organizations choose an appropriate process.	<ul style="list-style-type: none"> • Process structure • Group size • Competitiveness • Openness • Environment
5. In order to develop new business opportunities, established organizations should involve the right employees in the opportunity identification process because they are a well-known source of innovation.	<ul style="list-style-type: none"> • Employees
6. In order to develop new business opportunities, established organizations should involve people from outside organizations (with similar problems) in case of unknown markets or technologies, especially when the knowledge distance is large, because they are capable of identifying opportunities that are distant from the organization.	<ul style="list-style-type: none"> • People outside the organization (with similar problems)

Table 19: Design principles and parameters for opportunity selection

Design principles	Design parameters
7. In order to develop new business opportunities, established organizations should perform at least two opportunity screens: (1) an initial screen to determine further investigation, and (2) a thorough evaluation once the opportunity is developed into a business-case, because they prevent radical innovation opportunities from being ignored, and make sure that only the best opportunities are selected.	<ul style="list-style-type: none"> • The number of screens
8. In order to develop new business opportunities, established organizations should make the distinction between evaluation of a single project and portfolio evaluation, because they are both important but very different evaluations.	<ul style="list-style-type: none"> • Evaluation level

Design principles	Design parameters
<p>9. In order to develop new business opportunities, established organizations should evaluate the opportunity during the initial screen on: market worth (value which may be appropriated from the opportunity), relatedness (relatedness to the current competences and strategy of the firm), and competitive protection (the ability to gain a competitive advantage and sustain it by protecting the business from potential competitors), because these selection criteria have proved to select only the best opportunities.</p>	<ul style="list-style-type: none"> • Market worth • Relatedness • Competitive protection
<p>10. In order to develop new business opportunities, established organizations should use subjective models or objective models if possible, for the initial screen like checklists, profile sheets or scoring models, because they have proved most effective for the initial opportunity screen.</p>	<ul style="list-style-type: none"> • Subjective evaluation model for initial screen • Initial screen weights • Value to continue after initial screen
<p>11. In order to develop new business opportunities, established organizations should evaluate the opportunity during the thorough evaluation on criteria from the categories: strategic, business (product or service) advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk return, because these criteria are recognized as being important for a thorough opportunity evaluation.</p>	<ul style="list-style-type: none"> • Evaluation criteria thorough evaluation
<p>12. In order to develop new business opportunities, established organizations should use scoring models for the thorough evaluation of a project, because they have proved most effective by preventing opportunities from being killed based on a single criteria and allow comparison of different opportunities.</p>	<ul style="list-style-type: none"> • Weights for the thorough evaluation criteria
<p>13. In order to develop new business opportunities, established organizations should make sure the thorough evaluation involves multiple persons, because this will prevent a single person bias.</p>	<ul style="list-style-type: none"> • People involved in the evaluation

Table 20: Design principles and parameters for opportunity development

Design principles	Design parameters
<p>14. In order to develop new business opportunities, established organizations should select the most appropriate way to develop an opportunity (i.e. internal development inside a business unit, inside the company via (internal) corporate venturing, with partners via a strategic alliance/ joint venture/platform, acquiring a company, outside the company via a spin-off (external corporate venturing), investing in a company via corporate venture capital investments, or by selling the opportunity via licensing) based on corporate circumstances, operational relatedness, strategic importance, uncertainty, and venturing objectives because these selection criteria have proved to be important for selecting the most appropriate opportunity development mode.</p>	<ul style="list-style-type: none"> • Development modes • Development criteria

Opportunity identification (design principle 1): people

Definition: Someone who takes charge in developing new business opportunities (Based on: Ardichvili et al., 2003; Van Burg et al., 2012; Covin & Lumpkin, 2011; Lumpkin & Dess, 1996; Lyon et al., 2000);

Value: Entrepreneurial and absorptive capacity;

Application: **ASML should identify people with entrepreneurial skills and the right absorptive capacity to be able to identify, select, and develop opportunities.**

Opportunity identification (design principle 2): core competences of the organization

Definition: Core competencies are the most important tangible and intangible assets, people and processes that the organization uses to transform inputs into outputs (Collis & C A Montgomery, 1998);

Value: Core competencies can range from technology to distribution channels and including all areas of the value chain. Core competencies must at least fulfill the conditions of: not easy for competitors to imitate, re-usable widely for many products and markets and must contribute to end customer's experienced benefits (Prahalad & Hamel, 1990);

Application: ASML is one of the world's leading providers of lithography systems for the semiconductor industry, by designing, developing, integrating,

manufacturing, marketing, and servicing complex lithography scanners that are critical for the production of integrated circuits or microchips. ASML helps world's major chipmakers in more than 55 locations in 16 countries reducing the size and increasing functionality of microchips, and consumer electronic equipment. ASML strengthens its growth strategy for profitable growth by securing leadership in technology, cost of ownership and customer service, while maintaining a flexible cost structure, a high market share and a low break-even point. The lithography scanners need continuous improvement on the resolution, the speed, and the precision. ASML is able to realize the high paced technological improvements by securing its technological leadership in very precise engineering, which includes system engineering, system architecture, and nanometer fabrication. ASML's business model focuses on value of ownership, which is based on outsourcing production of a significant part of components and modules used to partnerships. ASML's value sourcing strategy is based on: maintaining long-term relationships with suppliers; sharing risks and rewards with suppliers; dual sourcing of knowledge, global together with partners; and single, dual or multiple sourcing of products, where possible or required. **ASML's core competencies therefore include very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers.**

Opportunity identification (design principle 3): appropriate markets

Definition: Markets in which ASML is able to use its core competencies (Based on: Kohli & Jaworski, 1990; Langerak et al., 2004; E. Lichtenthaler, 2005; Narver & Slater, 1990; Phan et al., 2009);

Value: Market delineation;

Application: **ASML should identify appropriate markets in which ASML is able to use its core competences when exploring a new business opportunity.**

Opportunity identification (design principle 4): process structure

Definition: The structure of the process by which opportunities are identified (Based on: Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; M. W. Johnson et al., 2008; Linder & Cantrell, 2000; Morris et al., 2005; Osterwalder, 2005; Shah et al., 2000);

Value: Intuitive or logical;

Application: Logical creativity methods are well suited for new product development. However, they are less suited for new business development in general, as these methods are not developed very well. These methods may be expected in the future, as for example logical creativity methods for business model innovation are being developed. **Therefore, ASML should use intuitive methods for the opportunity identification process.**

Opportunity identification (design principle 4): group size

Definition: The number of people in the group (Based on: Woodman et al., 1993; Yetton & Bottger, 1982);

Value: Individual or group activity;

Application: The chance of success is larger for entrepreneurial teams than for individual entrepreneurs. Furthermore, creativity in groups is larger than the sum of all individual parts. **Therefore ASML should use small entrepreneurial teams for identifying opportunities.**

Opportunity identification (design principle 4): competitiveness

Definition: The degree of competitiveness of the opportunity identification process (Based on: Van Burg et al., 2008; Der Foo et al., 2005; Huffman & Quigley, 2002; Shane & Venkataraman, 2000);

Value: Competitive or collaborative;

Application: A business-plan competition or an idea competition is a competitive process for identifying opportunities. While these have proved to be efficient, they are more suited for serial innovator companies for which diversification is embedded in their daily work processes. A collaborative process is better suited for ASML, as a competitive process would require larger resource investments to guide the process and a certain entrepreneurial innovative sense among employees. As a second phase, after having experimented on a smaller scale, a business-plan competition with a small selected group of highly talented entrepreneurial people offers great potential. **ASML should start with a collaborative process and in a later phase experiment with a small scale competitive process.**

Opportunity identification (design principle 4): openness

- Definition: The degree of openness in involving people in the opportunity identification process (Based on: Schweitzer et al., 2012);
- Value: Open call or selected group;
- Application: An open call is very well suited for solving a specific problem via for instance crowdsourcing. The power of an open call is the potential to involve many people and gain many ideas. However, the inherent downside of an open call is that it requires significant resource investments to start with and an entrepreneurial sense among employees, and is therefore better suited for serial innovators. Some crowdsourcing platforms offer self-selection mechanisms, in which participants value opportunities themselves to make the first selection. An open call in a corporate context may have the advantage of identifying intrapreneurs within the organization. On the contrary, teams function best when composed of people complementing each other and selected for the specific task (e.g. knowledge experts on their respective fields). Therefore, selected groups have the advantage over an open call of composing the right team for the job to be done. A selected group has the advantage over an open call of composing a task specific group which includes knowledge experts on the top of their respective field, especially when the opportunity search is well delineated by defining core competencies and a high growth market. **ASML should therefore start with a selected group of people.**

Opportunity identification (design principle 4): environment

- Definition: The environment where the opportunity identification takes place (Based on: Schweitzer et al., 2012);
- Value: Online or offline environment;
- Application: Online environments are especially suited for crowdsourcing activities, where many people, who may or may not be distributed all over the world, are involved. The involvement of many people results in large resource investments as all generated ideas have to be evaluated. When only limited people are involved, offline environments are better suited for the opportunity identification process, as interaction increases creativity. **Therefore, an offline environment is better suited for ASML than an online environment.**

Opportunity identification (design principle 5): employees

Definition: The involvement of employees in the opportunity identification process (Based on: Garud et al., 2011; Santos & Spann, 2011; Soukhoroukova et al., 2012);

Value: Employees;

Application: While employees are a well-known source of innovation, involving only employees inhibits the danger of not recognizing radical innovation opportunities by being constrained in their current paradigm. However, a good match with the company's core competences is required for identifying and exploiting a successful diversification opportunity. **Therefore ASML should involve selected employees in their opportunity identification.**

Opportunity identification (design principle 6): people outside the organization (with similar problems)

Definition: The involvement of people outside the organization in the opportunity identification process (Based on: Afuah & Tucci, 2012; Dell'Era et al., 2010; Dell'Era & Verganti, 2007, 2009, 2010; Huizingh, 2011; Pisano & Verganti, 2008; Verganti, 2011, 1997, 2008, 2009);

Value: People outside the organization;

Application: **When the distance to the required knowledge is large, ASML should involve selected people from outside the organization who are experts on the required field of knowledge.**

Opportunity selection (design principle 7): the number of screens

Definition: The number of screens to select the opportunity (Based on: Hall & Hofer, 1993; Haynie et al., 2009; M. Rice et al., 2001);

Value: Number of screens;

Application: ASML should at least perform two screens, an initial screen and a more thorough evaluation, because the initial screen determines further evaluation of an opportunity, and thereby prevent radical opportunities from being killed. A second more thorough evaluation determines whether to continue with an opportunity. ASML is not a major diversified organization; the opportunity identification should start with a small experiment. When, ASML would decide to do an open call for ideas,

additional screening moments should be added. **Therefore, ASML should do two screens, an initial screen and a more thorough evaluation.**

Opportunity selection (design principle 8): evaluation level

- Definition: The level on which the opportunity selection takes place, this can be on a higher strategic level (portfolio selection; combining projects to form a balanced portfolio) or a single project evaluation (Cooper, 2001);
- Value: Single project evaluation or portfolio evaluation;
- Application: Both single and portfolio evaluations are important. **However, for an initial experiment with new business development, ASML should perform a single project evaluation, as a diversification portfolio does not exist.**

Opportunity selection (design principle 9): market worth

- Definition: Value which may be appropriated from the opportunity (Based on: Bryant, 2007; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995; Shane & Venkataraman, 2000);
- Value: Market worth;
- Application: The market worth of the opportunity focuses not merely on the current value of an opportunity but more on the future value or potential value that the opportunity might be worth in the future. Estimation of market worth is related to the timing of the opportunity, because the value of a premature opportunity is more uncertain than a more crystalized opportunity. Careful consideration must be made here, for that the future value of radical innovations are very uncertain. Furthermore, many opportunities with relative small value have a large collective value. Also, one of the mistakes established firms make, is to go for too mature opportunities because of the certain (large) market value, however many seem to fail. **Market worth refers to the value which can be appropriated from the opportunity, a small market worth scores one out of five and a high market worth scores five out of five. Market worth is computed by market size (total sales) multiplied with market share (percentage expected market share) minus all costs. Market worth is equal to the potential profit a company can make. ASML made a profit of EUR 1467 million in 2011, and therefore, a high score on market worth (five out of five) is equal to a future potential market worth of approximately EUR 1500 million.**

Opportunity selection (design principle 9): relatedness

Definition: Relatedness to the core competences and strategy of the organization (Based on: Bryant, 2007; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995; Shane & Venkataraman, 2000);

Value: Relatedness;

Application: **Relatedness refers to the relatedness to the core competencies of ASML. ASML core competencies are very precise engineering (system engineering, system architecture, and nanometer fabrication) and cooperation with their network of suppliers. A low relatedness scores one out of five, and a high relatedness scores five out of five. A high relatedness to the core competencies of ASML is achieved when competition in the opportunity's industry is based on the same competencies as ASMLs core competencies.**

Opportunity selection (design principle 9): competitive protection

Definition: The ability to protect the business from potential competitors (Based on: Bryant, 2007; Crawford & Benedetto, 2010; Haynie et al., 2009; McGrath, 1995; Shane & Venkataraman, 2000);

Value: Competitive protection;

Application: **Competitive protection measures the degree to which ASML is able to sustain their gained competitive advantage. If ASML is able to acquire a large market share, but cannot sustain this by for example a large threat of imitation competitive protection scores one out of five. ASML scores a five out of five in its current industry, as ASML is able to sustain their competitive advantage very well.**

Opportunity selection (design principle 10): subjective evaluation model for initial screen

Definition: Subjective techniques or tools to be used with the initial screen or evaluation of the opportunity (Based on: Cooper, 2001; Crawford & Benedetto, 2010);

Value: Checklists, profile sheets or scoring models;

Application: **ASML should use a scoring model for the initial opportunity screen, as it is well suited for the evaluation of a single opportunity but also allows a comparison between opportunities.**

Opportunity selection (design principle 10): initial screen weights

Definition: The relative importance of the initial selection criteria;

Value: Weight;

Application: **ASML should determine the weight of the individual evaluation parameters, which may differ per opportunity.**

Opportunity selection (design principle 10): value to continue after initial screen

Definition: The weighted average of the initial opportunity selection after which to continue with the opportunity;

Value: Weighted average;

Application: **ASML could determine a cutoff value on which to decide a continuation of an opportunity. Furthermore, ASML can also select the opportunities with the best scores, and decide beforehand to continue with a certain amount of opportunities per time period (e.g. every half year with ten ideas).**

Opportunity selection (design principle 11): evaluation criteria thorough evaluation

Definition: The evaluation criteria on which the thorough selection takes place (Based on: Cooper, 2001);

Value: Criteria of the following categories may be included: strategic, product advantage, market attractiveness, synergies (leverage core competences), technical feasibility, and risk versus return;

Application: **ASML should determine evaluation criteria for their thorough evaluation.**

Opportunity selection (design principle 12): weights for the thorough evaluation criteria

Definition: The relative importance of the thorough selection criteria (Based on: Cooper, 2001; Crawford & Benedetto, 2010);

Value: Relative weights;

Application: **ASML should determine the weights of their thorough evaluation criteria.**

Opportunity selection (design principle 13): people involved in the evaluation

Definition: The people involved in the thorough evaluation of the opportunity (Based on: Crawford & Benedetto, 2010);

Value: The people involved;

Application: **Before ASML actually continues with the development of an opportunity, at least two persons should evaluate the opportunity for ASML.**

Opportunity development (design principle 14): development modes

Definition: The development mode through which organizations exploit new business opportunities (Based on: Bakker et al., 1994; Dunlap-Hinkler et al., 2010; Narayanan et al., 2009; Shane & Venkataraman, 2000; Sharma & Chrisman, 1999);

Value: Internal development inside a business unit, inside the company via (internal) corporate venturing, with partners via a strategic alliance/ joint venture/platform, acquiring a company, outside the company via a spin-off (external corporate venturing), investing in a company via corporate venture capital investments, or by selling the opportunity via licensing;

Application: Several governance modes to develop new business opportunities are identified, and compared as best alternatives for the situation at hand. However not all development options are suited for diversification opportunities. A diversification opportunity is always somewhat unrelated to the organization, as it does not directly fit into the existing reward structures and operations of the company. Therefore, internal development and internal corporate venturing are no alternatives for diversification opportunities for ASML. Venture capital investments are also not suited for the initial experimentation with diversification, as venture capital investments are made for creating future options, and are therefore aimed at the long term. As McKinsey concludes with their three horizons of growth, a company should remain balanced between short term gains, medium term gains and long term gains. On the longer term, venture capital investments are interesting for diversification, but first a medium term option should be created to gain experience with diversification. Selling an identified opportunity via licensing when not deciding to continue with the respective opportunity will not lead to diversification. Therefore, licensing is a way to create a money stream but not a means to the end of developing diversification opportunities. **Therefore, opportunities scoring high on external corporate venturing modes, with or without partners or which may include acquiring a company, are most likely to lead to successful diversification.**

Opportunity development (design principle 14): development criteria

- Definition: The value of the criteria on which the organization selects the most appropriate development mode (Based on: Burgelman, 1984; Dorf & Byers, 2008; Hill & Birkinshaw, 2008; Miles & Covin, 2002; Schildt et al., 2005; van de Vrande et al., 2009);
- Value: Corporate circumstances, operational relatedness, strategic importance, uncertainty and venturing objectives;
- Application: **ASML should determine the best development option per opportunity based upon the corporate circumstances, operational relatedness, strategic importance, uncertainty and venturing objectives.**

Appendix IV

TEST OF THE OPPORTUNITY DEVELOPMENT APPROACH

WITH TYPICAL CASES

Several cases are used to test the opportunity development approach. The cases are typical descriptions of the available opportunity development modes. Therefore, testing the opportunity development framework should result in the highest scores for the respective opportunity development modes. The case descriptions can be found in Table 21, the test results can be found in Figure 30 and Table 22. The items are scored with the limited information available in the case description. The researcher scored items for which only limited information was available by means of interpretation or assigned a random score in case of no available information. Figure 29 gives an example of the scoring model which is used for calculating scores.

Table 21: Typical opportunity development cases

Typical opportunity development cases

Case A

Typical description of opportunity development mode: internal development

Description: There is an opportunity which can almost directly be integrated into an existing business unit. However, we are not willing to invest into venturing.

Case B

Typical description of opportunity development mode: corporate venturing (internal)

Description: There is an opportunity which can almost directly be integrated into an existing business unit.

Typical opportunity development cases**Case C**

Typical description of opportunity development mode: strategic alliance / joint venture / platform

Description: Our company is missing an essential competence which is needed to develop or commercialize the opportunity. The company who has this competence is really big, but most part of this company is not needed to commercialize the opportunity.

Case D

Typical description of opportunity development mode: merger & acquisition

Description: Our company is missing an essential competence which is needed to develop or commercialize the opportunity. There is a small company who has this competence, of which we need to be in control.

Case E

Typical description of opportunity development mode: spin-off (external venturing)

Description: Our company is missing an essential competence which is needed to develop or commercialize the opportunity. There is no company who has this competence.

Case F

Typical description of opportunity development mode: spin-off (external venturing)

Description: Our company is missing an essential competence which is needed to develop or commercialize the opportunity. There is a small company who has this competence, but we do not trust them because we have a negative experience with them.

Case G

Typical description of opportunity development mode: corporate venture capital investment

Description: The opportunity concerns a really new and uncertain technology. The technology is distant from the companies' core competencies and a lot of research is necessary before the technology can be used to develop products and services.

Case H

Typical description of opportunity development mode: licensing

Description: There is a great opportunity, but it is completely unrelated to the companies' core competencies and therefore strategically unimportant.

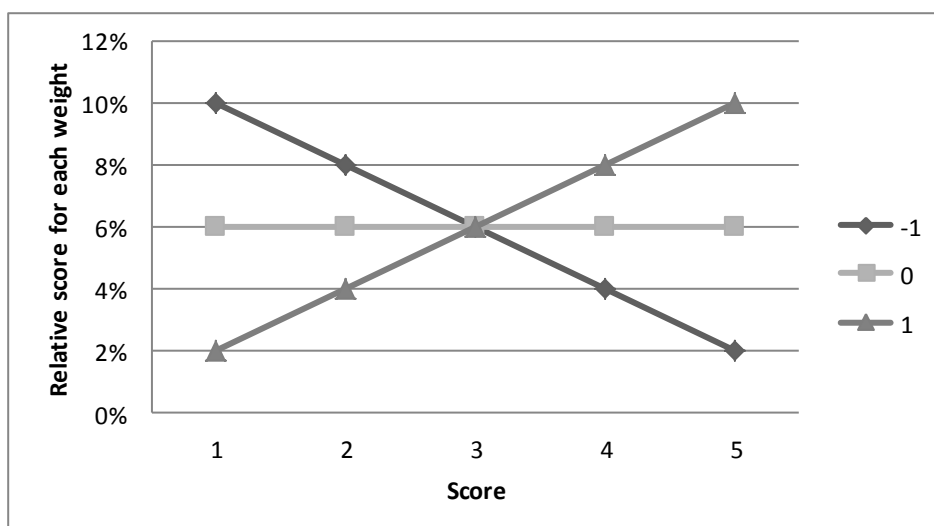


Figure 29: Example for calculating relative scores for factor -1, 0 and 1 for a weight of 10%

Table 22: Opportunity development cases tested in opportunity development framework

	Cases								Weight
	A	B	C	D	E	F	G	H	
Do you need control over the venture?	4	4	3	5	4	4	2	1	5%
Do you have the ability and willingness to commit resources to venturing?	1	5	4	4	4	4	5	1	5%
Are you willing to accept entrepreneurial risk?	1	3	4	4	4	4	5	1	5%
Is the opportunity operationally related to the company?	5	5	4	4	4	4	3	1	10%
Is the opportunity strategically important for the company?	4	4	4	4	4	4	4	1	5%
Is the environment of the opportunity turbulent?	2	2	3	3	4	5	4	4	5%
Is the technology new?	2	2	4	3	5	5	5	5	5%
Is the technological distant?	2	2	5	4	4	5	5	4	5%
Are you uncertain about cooperation?	1	1	1	2	1	5	2	1	5%
What is your venturing objective?	A	A	B	B	B	B	B	C	20%
Are there companies that you need?	1	1	5	5	1	4	5	1	15%
Are transaction costs too high?	1	1	5	1	1	1	1	1	15%
Internal Development (Case A)	<u>18%</u>	18%	13%	13%	15%	13%	11%	12%	
Corporate Venturing (internal) (Case B)	17%	<u>18%</u>	14%	13%	15%	13%	12%	11%	
Strategic Alliance / Joint Venture / Platform (Case C)	11%	12%	<u>17%</u>	16%	14%	15%	16%	13%	
Merger & Acquisition (Case D)	15%	15%	13%	<u>18%</u>	15%	17%	16%	14%	
Spinn-off (External Venturing) (Case E & F)	13%	14%	15%	13%	<u>16%</u>	15%	14%	16%	
Corporate Venture Capital Investment (Case G)	12%	11%	17%	15%	13%	15%	16%	16%	
Licensing (Case H)	13%	13%	11%	12%	13%	13%	13%	<u>18%</u>	

The letters of the typical cases are mentioned between brackets behind the development modes. The highest scores should match with the typical cases, which are the underlined percentages. The actual highest scores are bold.

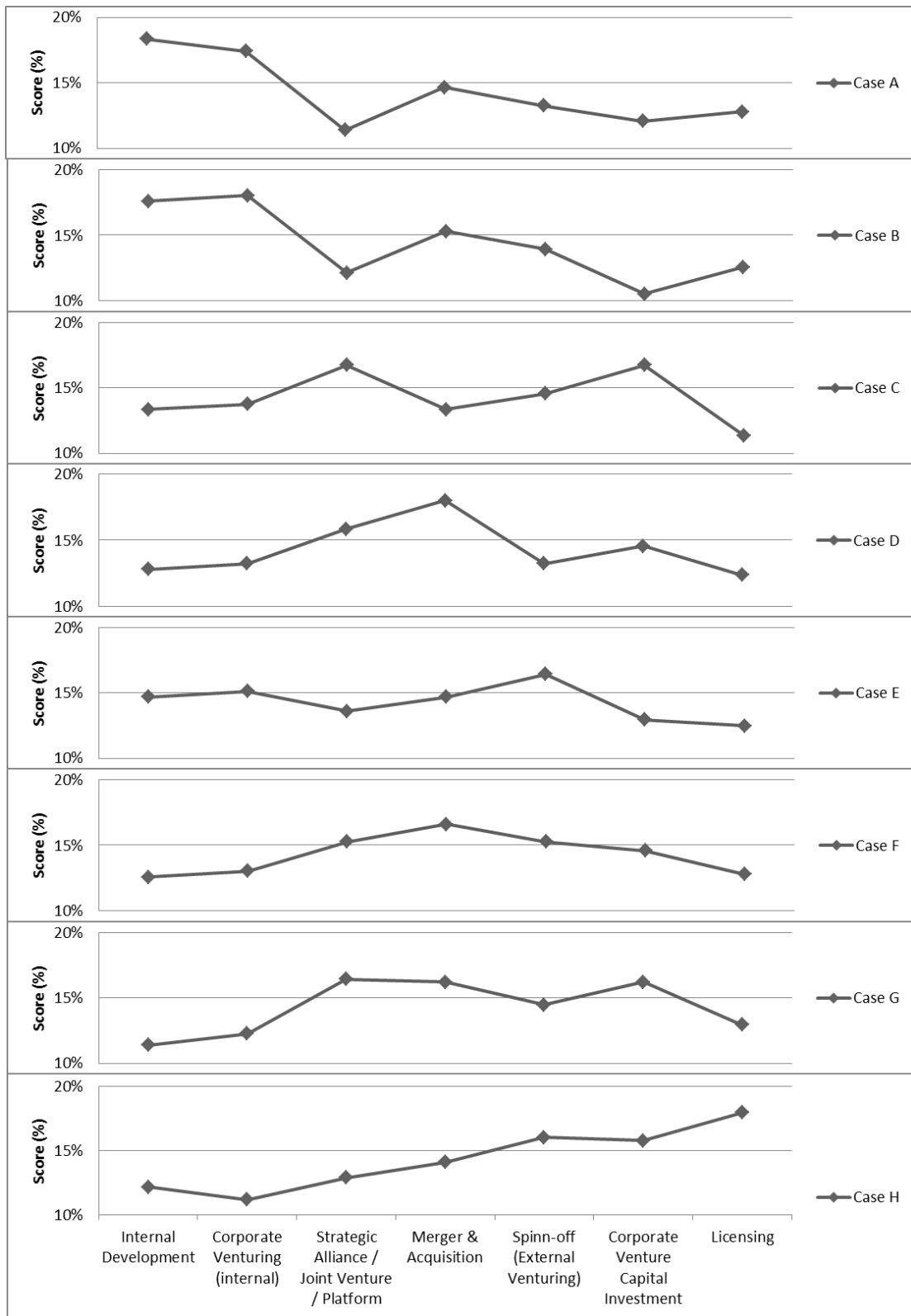


Figure 30: Case score on opportunity development modes