External Knowledge Acquisition And Transfer From Innovation Clusters To Central R&D Unit
The Mediating Role Of R&D Listening Posts As Technological Gatekeepers

Authors: Michael Ahlgrimm
Tutor: Ass. Prof. Dr. Dr. Sigvald Harryson
Program: Growth Through Innovation And International Marketing
Subject: Business Administration
Level and semester: Masterlevel Spring 2008 Baltic Business School
Acknowledgements

With these acknowledgements I would like to express my sincere gratitude and deepest appreciation to all the people who were involved in this study and contributed their time and effort to making this thesis possible.

First of all, I would like to thank my tutor Ass. Prof. Dr. Dr. Sigvald Harryson at the Baltic Business School for providing me with a very interesting and challenging topic to explore, and with the unique opportunity of collaborating with BMW Group on this project and enabling me to get valuable insights into the company, industry and the wider context of my particular field of interest. I would very much like to thank Martin Ertl and Alexander Stern at BMW Group for guiding me through the project and for all their highly appreciated input, encouragement and support. I also would like to express my deepest gratitude to Prof. Hans Jansson at the Baltic Business School, for the knowledge and learning I have attained during the whole Master’s Program in Growth through Innovation and International Marketing at the Baltic Business School in Kalmar, as well as his professional expertise and input.

Finally, I am very grateful to all my interviewees at BMW Group for their collaboration and for providing me with the information that made this thesis possible.

Kalmar, October 2008

________________________

Michael Ahlgrimm

michael.ahlgrimm@gmx.de
Abstract

Over the last few decades, the industrialized world in general and the automobile industry in particular was hit by immense changes which strongly influence the management of R&D. Trends such as globalization and sharp competition on worldwide open markets, increasing product complexity in order to meet the customers’ desires for more variety and individualization, technology fusion and cross industry innovations, high level of technological and competitive uncertainty, increasing pressure to reduce R&D budgets, and shorter time to market and reduced innovation cycles in consequence of rising competition, force companies to source external knowledge and to bring in and exploit outside-in innovations instead of reinventing them themselves. In the same way, the Open Innovation concept highlights the need for organizations to open up their innovation processes. As a consequence, many R&D organizations are being transformed in order to meet the upcoming challenges and established technological listening posts to source external knowledge in centers of technological excellence and innovation.

This study focus on the knowledge acquisition, transformation and transfer from innovation cluster to central R&D, and examines the roles and typologies of technological gatekeepers. Based on a sound literature review and in-depth qualitative study of the case company BMW, this thesis explores how technological listening posts can take the mediating role of technology gatekeepers and how different mechanisms and typologies for gatekeeping can be deployed for optimal transformation and transfer of external knowledge into internal innovation.

Keywords: open innovation, absorptive capacity, technological gatekeeper, international R&D, external knowledge sourcing and transfer, technical intelligence, technological listening posts.
# Table of contents

Acknowledgements .............................................................................................................. i  
Abstract ............................................................................................................................... ii  
Table of contents ............................................................................................................... iii  
List of figures ...................................................................................................................... vi  
List of abbreviations ........................................................................................................... vii  
1 Introduction ..................................................................................................................... 1  
   1.1 Research Background ........................................................................................... 1  
   1.2 Research purpose ................................................................................................. 3  
   1.3 Research questions ............................................................................................... 3  
   1.4 Delimitations ........................................................................................................... 4  
   1.5 The Automobile Industry ..................................................................................... 5  
      1.5.1 Collaborations .................................................................................................. 7  
      1.5.2 Increasing customer demands and expectations .............................................. 7  
      1.5.3 Differentiation ................................................................................................. 9  
   1.6 Open Innovation ................................................................................................... 10  
   1.7 Technological listening posts ............................................................................... 14  
   1.8 Organizational concepts for listening post activities ............................................ 21  
   1.9 Thesis Disposition ............................................................................................... 30  
2 Methodology .................................................................................................................. 31  
   2.1 Scientific Research Approach ................................................................................ 31  
   2.2 Research Method ................................................................................................... 33  
   2.3 The Abductive Approach ....................................................................................... 34  
   2.4 Case Study Strategy ............................................................................................... 36  
   2.5 Case Study Design ................................................................................................. 37  
   2.6 Data Collection ...................................................................................................... 38  
      2.6.1 Primary data ..................................................................................................... 38  
      2.6.2 Secondary data ................................................................................................. 39  
   2.7 Quality of research ............................................................................................... 39  
      2.7.1 Construct validity ............................................................................................. 39
2.7.2 Internal validity ................................................................................................ 40
2.7.3 External validity ............................................................................................... 40
2.7.4 Reliability .......................................................................................................... 41

3 Theoretical Framework ........................................................................................... 42
3.1 Absorptive Capacity ............................................................................................. 42
3.2 Roles in the innovation process ............................................................................ 51
3.2.1 Technological Gatekeeper / Boundary Spanner ............................................. 52
3.2.2 Champion Concept ......................................................................................... 62
3.2.3 Promotor Concept ......................................................................................... 67
3.2.4 The Change Agent ......................................................................................... 72
3.2.4.1 The change agent’s roles ....................................................................... 74
3.2.4.2 Factors in change agent’s success ......................................................... 77
3.3 Summary of Roles in the innovation process ....................................................... 79

4 Empirical Study ...................................................................................................... 84
4.1 BMW Group ......................................................................................................... 84
4.2 BMW Technology Office Palo Alto ..................................................................... 86
4.2.1 The Tech Office’s Workforce ...................................................................... 89
4.2.2 Push vs. Pull Project .................................................................................... 92
4.2.3 Technology Transfer Process ...................................................................... 94
4.2.4 Communication between Technology Office and BMW Partner Unit .......... 96
4.2.5 Communication within the Technology Office ............................................ 98
4.2.6 Exemplary Push Project Description ........................................................... 99

5 Analysis .................................................................................................................. 102
5.1 Technological Gatekeeper / Boundary Spanner ............................................... 103
5.2 Champion ........................................................................................................... 108
5.3 Promotor ............................................................................................................ 109
5.4 Change Agent ..................................................................................................... 111
5.5 Tech Office ........................................................................................................ 115

6 Conclusions .......................................................................................................... 120
6.1 Subquestion 1 .................................................................................................... 120
6.2 Subquestion 2 ................................................................................................. 124
6.3 Subquestion 3 .................................................................................................... 127
### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4 Main research question</td>
<td>129</td>
</tr>
<tr>
<td>7 Recommendations</td>
<td>134</td>
</tr>
<tr>
<td>7.1 Supporting knowledge-sharing culture</td>
<td>134</td>
</tr>
<tr>
<td>7.2 Setting R&amp;D internal objectives</td>
<td>134</td>
</tr>
<tr>
<td>7.3 Fostering and supporting networking, informal communication</td>
<td>135</td>
</tr>
<tr>
<td>7.4 Listening post: intercultural team of locals and expatriates</td>
<td>135</td>
</tr>
<tr>
<td>7.5 Face-to-face meetings and visits of listening post and central R&amp;D</td>
<td>135</td>
</tr>
<tr>
<td>7.6 Job-rotation</td>
<td>136</td>
</tr>
<tr>
<td>7.7 Relocation of marketing and sales employees to the listening post</td>
<td>136</td>
</tr>
<tr>
<td>7.8 Lead user and venture capitalist integration</td>
<td>136</td>
</tr>
<tr>
<td>7.9 Prototyping / Proof of feasibility</td>
<td>136</td>
</tr>
<tr>
<td>7.10 Building a “Skunk Works” unit</td>
<td>137</td>
</tr>
<tr>
<td>Bibliography</td>
<td>138</td>
</tr>
</tbody>
</table>
List of figures

FIGURE 1: PROGRESSION IN MATURE MARKET CONSUMER EXPECTATIONS ................................................................. 8
FIGURE 2: THE CLOSED INNOVATION MODEL ........................................................................................................ 11
FIGURE 3: THE OPEN INNOVATION MODEL ........................................................................................................... 13
FIGURE 4: PAPERS QUOTING “LISTENING POST” (PUBLISHED 1990-2008) .............................................................. 16
FIGURE 5: ARCHETYPES OF LISTENING POSTS ................................................................................................. 18
FIGURE 6: ORGANIZATIONAL CONCEPTS FOR LISTENING ACTIVITIES .............................................................. 22
FIGURE 7: DETERMINANTS OF THE ORGANIZATIONAL FRAMEWORKS FOR SCANNING ACTIVITIES .............. 28
FIGURE 8: ABSORPTIVE CAPACITY ........................................................................................................................... 48
FIGURE 9: CENTRAL GATEKEEPER VS. DECENTRAL GATEKEEPER ..................................................................... 56
FIGURE 10: INFORMATIONAL BOUNDARY SPANNING .......................................................................................... 58
FIGURE 11: THREE-STEP FLOW OF TECHNOLOGICAL COMMUNICATION .......................................................... 61
FIGURE 12: GATEKEEPER TYPOLOGIES AND ROLES IN THE INNOVATION PROCESS ...................................... 83
FIGURE 13: TECH OFFICE POSITIONING ................................................................................................................ 88
FIGURE 14: TECH OFFICE PARTNER NETWORK .................................................................................................. 89
FIGURE 15: TECHNOLOGY TRANSFER PROCESS ................................................................................................... 95
FIGURE 16: TRANSATLANTIC COMMUNICATION .................................................................................................... 97
FIGURE 17: CONFIGURATION FOR KNOWLEDGE ACQUISITION, TRANSFORMATION AND TRANSFER FROM INNOVATION CLUSTER TO CENTRAL R&D ......................................................... 130
List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>Aktiengesellschaft / Corporation</td>
</tr>
<tr>
<td>BMW</td>
<td>Bayerische Motoren Werke</td>
</tr>
<tr>
<td>D&amp;M</td>
<td>Design and Manufacturing</td>
</tr>
<tr>
<td>FMCG</td>
<td>Fast Moving Consumer Goods</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GM</td>
<td>General Motors</td>
</tr>
<tr>
<td>GmbH</td>
<td>Gesellschaft mit beschränkter Haftung/ Limited liability corporation</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>M&amp;S</td>
<td>Marketing and Sales</td>
</tr>
<tr>
<td>NIH</td>
<td>Not invented here</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>Tech Office</td>
<td>Technology Office Palo Alto</td>
</tr>
</tbody>
</table>
1 Introduction

The introduction chapter presents the research background and reasons for writing this thesis. Further, it highlights the purpose of the study, followed by the research questions and delimitations. Afterwards, I give an overview of the automobile industry and its current trends, which this thesis is focused on. The subsequent section briefly introduces the open innovation concept, followed by an overall picture about the phenomenon of technological listening posts and their set-up and activities. Finally, the thesis disposition gives an overview about this study’s structure.

1.1 Research Background

With the Open Innovation discussion gaining momentum in research and in the field, much has already been made of the need for organizations to open up their innovation processes. This effectively entails allowing both for external inflow of innovation to occur as well as enabling active outflow of non-relevant innovation spillovers through external commercialization (Chesbrough, 2003; 2006).

In faster-moving industries, organizations are already displaying business models and structures to support them which incorporate aspects of Open Innovation. Companies in “Fast Moving Consumer Goods” (FMCG), computing and high-tech sector are systematically tapping a diverse innovation network for knowledge-creation. Simultaneously, they use intermediaries or active Intellectual Property (IP) strategies to find alternative channels to market for their R&D spillovers. This phenomenon is aided by steady dispersion of the sources of innovation, to smaller, more agile firms, universities – and increasingly, these sources of knowledge originate outside of the immediate firm environment. While the proliferation of Information and Communications Technology (ICT) is a constant factor influencing the organization of the firm, the current
attention to Open Business Models (Chesbrough, 2003) bears a strong correlation to the renewed confidence in the internet, following the dot-com bust.

While having encountered empirical evidence in the above-mentioned industries, also in slower-moving industries such as the automotive industry, Open Business Models deserve closer consideration. However, although automotive OEMs have been able to successfully streamline their value-chain to an extent of up to 20 per cent vertical integration (as in the case of Porsche), R&D activities remain firmly anchored in a closed innovation model, where innovations are conceived mainly internally and commercialized through traditional channels. Continuous focus on improving efficiency has created a strong bias toward exploitation, while neglecting explorative activities. Especially in the German premium automotive industry, high competitive pressures have further eroded the incentives for more exploration and stifled attempts to introduce major amends of business models or R&D process.

With the broad knowledge base the automotive OEMs draw upon, however, skills and competencies can no longer be solely built inside. In addition to classical extramural knowledge from immediate suppliers and through classic market research, devising a way to systematically integrate a wider network of sources for innovation could be a first step toward an open business model – providing boundary-spanning (extra-industry) ideas as well as building a competence network that can be leveraged should competence in new technology fields lack internally.

First, however, processes for internal knowledge transfer must be established that take into account limited time-budget, growing self-efficacy and other barriers of knowledge transfer and absorption that have been fostered by exploitation focused organization.

Internal knowledge transfer has been mentioned in the context of absorptive capacity as a key determinant (Lenox and King, 2004),
although comprehensive models of it do not yet exist. Tushman and Katz (1980) provide a good starting point of how such a boundary-spanning activity could be structured; however, their construct requires major re-conceptualization in order to account for the factors affecting innovation in an Open Innovation world.

1.2 Research purpose

The objective of this thesis is to research how to manage and organize the transfer of knowledge and information from a company’s environment into the organization and how to secure, that this transferred knowledge can be transformed into implemented innovation. The main result of the thesis is a pragmatic analysis of benefits and drawbacks of the different gatekeeper typologies – both in practice and in theory – to develop recommendations and to give advice to interested academics and companies to take the step towards an open business model and to ensure the internal knowledge transfer and knowledge absorption.

1.3 Research questions

The above mentioned research background and purpose leads to the following main research question:

**MAIN RESEARCH QUESTION**

How can R&D listening posts acquire and transfer external knowledge effectively from innovation clusters to the central R&D unit in order to complement internal idea generation, establish a network of external competence and support its integration into internal innovation processes?
The main research question can be divided into the following three subquestions:

**Subquestion 1**
What are the typologies for and mechanisms used by gatekeepers or boundary spanners which can be discerned in the literature?

**Subquestion 2**
Which activities are included in the gatekeeping role – what are the external-internal transfer mechanisms employed in practice?

**Subquestion 3**
What are the most important gaps in the literature and how can different mechanisms and typologies for gatekeeping deployed for optimal transformation and transfer of external knowledge into internal innovation?

### 1.4 Delimitations

- The automotive industry will be the focus of this study, representative of slower-moving, mature industries
- The single case study will be based on primary research, representative for a German premium car manufacturer
- The case study’s subject of study will be BMW’s Technology Office in Palo Alto, California, USA
1.5 The Automobile Industry

The world’s automotive industry is a core industry and has been a unique phenomenon, which has dominated the 20th century. It is one of the largest and most multinational of all industries and a key indicator of economic growth, as well as a major contributor to the gross domestic product (GDP) of several European countries (EMCC, 2004). On a global level, in 1999, four of the world’s ten largest companies were in the automotive sector (EMCC, 2004).

In the middle of the 20th century, there were more than a hundred automotive producers. In the following decades, the structure of the automotive industry has changed: continuing consolidation of both producers and suppliers due to overcapacity has taken place and has led to the creation of major groups (EMCC, 2004). Following the trend of consolidation, through a series of mergers and acquisitions the number of OEMs has dropped from 30 in 1980 to 12 today (FAST 2015, 2004). As a consequence, multinational groups such as General Motors, Fiat and Saab; Ford, Volvo, Mazda and Rover; or Nissan and Renault, have emerged, and a rapid increase in global firm level concentration has taken place (EMCC, 2004). The most merging and acquisition activities took place during the late 1990s, and as a result the ten largest automobile makers accounted for 80% of the world vehicle production in 1999 (Sutherland, 2005). Beside this consolidation of OEMs, also the number of automotive suppliers is constantly decreasing and the emergence of “Mega-Suppliers” which manage considerable resources, capital and capabilities that go into OEM-independent R&D, is observable (Maurer et al., 2004). Rather than producing components following precisely clearly defined blue-prints from the OEMs, suppliers now develop and propose new designs – based on their own resources and networks, so as to offer serial development and production of complete vehicles (Volpato, 2004). Frost & Sullivan (2007) state that merger and acquisition activities will grow further especially at the supplier level. Furthermore, they forecast
INTRODUCTION

that by 2012, suppliers will be responsible for 60% of the industry’s R&D work, compared to 40% today.

Until the 1980s, the automotive industry was a growing sector. Today, however, the automotive industry has reached maturity in the Triad countries of Western Europe, the US and Japan. The sales levels are stagnating, profits declining, and the industry structure is characterized by product proliferation and stiff price competition (Maxton and Wormald, 2004). However, obsessive product proliferation only contributes little for growth, inflates the development costs, and threatens investment in needed future technologies (Maxton and Wormald, 2004). While the demand in those traditional Triad country markets develops slowly and sluggish, areas of growth have shifted to developing countries and areas with strong economic performance and low levels of car ownership, such as India, China, Eastern Europe and South America (Veloso and Kumar, 2002; VDA, 2008). Statistics for 2007 support this trend: while Western Europe and the US only show minor growth in demand, Central and Eastern Europe display a strong increase pertaining to numbers of registrations of new passenger cars, and most Asian markets show a dynamic growth in sales figures (VDA, 2008: 54-58). Thus, there is now a divided world of over-motorized countries like those in Western Europe, the US and Japan, and emerging aspirants everywhere else. However, Maxton and Wormald (2004) identify a growth problem, since the motorizing of these markets to the same extent is not possible in the nearest future.

The sluggish demand in the mature markets, as well as the shift of growth areas has increased the need, and thus the pressure upon OEMs, for diverse product offerings.

Once, lean production was the name of the game in the automotive industry, and then mass customization became the key. But today, innovation is the most effective way to differentiate from the competition.
Thereby, the automotive industry at present is influenced by several further trends, which challenge the players of the branch on their way to innovate: increasing level of collaboration, rising customer demands and responsiveness, increasing product complexity in order to meet the customers' desires for more variety and individualization, increasing level and diversity of technologies as well as technology fusion and cross industry innovations, strong need for differentiation, shorter time to market and reduced innovation cycles in consequence of rising competition (Blake et al., 2003; Gassmann and Gaso, 2004).

1.5.1 Collaborations
Nowadays, there is a growing trend among the largest OEMs of reducing the number of suppliers and forming collaborative partnerships with those that are most competitive in terms of costs and quality, but also have a high developed R&D (Veloso and Kumar, 2002). Besides cooperating with suppliers, there is also a major trend of cooperating with competitors in the automotive industry in order to reduce R&D costs, risks, and time. A recent example of such collaboration is the consortium of BMW, DaimlerChrysler and GM that works for the joint development of a new hybrid system. Also Maxton and Wormald (2004) suggest an unbundling of the automotive business involving more open co-operation and a more rational division of roles and responsibilities.

1.5.2 Increasing customer demands and expectations
Blake et al. (2003) stress a shift in the customer's demands and expectations, and in order to achieve a competitive advantage, OEMs have to find ways to meet and satisfy these increasing demands and expectations of their customers. Whereas consumer demands have long been driving technological change for a better vehicle performance and
reliability, areas such as safety, reduced environmental impact and additional consumer features have been gaining significant importance in recent years (KPMG, 2006). While new car buyers demand more and more features, the sticker price of new automobiles in comparable market segments such as compact, medium, or luxury class has remained unchanged. The following figure visualizes the increasing expectations of the customers.

Consequently, the societal but also the environmental challenges to the automotive industry are continuously increasing. Additionally, increasing product complexity in order to meet the customers’ desires as well as increasing level and diversity of technologies, technology fusion and cross industry innovations impose both new investment burdens and new
uncertainties and risks (Maxton and Wormald, 2004). This is amplified by governmental regulations in terms of safety, trade and environmental requirements.

### 1.5.3 Differentiation

Tay (2003) highlights differentiation as the most critical point which makes companies of the automotive industry solidly profitable. Further he states that today automobiles have changed from being just reliable, durable and with less noise and vibration to embrace more dynamic and emotional features. According to Tay (2003), the most visible means of differentiation is the car design, which both interior and exterior glamorizes the car brand’s image. Furthermore, Tay (2003) identifies several more issues with which an OEM can differentiate from its competitors in terms of quality (such as reliability, durability, performance, vehicle handling, comfort and convenience features, safety, driving aid technologies, customer handlings), cost/value (price, value, cost of ownership, and warranty & service), and timeliness (timeliness to market).

In summary, the automotive industry displays progression of competitive differentiation over the last century from mass production for a seller's market to mass production for a buyer’s market, to lean production, and then to mass customization. Nowadays, mass innovation is the key of competitive differentiation and the industry is affected by drivers such as consumer preferences for style, driving characteristics and performance. Additionally, governmental regulations in terms of safety, trade and environmental requirements force and urge OEMs to modernize and change design and production. Increasing competition ask for research, design innovations, and changes in the manufacturing processes and finally all car manufacturers are constantly under pressure to identify consumer preferences, national biases, and new market segments where they can sell vehicles and gain market share (Veloso and Kumar, 2002).
Furthermore, the aforementioned trends such as the industry’s ongoing consolidation, rising customer demands and responsiveness, increasing product complexity, increasing level and diversity of technologies as well as technology fusion and cross industry innovations, strong need for differentiation, and shorter time to market and reduced innovation cycles, asking for a rethinking of OEMs which are usually not able to maintain all the competences, resources, and capabilities in-house required for R&D, engineering and production of their respective product. In addition to classical extramural knowledge from immediate suppliers and through classic market research, devising a way to systematically integrate a wider network of sources for innovation becomes more and more crucial in order to gain a competitive advantage in the mature automotive industry.

1.6 Open Innovation

In recent years, a fundamental shift has emerged in how companies generate new ideas and bring them to market (Chesbrough, 2003). The new paradigm of open innovation can, according to Chesbrough et al. (2006), be understood as the oppositional notion of the closed innovation model which they describe as traditional vertical integration model where internal R&D activities lead to internally developed products that are then distributed by the company. Furthermore, Chesbrough (2003) defines that closed innovation involves developing ideas, building on them, take them to market, service them, finance them and support them internally without any external input. Thus, the notion of closed model is based on the belief that an organization should hire the most knowledgeable and experienced people in the industry, innovate internally, and safeguard the innovations by property rights, so that the competitors cannot copy them (Chesbrough, 2003). Hence, closed innovation has been a characteristic present in many large companies that have a need to highly control their innovation processes. Referring to Chesbrough et al. (2006) the innovation process is considered as “close” when impulses and projects only originate from one
source, and later after passing the development process are only moving in one direction towards the current market. This closed innovation process is illustrated in the figure below.

![Figure 2: The Closed Innovation Model](image)

Following this closed innovation model, companies have to ensure that the needed information, knowledge, and expertise is located and present within the firm’s boundary in order to innovate. This, however, becomes more and more difficult in times in which workers are more flexible and independent in terms of time and location and constantly moving from one company to another. Consequently, organizations have to face a constant loss of knowledge, skills and expertise. Furthermore, increasing product complexity, technology diversity as well as sharp competition, rising development costs and shorter time to market in most technology intense industries, calls for paradigm shift to more open business models. Therefore, Chesbrough et al. (2006) present the concept of open innovation.
In contrast to the closed innovation model, Chesbrough et al. (2006: 2) define open innovation as ‘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 thereby 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, 2004: 23). This is based on the assumption that useful knowledge is widely distributed, and that even the most capable R&D organizations must identify, connect to, and leverage external knowledge sources as a core process in innovation (Chesbrough et al., 2006). In the same way, Sawhney (2002: 26) states that today’s ‘innovation challenge has become how to best identify and use the knowledge that is available both within and outside the company’. Therefore, he further states that rather than tear down organizational walls, companies should make them permeable to information (Sawhney, 2002). Furthermore, several authors have claimed that the open innovation paradigm is not only a process that has to be implemented, but rather an entrepreneurial culture and a question of teamwork in order to innovate successfully (Kirschbaum, 2005). Also King et al. (2003: 600) argue that managers have to be ‘receptive to obtaining from external sources the resources needed to create or exploit technological innovations’, but may not be naturally open to augment their firm’s internal resources with complementary, externally acquired knowledge due to the not-invented-here phenomenon present in many organizations.

None the less, companies which follow the open innovation concept have become aware of valuable information, knowledge and expertise existing outside the own company’s walls. At the same time, firms also have realized that there is more than one way to market a product and open innovation assumes that internal ideas can also be taken to market through external channel, outside a firm’s current businesses, to generate additional value (Chesbrough, 2004; Chesbrough et al., 2006). Hence, in
the concept of open innovation is also a greater value adding contribution to society, due to the reason that ideas developed by one company can be sold to another, if they do not have the capabilities, resources or even interest to bring the idea to the market themselves (Chesbrough et al., 2006). This can take place in forms of licensing or spin-offs as the following figure of the open innovation model visualizes below.

Chesbrough and Schwartz (2007: 55) further suggest that an open innovation process, as depicted above, and ‘the use of partners in the research and/or development of a new product or service creates business model options that can significantly reduce R&D expense, expand innovation output, and open up new markets that may otherwise have been inaccessible’. Additionally, Sawhney et al. (2007) bring forward the argument that companies of an industry tend to come up with the same innovations if they are seeking for opportunities in the same places. Hence, firms viewing innovations too narrowly are blind to some valuable
and fruitful opportunities and leave them vulnerable to competitors with broader perspectives. Thus, in the course of the open innovation concept, external knowledge sourcing and the attraction of bringing in outside-in innovations instead of reinventing the wheel are becoming a crucial task for most companies, but especially for technology intensive firms. According to Gassmann (2006), the paradigm of open innovation includes various perspectives: globalization of innovation, outsourcing of R&D, early supplier integration, user innovation, and external commercialization and application of technology. In the context of open innovation, Gassmann and Gaso (2004; 2005) pay particular attention to technological listening posts as a means of technological knowledge sourcing in centers of technological excellence and innovation clusters. These corporate technology scouting outposts are further described and presented in the following section.

1.7 Technological listening posts

This section provides a literature review about the concept of technological listening posts as a means of organizations’ technological knowledge sourcing in centers of technological excellence and innovation clusters.

Over the last few decades, the industrialized world was hit by immense changes which strongly influence the management of R&D. Trends such as globalization and sharp competition on worldwide open markets, increasing product complexity in order to meet the customers’ desires for more variety and individualization, technology fusion and cross industry innovations, high level of technological and competitive uncertainty, increasing pressure to reduce R&D budgets, and shorter time to market and reduced innovation cycles in consequence of rising competition, force companies to source external knowledge and to bring in and exploit outside-in innovations instead of reinventing them their selves (Gassman and Gaso, 2004). As a consequence, many R&D organizations are being
transformed in order to meet the upcoming challenges and established technological listening posts to source external knowledge in centers of technological excellence and innovation clusters (Gassmann and Gaso, 2004). Furthermore, Gassmann and Gaso (2004) state that the accelerated progress in and the impact of software, information and communications technology over the last decade facilitates and enables a firm’s decentralized knowledge sourcing activities.

Thus, technological knowledge sourcing in centers of technological excellence and innovation clusters became a widespread phenomenon (Gassmann and Gaso, 2004). Listening posts already began as a typical Japanese phenomenon in the early 1980s, when Japanese firms launched technological listening posts first in the United States and England (Gassmann and Gaso, 2004). In the 1990s, several American and European technology-intensive companies were following and opened up technological listening posts in areas of regional concentrations and networks of companies, specialized suppliers, service providers, firms in related industries and associated institutions such as universities, research labs, standards agencies and trade associations.

Despite the increasing importance of listening post activities for technology-intensive companies, the literature reveals a gap in the field of technological listening posts and lacks contribution in terms of conceptual foundation and comprehensive description of, and frameworks for technological listening post activities.

Therefore, I tested a sample of 24 academic journals in the field of innovation, technology, and R&D management in order to find out how much the subject of listening posts attracted the interest of relevant literature. The table below visualizes the number of papers and articles
that quote the term of “listening post” (and additional related keywords) and has been published between January 1990 and June 2008.¹

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number of Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D Management</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Technology Management</td>
<td>-</td>
</tr>
<tr>
<td>Research Policy</td>
<td>-</td>
</tr>
<tr>
<td>Creativity and Innovation Management</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Management Studies</td>
<td>3</td>
</tr>
<tr>
<td>California Management Review</td>
<td>6</td>
</tr>
<tr>
<td>Journal of International Business Studies</td>
<td>3</td>
</tr>
<tr>
<td>MIT Sloan Management Review</td>
<td>3</td>
</tr>
<tr>
<td>Organization Science</td>
<td>1</td>
</tr>
<tr>
<td>Strategic Management Journal</td>
<td>2</td>
</tr>
<tr>
<td>Harvard Business Review</td>
<td>8</td>
</tr>
<tr>
<td>Research Technology Management</td>
<td>7</td>
</tr>
<tr>
<td>Technology Analysis &amp; Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>Administrative Science Quarterly</td>
<td>1</td>
</tr>
<tr>
<td>Journal of High Technology Management</td>
<td>1</td>
</tr>
<tr>
<td>Academy of Management Journal</td>
<td>-</td>
</tr>
<tr>
<td>Academy of Management Review</td>
<td>-</td>
</tr>
<tr>
<td>Management Science</td>
<td>-</td>
</tr>
<tr>
<td>Organization Studies</td>
<td>-</td>
</tr>
<tr>
<td>Journal of Business Venturing</td>
<td>-</td>
</tr>
<tr>
<td>IEEE Transactions on Engineering Management</td>
<td>-</td>
</tr>
<tr>
<td>International Journal of Technology Intelligence and Planning</td>
<td>1</td>
</tr>
<tr>
<td>Longe Range Planning</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Economic Geography</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

Figure 4: Papers quoting "listening post" (Published 1990-2008)

Source: own

The result shows that only 42 papers and articles that use the term of “listening post” has been published by the sampled journals between January 1990 and June 2008. Afterwards, I scanned the 42 papers in terms of how the subject of technological listening posts has been used by

¹ The search for papers was conducted in EBSCO data base on 08.07.2008. All journals of the sample has been searched for the following key words: “technology listening post”, “technological listening post”, “R&D listening post”, “listening post”, “technology scouting office”, “technological scouting office”, “R&D scouting office”, “technology outpost”, “technological outpost”, “R&D outpost”, “outpost”.
the author. Thereby, I checked if the article contributes to the research of listening post theory and provide conceptual findings about listening post activities, or if only a minor citation of listening posts is made without adding substance to the theory. 39 out of the 42 papers only cited technological listening posts marginal, in most of the cases in the context of empirical case studies, mentioning that case companies run a listening post without giving a theoretical foundation of the phenomenon. Only three articles provide a deeper insight into the subject of technological listening posts and contribute to the theory which shows that relevant academic literature neglected the phenomenon so far.

The R&D management literature already described an ongoing trend towards the internationalization of industrial R&D in order to find market closeness and exploit resources in regional centres of technological excellence over the past decades. Recent research in this context reveals a link between technology scouting and foreign direct investment. Kuemmerle (1997) observed that companies undertake foreign direct investment and establish new R&D sites with the primary objective to access and tap unique knowledge and resources from competitors and universities. Hence, these firms locate their new R&D sites in regional clusters of scientific excellence in order to acquire valuable knowledge and let information flow from the foreign laboratory to the central lab at home (Kuemmerle, 1997). Nonetheless, rich and profound literature concerning technological listening posts is almost completely missing.

Oliver Gassmann and Berislav Gaso provide a first comprehensive description of listening posts with their 2004 paper. Their research reveals various types of listening posts and their strategic missions, roles and success factors.

Gassmann and Gaso (2004: 4) define a listening post as a ‘peripheral element of a decentralized R&D configuration with a specific strategic mission and sophisticated mechanisms for knowledge sourcing’. In the
course of their research, Gassmann and Gaso (2004) identified three archetypes of listening posts: trend scout, technology outpost and matchmaker. These three types of listening posts are different organization forms and are categorized in accordance to their alignment and the type of knowledge they process (Gassmann and Gaso, 2004). This classification is visualized in the figure below.

![Figure 5: Archetypes of listening posts](source: Gassmann and Gaso (2004: 7))

The alignment of the listening post indicates either the access to direct knowledge sources or the use of indirect knowledge intermediaries. Access to direct knowledge sources refers to first-hand, personal contacts to information and knowledge regarding technical changes (Gassmann and Gaso, 2004). In contrast, indirect knowledge intermediaries source
knowledge on a market basis through relationships, partnerships, collaborations, co-developments, joint ventures and alliances that are characterized by a high degree of mutual learning (Gassmann and Gaso, 2004).

The type of processed knowledge is distinguished in trend & application knowledge and technological knowledge. Trend knowledge refers to trends that are either significant and market-place shaping or rather specific and display changes and preferences in lifestyle, culture and attitudes. Application knowledge entails information about future products and how to recombine existing technologies (Gassmann and Gaso, 2004). On the other hand, technological knowledge encompasses complex and sophisticated tacit knowledge that is unique and hard to imitate (Gassmann and Gaso, 2004).

Based on their classification of listening posts, Gassmann and Gaso (2004) describe the three archetypes as follows:

**Trend Scout**

Trend scouts are usually located in lead markets, innovation clusters and trendy areas. Their mission is to acquire and gather trend and application knowledge and transfer it to their home-base R&D. Thereby, trend scouts focus on technological trends, new application areas and future potential in consequence of a changing society (Gassmann and Gaso, 2004). Even though trend scouts are not strongly regional embedded they exhibit a high sensitivity to local markets (Gassmann and Gaso, 2004). Gassmann and Gaso (2004) observed that trend scouts are centrally coordinated and job rotation programmes with the home-base R&D are often used to transfer tacit knowledge.
Technology outpost

The technology outpost’s mission is to gather sophisticated technological knowledge and transfer technologies to its home-base R&D (Gassmann and Gaso, 2005). Therefore, technology outposts are typically located in areas of technological excellence with access to academic institutions and innovative high-tech organizations. They exhibit a high degree of regional embeddedness and maintain a close relationship to scientific communities and university collaborations are of great importance (Gassmann and Gaso, 2004). At the same time, technology outposts are highly independent from their central R&D and can work autonomically with a confirmed top management commitment (Gassmann and Gaso, 2004).

Matchmaker

Matchmakers are highly regional embedded, are often organized autonomously and maintain a huge informal network (Gassmann and Gaso, 2004). Their mission is to initiate, leverage and establish contacts and cooperations, and to broker between their home company and partners (Gassmann and Gaso, 2004). Thus, they act as an ambassador of a company and aim to open up foreign innovation sources and match them with the home-base organization (Gassmann and Gaso, 2004).

Beside the aforementioned physical listening posts, Gaso (2005) identified also virtual listening posts. These virtual matchmakers are firm's internet interfaces that are set up to target innovators (who are completely new to the company) and attract outside-in innovation (Gaso, 2005). They are highly centrally managed and either located on the company's website or operated in collaboration with third-party providers (Gaso, 2005).

After Gassmann and Gaso (2004) identified various archetypes of technological listening posts, their 2005 paper is dedicated to the
organizational frameworks and concepts that are underlying listening post activities. Their findings are presented in the following section.

1.8 Organizational concepts for listening post activities

In order to conduct monitoring, scouting and acquisition activities in centres of technological excellence, firms must hold some sort of organizational structure and coordination. Technology intelligence literature most often provide typologies of technology intelligence structures that are based on formalized models, consisting of a centralized technology intelligence unit at the corporate level and some additional (internal and/or external) decentralized technology intelligence elements such as technological gatekeepers internal venture capital funds, lead users, and external expert networks (Gaso, 2005). Lichtenthaler (2000, 2004) distinguishes three forms of corporate coordination of technology intelligence processes: structural, hybrid, and informal. His empirical research shows that coordination of technology intelligence processes cannot be limited to structural coordination; rather hybrid and informal forms of coordination are used simultaneously in most organizations (Lichtenthaler, 2004). Furthermore, several factors such as company culture, technology life cycle, basic company structure, innovation strategy, decision-making process, and the industrial sector influence the organizational structure of technology intelligence activities (Gassmann and Gaso, 2005).

Based on exploratory research, Gassmann and Gaso (2005) reveal three different organizational concepts for listening post activities: ad-hoc constellations, temporary-overlaying organizations, and institutionalized scanning units. These three concepts are categorized according to the external transparency of the environment and internal information needs, as visualized in the figure below.
The two dimensions of “internal information needs” and “external transparency of the environment” are strongly linked. The company’s internal information needs are either focused or ample. Focused internal information needs implies a low uncertainty in regard of technological scenarios and are observed in organizations that have a high affinity with existing products and therefore focus on adaptation and improvement of those products (Gassmann and Gaso, 2005). In contrast, ample information needs emerge when a firm faces high uncertainty pertaining future alternatives and shows low affinity with existing products (Gassmann and Gaso, 2005). Those firms are driven by the identification
of new technologies, applications and potential markets, and the discovery of new technology platforms and cross-sectional technologies (Gassmann and Gaso, 2005).

Gassmann and Gaso (2005: 245) determine the external transparency of the environment as the ‘straightforwardness of an industry as well as its actors, customer needs and boundary conditions’. These antecedents are either deterministic and extrapolatable, or of discontinuous character (Gassmann and Gaso, 2005).

Along internal information needs and external transparency of the environment, Gassmann and Gaso (2005) distinguish and describe the organizational concepts “ad-hoc constellations”, “temporary-overlaying organizations”, and “institutionalized scanning units” as follows:

**Ad-hoc constellation**

Ad-hoc constellations gather information in a discontinuous and uncoordinated manner. Thereby, they have a high-degree of autonomy, only poor resources and limited access to informal sources (Gassmann and Gaso, 2005). Ad-hoc constellations emerge typically as the result of personal and professional interests of particular R&D employees or in the course of projects-specific information needs and are thus highly dependent upon the personal network of employees (Gassmann and Gaso, 2005). Thus, their activities are not part of a systematic technology and suffer from weak methodological competencies for scanning tasks (Gassmann and Gaso, 2005). The ad-hoc constellations’ aim is to collect technology-specific information in order to improve and adapt existing products (Gassmann and Gaso, 2005).
**Temporary-overlaying organization**

Temporary-overlaying organizational forms are highly flexible and have discontinuous character, but projects follow a coordinated and standardized process (Gassmann and Gaso, 2005). Projects encompass both focused and ample information needs as well as manageable and non-manageable external environments (Gassmann and Gaso, 2005). Thereby, they are usually focused on certain technology areas, but also directed to identify and react on environmental changes (Gassmann and Gaso, 2005). These temporary-overlaying projects are not formally connected to the strategy process but can achieve a strategic impact through decisions and results that become part of strategic technology planning (Gassmann and Gaso, 2005). Projects are realized through one project manager and an interdisciplinary and boundary spanning team with well-balanced technological and methodological competencies that is tapping formal and informal sources and accessing internal and external networks (Gassmann and Gaso, 2005).

**Institutionalized scanning unit**

Institutionalized scanning units are formally anchored in and controlled from the home-base organization. They are usually set up if the organization faces internal information needs that are ample and an external environment that is perceived as highly dynamic (Gassmann and Gaso, 2005). Gassmann and Gaso (2005) classify four different types of institutionalized scanning units: (1) corporate scanning units, (2) business unit scanning units, (3) embedded scanning units, and (4) scanning networks.
Corporate scanning unit

According to Gassmann and Gaso (2005), corporate scanning units experience an assignment of tasks over hierarchies and departments. They continuously scan for new technologies and application knowledge, and coordinate all scanning activities such as listening posts within the company (Gassmann and Gaso, 2005). The scanning unit is centrally financed and its workforce is highly methodological and professional skilled, maintain a continuously growing internal and external network, and uses informal as well as formal sources (Gassmann and Gaso, 2005). Characteristic for corporate scanning unit is the existence of job descriptions, standardized processes and organizational directives. Well-integrated in and linked to strategy development processes as well as to technology strategy processes, corporate scanning units achieve high strategic impact (Gassmann and Gaso, 2005).

Business unit scanning unit

Similar to the aforementioned centralized scanning units, Business unit scanning units experience an assignment of tasks over hierarchies and departments and have job descriptions, standardized processes and organizational directives (Gassmann and Gaso, 2005). They also achieve high strategic impact, but in contrast, they emerge when decision-making responsibilities are located in strategic business units/business groups, and are locally financed (Gassmann and Gaso, 2005). The business unit scanning units’ mission is to continuously scan for new technologies and application knowledge and to coordinate all scanning activities within the scope of the business unit (Gassmann and Gaso, 2005). The employees of decentralized scanning units exhibit high methodological and professional competencies, use a broad array of informal and formal
sources, and maintain strong internal and external networks (Gassmann and Gaso, 2005).

*Embedded scanning unit*

The organizational form of embedded scanning units emerge on corporate as well as on business unit level and their scanning function is often integrated within other business functions such as technology management, market intelligence or strategic planning (Gassmann and Gaso, 2005). Embedded scanning units are typically anchored in strategic business functions and thus achieve high strategic impact by passing scanning results seamlessly over to strategy processes (Gassmann and Gaso, 2005). All scanning activities are financed and coordinated through the respective business function. The employees exhibit a strong technical expertise and average methodological background, maintain a strong internal network and tap both formal and informal sources (Gassmann and Gaso, 2005). Job descriptions, organizational directives and the integration within other business functions characterize the embedded scanning unit (Gassmann and Gaso, 2005).

*Scanning networks*

Centrally financed scanning networks occur to meet ample internal information needs and hardly manageable external environments (Gassmann and Gaso, 2005). Their mission is to identify new technologies or unknown markets and to gather information continuously under discontinuous constraints (Gassmann and Gaso, 2005). Thereby, scanning networks have excellent access to internal and external high quality expert networks and relevant information with a focus on informal sources and tacit knowledge. The configuration of scanning networks is coordinated by a network leader with strong methodological and
communicative skills, and an explicit job description and standardized processes (Gassmann and Gaso, 2005). Gassmann and Gaso (2005) mention high communication intensity, coordination and mutual trust within the network as critical success factors. The strategic flexibility and concentration on competencies makes networks highly appropriate in order to identify radical innovations (Gassmann and Gaso, 2005).

Thus, Gassmann and Gaso (2005) identified and described three different principal concepts of organizing scanning activities. In summary, ad-hoc constellations and temporary-overlaying projects have discontinuous character and are characterized by informal procedures and high professional competencies. These configurations are driven and motivated by content acquisition and the wish to learn (Gassmann and Gaso, 2005). In contrast, institutionalized scanning units acquire and gather information continuously and structured processes and strong methodological competencies are the basic of this concept, while highly skilled information experts are gathering information (Gaso, 2005).

Despite the classification of the three aforementioned different concepts, Gaso (2005) observed that instead of following strictly one of these concepts of organizing scanning activities, rather hybrid configurations of scanning activities emerge in practice. Organizations that run corporate scanning units, often use at the same time informal scanning networks, ad-hoc constellations or temporary configurations on a decentralized level (Gaso, 2005).

Based on their empirical investigations, Gassmann and Gaso (2005) identified four determinants that are relevant in order to choose a specific organizational framework for listening post activities: knowledge acquisition, knowledge assessment, knowledge transformation, and knowledge application.
The figure above visualizes the four determinants of the organizational frameworks and their fit with the three principal concepts of scanning activities. The first determinant of knowledge acquisition is linked to the firm’s or listening post’s ability to identify and acquire externally generated knowledge (Gaso, 2005). Knowledge acquisition is based either on formal and/or informal sources. Explicit knowledge which is easily articulated and
documented is usually codified and communicated through formal sources, while implicit knowledge is typically acquired through informal sources (Gassmann and Gaso, 2005). Implicit knowledge is highly contextual information and related to particular processes and problems, and therefore hard to codify and handle.

Knowledge assessment describes the firm’s or listening post’s processes and competencies to analyze, interpret and understand externally acquired information (Gaso, 2005; Szulanski, 1996). Gassmann and Gaso (2005) suggest that professional and methodological competencies are the most important criteria in order to assess knowledge. Professional competencies imply the analytical capability to interpret and assess technological information and trends, while methodological competencies refer to observing capabilities such as conducting inquiries and applying decision tools (Gassmann and Gaso, 2005). Ad-hoc constellations are typically driven by R&D employees’ personal interest and project-specific needs, and staffed with expert technicians in charge of acquiring and assessing external information (Gassmann and Gaso, 2005). In contrast, institutionalized scanning units exhibit a large number of information experts with both technical and methodological competencies (Gassmann and Gaso, 2005).

Knowledge transformation refers to the capability to refine processes and routines which allows a company or listening post to combine existing and newly acquired and assessed knowledge (Zahra and George, 2002; Gaso, 2005). The wish to acquire new competencies requires a high degree of internalization in order to transform external knowledge (that augments existing competencies) into internal knowledge, and is typical for institutionalized scanning units (Gassmann and Gaso, 2005). On the other hand, ad-hoc constellations exhibit usually a low degree of internalization but a high affinity to existing competencies. In this case, external technological information only enhances the existing competencies (Gassmann and Gaso, 2005).
The fourth determinant is the type of knowledge application and describes a firm’s or listening post’s ability to augment existing competencies and to build new competencies through a successful transformation of external knowledge (Gaso, 2005). According to Zahra and George (2002), this process takes place either accidentally or in a planned way. Institutionalized scanning units are strategic embedded and apply knowledge systematically and continuously, while ad-hoc constellations act rather discontinuously and apply knowledge only sporadically (Gassmann and Gaso, 2005).

In summary, Gassmann and Gaso (2005) reveal three principal organisation forms of scanning activities: ad-hoc constellations, temporary-overlaying projects and institutionalized scanning units. The efficiency of these three concepts is influenced by the four determinants of knowledge acquisition, knowledge assessment, knowledge transformation, and knowledge application. Finally, Gassman and Gaso (2005) conclude that only institutionalized scanning units are suitable organizational configurations for the management of technological listening posts, while ad-hoc constellations and temporary-overlaying projects are not suited.

1.9 Thesis Disposition

Chapter 1 Introduction
Chapter 2 Methodology
Chapter 3 Theoretical Framework
Chapter 4 Empirical Study
Chapter 5 Analysis of the Empirical Results
Chapter 6 Conclusions
Chapter 7 Recommendations
2 Methodology

In this chapter I present the methodology applied in this thesis. First, the scientific research approach is described, followed by the research method. The next section outlines how theory and empirical findings are combined in the abductive approach. In order to conduct a research, the chosen strategy and the case study design is presented. Afterwards, I give an overview how to collect the needed data, while the last section discusses the quality of research.

2.1 Scientific Research Approach

According to Andersen (1998), the researcher who is going to conduct a research has first to decide what his own scientific position is. Patel and Davidson (2003) mention in this context that the scientific approach mirrors the researcher’s view on the surrounding world, philosophy, science, and what is considered as knowledge. In order to chose and apply the most suitable approach, Patel and Davidson (2003) suggest that the researcher has to have an overview of what different scientific approaches exist. Therefore, the most common scientific approaches are presented in the following section.

Positivism and hermeneutics are the two predominant scientific approaches in organizational research (Brannick and Coghlan, 2007), and can be considered as completely oppositional notions. According to Fisher (2004), positivism is based on the belief that an external reality exists and a value-free knowledge of things is possible (Fisher, 2004). In contrast, according to Brannick and Coghlan (2007: 6), the hermeneutical approach is based on the assumption that ‘there is no objective or single knowable external reality and that the researcher is an integral part of the research process, not separate from it’. Moreover, there are authors who take a more balanced stance between the aforementioned oppositional
approaches. Fisher (2004), for instance, calls for a distinction between realism and positivism, arguing that while both approaches believe in the power of science and rational thought to comprehend and manipulate the world, realism recognizes the subjective nature of research and the inevitable role of values in it. Referring to Fisher (2004: 35), realist researchers believe that ‘the knowledge we gain through research can accurately mirror reality itself’, but the difference from a more extreme positivist point of view is, that ‘the image may be distorted by the intrusion of subjectivity into the process of knowing’. Thus, realists delimit themselves by claiming that knowledge never entirely mirrors the object of study. Another more balanced scientific approach is interpretivism. Interpretative research is explained by Merriam (1998) as understanding the phenomenon of interest from the participant’s perspective. Thus, researchers who take an interpretivistic approach believe that reality is socially constructed which is characterized by how the researcher interprets reality as well as how other people interpret it, and how these interpretations relate to each other (Fisher, 2004). In the same way, Patel and Davidson (2003) refer to interpretivism as a systematic reflection through that the researcher gets an understanding of the structures that exist in people’s view of the surrounding world.

With respect of the two major paradigms, I consider the interpretivistic approach as most suitable for the purpose of this thesis and thus this study will follow an interpretivist methodology by studying organizational behavior first hand as preferred to relying on ‘hard’ tangible data, models and variables. This is supported by Harryson (1998: 24) who holds that ‘obtaining first-hand knowledge of the subject under investigation yields the best exploration and understanding of the subject’. Furthermore, an interpretivist approach provides a sound framework of data collection, especially in areas where tangible facts fail to cover and explain phenomena.
2.2 Research Method

According to Andersen (1998), qualitative research is the appropriate method to achieve a deeper understanding of a subject. Holliday (2002) adds that a qualitative study is open-ended which gives the researcher the opportunity to discover unforeseen areas. Furthermore, the qualitative research method is also aligned with the interpretivistic approach (Fisher, 2004), which is presented in the previous section. Hence, qualitative research will be used in this thesis.

Beside several types of research strategies such as experiments, survey, archival analysis, and history, Yin (2003) points out that qualitative research through a case study is preferable in order to find answers to research questions that start with “why” and “how”, when the researcher has little control over events. Further, Yin (2003) emphasizes how qualitative research through case study research provides a sound tool for investigation of a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident, and where multiple sources are used. Also Merriam (1998) argues that qualitative research is undertaken if there is a lack of theory, or existing theory fails to adequately explain a phenomenon. Additionally, Merriam (1998) highlights, that the design of a qualitative study is emergent and flexible, as well as responsive to changing conditions of the study in progress.

In the context of this study, it is required to cover new ground in an area of research which has not been adequately covered yet. Currently, the related literature fail to cover the subject studied in sufficient depth. That is the reason why I will use the existing theory and closely related literature to the subject of this thesis in order to arrive at an approximation of a theoretical typology of the phenomenon of technological gatekeeper.

The research topic of this thesis requires extensive use of exploratory research methods, which offers variety of options to be employed.
According to Fisher (2004: 140), these options encompass interviews, observation, and document analysis. All these tools are considered and used within the case study of this thesis.

Later, I will give a more detailed justification for the rationale behind using a case study based approach, describing which advantages and disadvantages occur and how I have designed the case study of this thesis.

### 2.3 The Abductive Approach

According to Patel and Davidson (2003), there are three different approaches how researchers can connect theory and reality: deductive approach, inductive approach, and abductive approach.

Fisher (2004) describes that the deductive approach is applied when a researcher draws conclusions from already existing principles and theories. According to Patel and Davidson (2003), the deductive approach strengthens the objectivity of the research by using the already existing theory as starting point for the research. On the other side, they argue that the deductive approach can affect and direct the research towards a specific direction, and thus delimit new discoveries. Atkinson and Delamont (2005: 833) describe the purely deductive logic as one that ‘cannot account for the derivation of fruitful theories and hypotheses’.

In contrast, the inductive approach is characterized by a research that goes out in the field without any prior knowledge about the subject that is going to be studied. Silverman (2005) summarizes the inductive approach as idea to grasp reality in its daily accomplishment. Without any existing theories inhibiting the research, the researcher is more likely to make discoveries and revealing new knowledge more or less unconditionally (Patel and Davidson, 2003). Atkinson and Delamont (2005: 833) alert that
a purely inductive logic ‘never transcends the collection and aggregations of observations in generating generalizations’.

Instead of following either the isolated deductive approach or the inductive approach, Atkinson and Delamont (2005: 833) suggest to use the abductive approach which is a combination of both logics ‘through which analysts explore the social or natural world through practical engagements with it, derive working models and provisional understandings, and use such emergent ideas to guide further empirical explorations’. Referring to Dubois and Gadde (2002), the abductive approach is a combination of deduction and induction in which the researcher produces knowledge as systematic combining. They define systematic combining as ‘a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality’ (Dubois and Gadde, 2002: 536). Dubois and Gadde (2002: 555) further state that systematic combining is especially suitable for case studies when they provide ‘unique means of developing theory by utilizing in-depth insights of empirical phenomena and their contexts’. Moreover, they (Dubois and Gadde, 2002: 555) explain that ‘the researcher, by constantly going back and forth from one type of research activity to another and between empirical observations and theory, is able to expand his understanding of both theory and empirical phenomena’. Thus, the abductive approach is preferred if the researcher’s objective is to discover new things (Dubois and Gadde, 2002).

The abductive approach is used for this thesis, since Dubois and Gadde (2002) state that systematic combining gives the possibility to identify new issues during the evolving framework which in turn might create a need to redirect the theoretical framework. By ‘going back and forth between framework, data sources, and analysis’ (Dubois and Gadde, 2002: 556) my objective is to match theory and reality in order to enrich the theory by utilizing the empirical findings.
2.4 Case Study Strategy

A case study is defined in various ways. According to Eisenhardt (1989: 534), ‘the case study is a research strategy which focuses on understanding the dynamics present within single settings’. Merriam (1998: 27) defines case studies as ‘an intensive, holistic description and analysis of a single instance, phenomenon or social unit’. The strategy used depends mainly on the research question at hand. Yin (2003: 13) argues that the case study as a strategy has a distinct advantage when “how” or “why” questions are being asked, when the research focuses on a contemporary phenomenon within its real-life context, and when the investigator has little or no control over events.

As mentioned earlier in this chapter, the qualitative research method is considered as most suitable for my thesis and therefore case study research has been chosen as the strategy to collect the qualitative data. In the case of the research question this study aims to cover, a “how” question is asked. Further, the phenomenon I attempt to explain has not yet been sufficiently documented or analyzed in the literature.

Criticism of case study research implies that researchers have allowed personal bias of themselves or interviewee’s personal views to influence and misdirect their research, resulting in a distorted representation of the data studied. Yin (2003) highlights that researchers must not make inferences in case study material and must work hard to report all evidence fairly. Therefore, in my research I have ensured that the views presented in the case study originate from several sources, so that findings did not rely on subjective opinions. Another point of criticism states that case study research simply takes too long and results in unwieldy documents (Yin, 2003). This has been addressed by taking care that the case study is accessible and focused, with a clear and concise structure.
2.5 Case Study Design

According to Yin (2003: 27), ‘a research design is the logic that links the data to be collected to the initial questions of study’. Thereby, Yin (2003) classifies four different types of case study designs which are single-case holistic, single-case embedded, multi-case holistic, and multi-case embedded. Holistic case studies examine the global nature of an organization, while embedded case studies also examine one or more subunits within the unit of analysis.

I have designed a single-case embedded research design for this thesis, which is intended to ensure rich and compelling data. This is critical to capture all relevant information, and to get a deeper insight and sound understanding of gatekeeper typologies applied in practice, especially in form of listening post activities. The decision to conduct a single-case design was based on several rationales. First, the author was permanently placed in the case company and thus had access to different data sources as well as to the business unit that acts as technological gatekeeper. Hence, the author benefits from an in-depth insight. Secondly, gatekeeping activities in forms of technological listening posts are a sensitive and strictly confidential part of a company’s strategy and therefore it was not possible to get access to further case companies and their listening post activities. This point is supported by Yin (2003) who highlights that a rationale to select a single-case is given, when the investigator studies a revelatory case which gives him the opportunity to observe and analyze a phenomenon that is hardly accessible. Thirdly, this single-case study might represent a significant contribution to knowledge and theory-building, as well as it can help to refocus future investigations in the field of technological gatekeeping in form of listening post activities. Finally, also an in-depth single case research requires extensive time and resources, so that I have been restricted to one single case within this thesis.
As mentioned before, this single-case study is based on in-depth primary and secondary data and is described extensively. Subsequently, there will be a section analyzing the case study and aligning the empirical findings and results with the theory.

2.6 Data Collection

2.6.1 Primary data

The primary data for this study was collected through a series of interviews with different employees and alumni of the Technology Scouting Office in Palo Alto. Denzin and Lincoln (2000: 645) define interviews as ‘one of the most common and powerful ways, in which we try to understand our fellow human beings’. Yin (2003) points out that interviews are vital sources for collecting data and case study information. Denzin and Lincoln (2000) distinguish between structured interviews, in which the interviewer asks the same series of pre-determined questions with a limited set of response options, and unstructured interviews, which provide an unlimited set of questions and answering possibilities. Klandermans and Staggenborg (2002) add a third type of interview, the semi-structured interview, in which the interviewer is guided by a consistent set of questions, but has still the freedom to deviate from those in order to ask deepening questions and touch upon related areas. Supported by Goulding (2005) who suggest that semi-structured interviews generate rich and detailed information, and are flexible enough to allow the discussion to touch other areas, which might not have been previously considered, this thesis’ interviews have been conducted in a semi-structured form. Most of these interviews were face-to-face interviews, while one interview has been conducted via telephone and one via email. In accordance with Fisher (2004), questions pertaining to the topic were gathered and then structured according to sub-topics or categories such as communication and project structure.
2.6.2 Secondary data

Secondary data was used to gain insight into the industry, the case company and the unit examined. Furthermore, secondary data was drawn from the different literature streams that make up the theoretical framework. Additionally, I used articles and journals, as well as other theses and dissertations published in related subjects.

2.7 Quality of research

Merriam (1998: 198) mentions that ‘research results are trustworthy to the extent that there has been some accounting for their validity and reliability, and that qualitative researchers need to address the concerns or even challenges from outsiders’. Furthermore, Yin (2003) stresses that a research design is supposed to represent a logical set of statements. In order to address these concerns within the case study design, Yin (2003: 40) suggests a number of logical tests to establish and prove the quality of the research: (1) construct validity, (2) internal validity, (3) external validity and (4) reliability.

The following paragraphs describe how the research design of this thesis covered these four logical tests in order to provide a scientific sound and reliable study.

2.7.1 Construct validity

In order to address the criticism of case study research that this research method lacks a ‘sufficiently operational set of measures and that subjective judgment is used to collect the data (Yin, 2003: 41), I considered the importance of multiple sources of evidence and used them to validate the case study findings. Research of secondary sources as well as company-internal documents, but also several interviews with different
Interviews have been conducted. Furthermore, excerpts from the interviews and documents were cited in order to provide a chain of evidence. Finally, the entire case study was presented to and reviewed by the interviewees to double-check the given information and materials.

2.7.2 Internal validity

Internal validity is in accordance to Yin (2003: 43) mainly critical for causal or explanatory studies, in which the researcher is trying to determine whether event x led to event y. The only way to address the internal validity is to test and ensure that inferences which are made along the case study are correct. Yin (2003: 43) suggests that ‘the analytic tactic of pattern-matching is one valid test for internal validity’. This will be made within this study through a comparison of patterns or typologies that emerge from the theoretical literature and those of the empirical results and findings of the case study. This will work two-ways, exemplifying the related theory and at the same time founding the case study findings on a theoretical basis.

2.7.3 External validity

External validity refers to which extent a study’s findings are ‘generalizable beyond the immediate case study’ (Yin, 2003: 43). Yin (2003) suggests that the use of replications and the conduction of multiple-case studies address the problems of analytical generalization and increase the external validity. However, this study contains a single-case study and the findings might not be generalizable beyond this case study. Therefore, according to Yin (2003: 44) ‘an analyst should try to generalize findings to “theory”’, which then might become the vehicle for examining other cases’. Thus, first I classified typologies of gatekeepers emerging from the literature review, matched the theory with the findings from the case study and combined both to an ideal gatekeeper typology.
2.7.4 Reliability

According to Yin (2003) case study data is considered as reliable if a later investigator, who follows exactly the same procedures and conducts the same case study all over again, will arrive at the same findings and conclusions as the one who originally conducted the research. In the same way, Merriam (1998: 205) defines reliability as ‘the extent to which findings can be replicated’. Furthermore, Yin (2003) stresses that the goal of reliability is to decrease the number of errors and the degree of subjectivity in a case study. In order to address the problem of reliability, Yin (2003) calls for the need to document the procedures of the case study. Further he suggests to make all steps of the case study research as operational as possible. This has been achieved by following a semi-structured questionnaire. Additionally, all the collected data is saved and stored in a case study data base.
3 Theoretical Framework

This chapter presents the theoretical framework I have utilized throughout my thesis. The first section of the theoretical framework provides an extensive introduction of the concept of absorptive capacity as an organizational ability to utilize external knowledge. The second section contains a literature review about the technological gatekeeper and further illustrates the typologies already extant in the literature pertaining to gatekeeping individuals and important roles within a firm’s innovation process. Thus, the theoretical framework acts as inspiration and guidance for this thesis’ research, as well as it builds the basis to draw the analysis, conclusion and recommendation chapters upon.

3.1 Absorptive Capacity

This chapter introduces the term and the concept of absorptive capacity. With the increasing importance of and the shift to the Open Innovation paradigm organizations are challenged to develop their absorptive capacities. Absorptive capacity is a key determinant of an organization’s ability to absorb and exploit external knowledge. Especially in the context of Open Innovation, absorptive capacity represents the firm’s crucial capability to benefit from the technological opportunities of the firm’s external environment. The absorptive capacity concept describes critical firm-level characteristics that are necessary for an effective and successful integration of external knowledge. Thus, this chapter deals with one of the key mechanisms that enable an organization to create competitive advantage through an ability of learning and integrating external knowledge to remain successfully in fast changing business environments.
In the past two decades absorptive capacity has been the subject of extensive research and occurred across different fields such as strategic management, technology management, international business, organizational economics, and innovation management. A lot of research reveals the importance of absorptive capacity and its inherent effects, and stresses the concepts’ contribution to the understanding and analysis of diverse, significant and complex organizational phenomena. This chapter gives an overview of the absorptive capacity concept by highlighting the prevailing notions found in the literature. Thereby, the literature review provides insight into the dimensions, determinants, and mechanisms affiliated to absorptive capacity. Moreover, this chapter will describe how absorptive capacity contributes to bring a firms’ organizational learning in line with its external environment, and which key mechanisms enable the organization to benefit from rich and wide external opportunities which the Open Innovation paradigm implies.

The research into and literature about absorptive capacity concurs in the conclusion that absorptive capacity contributes to an organization’s ability to manage knowledge. Studies reveal that lack of absorptive capacity was the most significant barrier to knowledge sharing (Szulanski, 1996). However, the interpretation of the absorptive capacity concept as well as the operationalization of the construct and its underlying dimensions lacks standardization (Zahra & George, 2002).

Cohen and Levinthal spent a considerable amount of research on how organizations absorb new knowledge and originally coined the term of absorptive capacity in their 1989 paper in the Economic Journal by defining it as ‘a firm’s ability to identify, assimilate, and exploit knowledge from the environment’ (1989: 569). They consider absorptive capacity as a by-product of conducting R&D and argue that firms that invest in own R&D are better able to utilize information which is available in the organizations external environment (Cohen & Levinthal, 1989). Hence, Cohen and Levinthal (1990) posited that higher R&D spending results in a higher level
of absorptive capacity and firms with intense activities and high investment in R&D are more likely to appropriate external knowledge. However, external knowledge can hold different levels of maturity, since organizations can either acquire and imitate product or process innovations inside their industry, or adapt distant intersectoral knowledge and innovations originating outside their immediate industry (Cohen & Levinthal, 1989).

In their 1990s follow-up paper, Cohen and Levinthal redefine the term absorptive capacity as ‘the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends’ (Cohen & Levinthal, 1990: 128).

Absorptive capacity is critical to organizations’ innovative capabilities since external knowledge is often crucial to the innovation process and most innovation results from borrowing and adoption rather than invention (Cohen & Levinthal, 1990). In their 1990s paper Cohen and Levinthal (1990) argue that an important prerequisite with regard to the level of absorptive capacity and the ability to evaluate and utilize external information is a certain level of prior related knowledge. Only a foundation of basic skills, a commonly shared language as well as existing knowledge in the most recent developments in related scientific or technological fields allow firms to recognize the value of new information and knowledge (Cohen & Levinthal, 1990). Ideally, some contingent of the existing prior knowledge must be closely related to the new knowledge to facilitate its assimilation, while some parts of the prior knowledge should be rather diverse to allow effective and creative application of the new knowledge (Cohen & Levinthal, 1990). Thus, accumulated prior knowledge not only increases a firm’s ability to acquire and memorize new knowledge, but also enables an organization to recall and use it.

With regard to the development of absorptive capacity, Cohen and Levinthal (1990) assume that a certain level of knowledge overlap across
an organization and its individuals is necessary for effective internal communication, while diversity in knowledge contributes to learning and problem solving capabilities which enables a firm to innovate. Thus, an organization’s absorptive capacity is based on the individual absorptive capacity of its employees, and rather depends on the links and communication across those individual capabilities. As a result, a firm has to develop a broad and active network of internal and external relationships to strengthen its employees’ awareness of others’ capabilities and knowledge in order to increase the organization’s absorptive capacity (Cohen & Levinthal, 1990).

Cohen and Levinthal (1990) conclude that a higher level of absorptive capacity within a firm leads to a more proactive strategy of exploiting promising external opportunities, while organizations that have a modest absorptive capacity tend to be reactive, searching for new opportunities only in response to performance failure. Thus, firms with a high aspiration level, influenced by externally acquired information, will increase their awareness of and attention to external information and knowledge and initiate further innovative activity (Cohen & Levinthal, 1990). Furthermore, firms with a high level of absorptive capacity may gain a competitive advantage as absorptive capacity enables the organizations ability to more accurately forecast and predict technological trends and advances before its rivals can recognize them (Cohen & Levinthal, 1994).

In accordance with Cohen and Levinthal, Lane and Lubatkin (1998) take the multidimensional nature of absorptive capacity into consideration and distinguish between the three distinct capabilities of recognition, assimilation and application of external information. They integrate the absorptive capacity concept into the context of inter-organizational learning and assume that within a dyadic learning construct (learning alliances) absorptive capacity is based on the participating firms’ knowledge bases, organizational structure, and preferences for projects of certain characteristics (dominant logic). In the same way, the
aforementioned three dimensions of absorptive capacity pointed out by Lane and Lubatkin, can also be found in March’s (1991) determination of absorptive capacity in exploration (linked to recognition and assimilation) and exploitation (linked to application and commercialization).

Another definition is offered by Mowery and Oxley (1995) who suggest that absorptive capacity is a broad set of skills needed to deal with the tacit components of transferred knowledge and the need to modify this imported knowledge for internal application (Zahra & George, 2002; c.f. Mowery & Oxley, 1995).

The literature reveals a third definition of absorptive capacity that is defined by Kim (1995) as the capacity to learn and solve problems (Zahra & George, 2002; c.f. Kim, 1995). Thus, absorptive capacity requires learning capability that is described as the capacity to assimilate knowledge (for imitation), and develops problem-solving skills which enables a firm to create new knowledge to innovate (Kim, 1998). Thereby, the prior knowledge base and the intensity of effort are two crucial dimensions that indicate the level of absorptive capacity. According to Kim (1998), accumulated prior knowledge increases a firm’s ability to make sense of and to assimilate and use new knowledge, whereas considerable time and effort must be invested to learn how to solve problems.

Zahra and George (2002: 185) reconceptualize the concept and propose absorptive capacity as a ‘dynamic capability pertaining to knowledge creation and utilization that enhances a firm’s ability to gain and sustain a competitive advantage’. Thus, Zahra and George (2002: 186) define absorptive capacity as ‘a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability’. Hence, absorptive capacity triggers the reconfiguration of an organization’s resource base and the adaptation to changing market situations (Zahra & George, 2002).
Their definition points out four distinct but complementary dimensions that compose an organization’s absorptive capacity: (1) Acquisition describes a firm’s capability to identify and acquire externally generated knowledge that is critical to its operations, (2) Assimilation refers to an organization’s routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources, (3) Transformation denotes a firm’s capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge, and (4) Exploitation is a firm’s capability that is based on the routines that allow firms to refine, extend, and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations (Zahra & George, 2002: 189-190).

These four dimensions of absorptive capacity are capabilities inherent in two separate but complementary subsets of the absorptive capacity construct: potential and realized absorptive capacity (Zahra & George, 2002). Potential absorptive capacity makes an organization receptive to acquire and assimilate external knowledge, while realized absorptive capacity comprises a firm’s transformation and exploitation capabilities (Zahra & George 2002).

The organizations’ structure and culture influences the ability to transform and exploit knowledge and thus the realized absorptive capacity. In a negative example, this becomes apparent with the occurrence of the not-invented-here phenomena (Jones, 2006). Processes that are linked to realized absorptive capacity are based on routines in terms of structural, systemic and procedural mechanisms by which organizations exploit knowledge (Zahra & George 2002).
Zahra and George’s model of absorptive capacity depicts the dimensions and antecedents of the concept and identifies external sources of knowledge and experience as key prerequisites. The various external knowledge sources within a firm’s external environment influence the potential absorptive capacity of an organization. Zahra and George (2002) propose that the more diverse and complementary the external knowledge sources are, the more they influence the acquisition and assimilation capabilities that constitute a firm’s potential absorptive capacity. Thereby, past experience that reflects a firm’s successes and failures influences both the way how organizations acquire and assimilate new knowledge and the locus of future search (Zahra & George, 2002).

Activation triggers are internal or external events that motivate a firm to intensify its efforts to seek external knowledge. With increasing intensity of the activation trigger, a firm will invest more heavily in the allocation of resources in order to develop the capabilities to acquire and assimilate new external knowledge (Zahra & George, 2002).
Once external knowledge is acquired and assimilated, social integration mechanisms are necessary to bridge the gap between potential and realized absorptive capacity. In order to ensure knowledge sharing and information flow among members of the firm, both social integration through informal linkages or more formal organizational structures help to overcome structural, cognitive, behavioural, and political barriers to information exchange and allows the firm to transform and exploit the absorbed knowledge (Zahra & George, 2002). Since capabilities of knowledge acquisition and assimilation help to reconfigure and renew a firm’s knowledge base, while transformation and exploitation capabilities may enhance an organization’s performance through product and process innovations, absorptive capacity might be an important source to gain a competitive advantage (Zahra & George, 2002).

Based on Cohen and Levinthals (1990: 131) assumption that absorptive capacity ‘depends on the transfer of knowledge across and within subunits that might be quite removed from the original point of entry’, Lenox and King (2004) focus their research on how to organize the flow of information within the firm to increase the likelihood that organizational subunits will adopt valuable new practices. Thus, they stress the importance of internal mechanisms which positively affect absorptive capacity. Since the best location for acquiring information often differs from the best location for using and applying it, managers can develop the firm’s absorptive capacity by providing information to potential adopters in the organization (Lenox and King, 2004). This internal information provision is described as ‘transfer of practice-specific data from central knowledge repository (e.g. corporate R&D lab) to agents within the firm that make technology adoption decisions’ (Lenox & King, 2004: 332). Lenox and King (2004) find that internal information provision is most useful and effective when a potential adopter has less knowledge that is directly related to the new information, but possesses broad knowledge in moderately related subjects. Consequently, the managers’ ability to affect absorptive capacity
through internal information provision depends on the distribution of related experience and information within the organization. Thus, managers’ internal policies and programs to ensure successful information transfer can directly affect a firm’s absorptive capacity and highlights the importance of internal communication to develop a firm’s absorptive capacity.

Lane et al. (2006) conducted an in-depth analysis by reviewing prior literature related to the absorptive capacity construct in order to reconceptualize and rejuvenate the construct. They redefine absorptive capacity as ‘a firm’s ability to utilize externally held knowledge through three sequential processes: (1) recognizing and understanding potentially valuable new knowledge outside the firm through exploratory learning, (2) assimilating valuable new knowledge through transformative learning, and (3) using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning’ (Lane et al., 2006: 856).

Due to the fact that absorptive capacity refers to the acquisition and assimilation, as well as to the transformation and exploitation of information, an organization’s absorptive capacity is dependent on both the firm’s direct interfaces with the external environment (and therefore with the critical sources of innovation-related information and knowledge), and the firm’s knowledge-transfer across and within subunits (Cohen & Levinthal, 1990). Hence, communication structures between an organization and its environment as well as between subunits are a crucial element of absorptive capacity. Consequently, the individuals who stand at the interface of either the firm and the external environment or at the interface between subunits within the firm play an essential role and contribute significantly to an organization’s absorptive capacity (Cohen & Levinthal, 1990).

Cohen and Levinthal (1990) stress the importance of effective communication and crucial interface functions in regard to the absorptive
capacity concept and mention the role of the technological gatekeeper as important mechanism to increase a firm’s absorptive capacity. Zahra and George (2002) in turn point out social integration mechanisms as a need for successful absorption of external knowledge. Nevertheless, little attention is paid to the contribution of individual actors to the process and the absorptive capacity literature lacks to examine the role of gatekeepers and holds a gap how the gatekeeper can enable the firm’s knowledge absorbing capabilities. Only Lennox and King (2004) pick up this aspect by stressing the importance of managerial internal knowledge provision in order to develop absorptive capacity. Hence, since absorptive capacity represents the central capability for any firm wishing to benefit from the wide and diverse external knowledge proposed by the Open Innovation concept, the individuals who take the linking roles between the firm and its external environment, as well as across and within subunits, need further attention, and will be explored and described in the following chapter.

3.2 Roles in the innovation process

The importance of knowledge transfer for successful organizational innovation is largely discussed in the literature. Hence, as already pointed out in the previous chapter about the absorptive capacity concept, knowledge can only be valuable as long as it is appropriate, accurate and accessible to its users. Therefore, effective transfer of knowledge requires a framework of systems, methods and procedures, as well as an appropriate organizational culture (Karlsen & Gottschalk, 2004). Only less consideration to the concept of key individuals in knowledge transfer and innovation activities is taken by the knowledge management literature and as mentioned before the absorptive capacity literature holds a gap in researching the role of crucial actors to develop a firm’s absorptive capacity in order to gain a competitive advantage. Therefore, this chapter describes important roles that are taken by individuals or business units
and that are crucial to develop a firm’s absorbing capabilities. The literature and innovation studies contain information on a number of roles, use a variety of names to describe them, and often come to conflicting conclusions about their importance (Jervis, 1975). Hence, the following subchapters distinguish different actors and their activities within the innovation process.

### 3.2.1 Technological Gatekeeper / Boundary Spanner

This section focuses on the role and activities of technological gatekeeper and reviews the literature about technical gatekeepers in order to draw a broad and comprehensive picture of gatekeeping mechanisms, the roles played by gatekeepers in mediating external information, as well as conducted activities and employed transfer mechanisms. The results will give an overview of which role a gatekeeper can play in the acquisition and utilization of external information and thus how they can contribute to a firm’s absorptive capacity.

The role of the gatekeeper is the one that is most closely associated with knowledge transfer. Since the innovation literature often highlights the importance of simultaneous communication across and within organizations, the role of the gatekeeper in promoting formal and informal communication becomes crucial because organizations and units have different mental maps, languages, time frames and norms (Allen & Cohen, 1969; Dougherty, 1992). Moreover, in times of fast changing markets and globalization the role of intermediaries becomes more and more important and in the light of Open Innovation individuals are needed who secure to scan and tap external knowledge sources and transfer this external knowledge into the organization in order to foster innovation. Despite the importance of gatekeeping individuals, most of the literature about the technological gatekeeper is, with few exceptions, more than 20 years old.
Already Allen and Cohen (1969) examined the communication and information flow in R&D laboratories with the assumption that no R&D laboratory is self-sustaining and therefore must use external knowledge sources to stay informed and updated about scientific and technological developments. Thus, in order to gain a competitive advantage a firm has to develop its absorptive capacity to ensure that external knowledge is successfully integrated. In this context, Cohen and Levinthal (1990) stress the importance of gatekeepers to develop a firm’s ability to absorb external knowledge. The existence of different languages, coding schemes, and norms in different organizations often leads to a mismatch that hinders the effective flow of communication between organizations (Allen & Cohen, 1969). This mismatch can be overcome by key individuals who are bridging the gap between organizations and their different coding schemes by translating the flowing information to the receiving organization (Allen & Cohen, 1969). Those key individuals are defined as internal communication stars who have a high degree of informal contacts with colleagues outside of their organizations, as well as a direct access and readership to professional scientific and engineering literature (Allen & Cohen, 1969). Allen and Cohen (1969) coined the term of the technological gatekeeper by defining him as an internal communication star who occupies a key position in a laboratory’s communication network, who also maintain a high degree of external communication and take the role of information transmitters. The technological gatekeeper is assumed to show large contact with technical activity outside the laboratory’s boundaries by having a greater knowledge of formal media as the scientific and technological literature, as well as maintaining informal contacts with the external scientific and technological community to a great extent (Allen & Cohen, 1969). Thus, the technological gatekeeper takes a crucial role as intermediary within a two-step communication process by linking the organization to its external environment and transmitting and translating the external information to the internal colleagues and subunits.
Tushman's 1977s paper focuses on the innovation process and the organization’s need to acquire information from and transmit information to several external information sources in order to innovate. Thereby, Tushman (1977) points out the importance of boundary spanning roles within the organization's communication network that links the firm's internal network to external sources of information. While external information and knowledge are crucial to the innovation process, this information is difficult to internalize due to a mismatch between the coding schemes, values, norms, and time frame of different organizations as well as differentiated subunits in the same organization (Tushman, 1977). Thus, Tushman (1977) identifies several organizational communication boundaries hindering the free flow of information that exist due to different external sources and areas of critical information in the innovation process. Tushman's study of an R&D laboratory as innovating subsystem reveals that spanning roles occur at extra-organizational boundaries, larger organization boundaries, and intra-laboratory boundaries to overcome inefficient communication between different organizations but also across organizational subunits (Tushman, 1977). Boundary spanning individuals bridge differences by translating contrasting coding schemes and channel information between organizational groups or between organizations. Boundary spanning individuals who have a substantial amount of extra-organizational communication are termed gatekeepers and are likely specialized in certain information domains since they may not attend to all external knowledge areas (Tushman, 1977). The number and distribution of boundary roles that span several organizational communication boundaries depends on various factors such as the complexity of information-processing, changing or stable environment, uncertainty, task of the project, and task interdependence. Consequently, boundary spanning roles are often taken by opinion leaders or individuals who are strongly connected to external areas of information in order to mediate the communication throughout the two-step information flow from
outside sources into the organization’s internal communication network (Tushman, 1977).

Allen et al. (1979) focus their research on R&D projects and innovations that are different in nature. While scientific research meets universal problems and scientists share a common language and methods, research projects are high performing when all project members maintain high levels of communication with colleagues outside their organization and thus, information flows directly between the external environment and the innovating unit (Allen et al., 1979). In contrast, product and process development projects are often of technological nature, rather specific and therefore significantly more successful when external communication is conducted by one or few key individuals who overcome communication impedance and mediate the information between the organization and external information and knowledge areas (Allen et al., 1979). Those boundary spanning individuals, labelled as technological gatekeepers, are able to recognize and understand relevant external technological developments and to translate these into terms that can be understood by the firm’s internal employees (Allen et al., 1979). Hence, Allen et al. (1979) find alternative mechanisms for the transfer of information into the laboratory depending on the tasks nature. They thus distinguish between different mechanisms for knowledge transfer from external sources into the laboratory dependent on the degree of similarity to existing knowledge. Cohen and Levinthal (1990: 132) support the mediating role of boundary spanning institutions and assume that ‘when the expertise of most individuals within the organization differs considerably from that of external actors who can provide useful information, some members of the group are likely to assume relatively centralized “gatekeeping” or “boundary-spanning” roles’. Along with Allen et al. (1979) and Cohen & Levinthal (1990), the following figure illustrates the model of central and decentral gatekeeping.
According to Allen et al. (1979), the technological gatekeeper takes a crucial role in the R&D setting as he emerges informally to transfer information and technology effectively into the organization, when the formal organization is incapable of fulfilling it. Especially when the technology is dynamic, the technological gatekeeper is most important to overcome well defined organizational boundaries by his expertise and ability to understand, transfer and introduce new technology into the organization (Allen et al. 1979). This required technological expertise is most often found among employees who operate at lower levels of the organization (first level supervisor and below) and then play the role of the gatekeeper by linking colleagues within and outside the organization (Allen et al., 1979). Thus, also Allen et al. (1979) stress the importance of an informal two-step information flow − initiated through the technological gatekeeper − when a specific local task and its attendant communication boundary hinders the effective communication of information in a dynamic technology environment. However, when the technology is well defined and stable, the informal gatekeeper is not necessary, but rather an opinion leader at high levels of the organization gathers information and takes
technical decisions, which are, in turn, diffused through the organization’s formal hierarchy (Allen et al., 1979).

In line with the before described literature, Tushman and Katz (1980: 1071) identify key individuals whose activities span organizational boundaries and define gatekeepers as ‘key individuals who are both strongly connected to internal colleagues and strongly linked to external domains’. Beside the fact that those boundary spanning individuals act as an important linking mechanism between organizations and their environments, gatekeepers do not only mediate external information, they rather facilitate the external communication of their more local project colleagues. Thus, in order to reduce the communication boundary between a firm’s subunits and external knowledge domains, an important active role of the gatekeeper is to direct, train and coach the external communication of other subunit members. Furthermore, Tushman and Katz (1980) give support to the assumption that universally defined tasks rather benefit from direct contact between subunit workers and external information domains, while locally defined tasks require gatekeepers to link the innovating subunit with the external environment. Hence, gatekeepers are most important in development projects in that the task is locally defined and where the employed technology is highly dynamic rather than defined and stable (Tushman & Katz, 1980). In these projects, the boundary spanning role is not a function of formal position, but rather an informal phenomenon where scientists and engineers from lower hierarchical levels are driven by job satisfaction, morale, and promotion to mediate crucial information between the organization and the external environment (Tushman & Katz, 1980). This two-step process of informational boundary spanning is visualized below.
The research of the gatekeeper phenomenon during the 1970s and 1980s consentaneously suggests a two-step flow of technological communication into the organization. Technological gatekeepers were identified as individuals who are capable of understanding and translating the contrasting coding schemes of the internal organizational environment and the external environment and thus, to overcome the organizations boundaries. Hence, with the ability to gather and understand external information, and then to translate this information into meaningful and useful knowledge to internal colleagues within the organization, technological gatekeepers are found to be both internal communication stars that are strongly connected to internal colleagues, and external communication stars that are strongly linked to external domains (Allen & Cohen, 1969; Tushman & Katz, 1980).

Brown and Utterback (1985) findings add a further dimension to the importance of gatekeepers in an organization. Based on an empirical
study, they find that technological gatekeepers perceived a significantly higher level of uncertainty in the organization’s environment than others in their firms (Brown & Utterback, 1985). Thus, technological gatekeepers play an important role in reducing and absorbing uncertainty faced by internal colleagues through protecting them from environmental turbulence (Brown & Utterback, 1985). Reduced levels of uncertainty may help the internal units to improve the quality and quantity of work output due to more stable internal conditions (Brown & Utterback, 1985).

The literature of the 1960s, 1970s and 1980s unanimously defines the technical gatekeeper as internal and external communication star and identifies a two-step process for the acquisition of external knowledge and the transfer of the information from external sources into an organization. Later, only few contributions or extensions can be found in the gatekeeper literature concerning the role and activities of the technological gatekeeper.

An important extension was made by Harada (2003). His (2003) study of the role of the gatekeeper in R&D organizations suggests a three-step flow of technological communication. In contrast to previous studies that suggest a two-step process that contains information gathering and information transmitting functions as main roles of technological gatekeepers, Harada (2003) adds the knowledge transforming function to the knowledge transfer process. However, unlike the notion that the technological gatekeeper is external and internal communication star at the same time, Harada (2003) finds that boundary spanning individuals who transfer external information to the organization do not frequently communicate with colleagues inside the organization. Rather, they are strongly connected to internal communication stars that translate and transform the external information into organization specific knowledge and use their internal network capabilities to transmit it to other members inside the organization. Thus, a new role is added to the information process that is fulfilled by persons that are defined as knowledge
transformers (Harada, 2003). The distinction of boundary spanning and knowledge transforming roles is a consequence of the dilemma of information gathering and translation. Harada (2003) argues that gathering capabilities and information translation capabilities are mutually incompatible and may be rarely found in the person of the gatekeeper. The translation capability requires not only a sound understanding of external coding schemes and languages, but also a certain period of intra-organizational experience in order to be familiar with the local coding scheme and language shared among organization members (Harada, 2003). In contrary, long organizational experience impedes a persons` external communication and thus is negatively related to external information gathering (Harada, 2003). Thus, Harada (2003) suggest that the functions of the technological gatekeeper (external information search and internal communication) are rather performed by interplay of boundary spanning individuals and knowledge transformers in a three-step flow of communication. Thereby, boundary spanners tend to be young organization members with a high level of external communication that are closely connected to knowledge transformers that have organizational experience and understanding and therefore facilitate the integration of information gathering and distribution into each members` problem solving activities (Harada, 2003). Haradas three-step process is visualized in the figure below:
Cranefield and Yoong (2007) examined the role of the gatekeeper in the context of inter-organizational knowledge transfer. Based on the perspective of the knowledge gatekeeper who is defined as ‘individual who acts as a knowledge interface between their own organization and other organizations’, their findings suggest gatekeepers to play multiple roles during the process (Cranefield & Yoong, 2007: 95). The identification of translation and interpretation activities as critical factors that facilitate knowledge transfer requires the gatekeeper to act as translator and interpreter (Cranefield & Yoong, 2007). Hence, gatekeepers need to have specialized skills for each stage of the knowledge transfer process and are often required to perform a number of roles simultaneously (Cranefield & Yoong, 2007). These activities are knowledge-filtering, simplifying and
tailoring knowledge to fit the recipient’s needs, and applying, adapting and translating knowledge (Cranefield & Yoong, 2007). Cranefield and Yoong (2007) recognized that the dependence on a single person as the centre of knowledge transfer is highly risky for organizations because of the discontinuity and loss of knowledge that would arise from the loss of this person. Thus, they conclude to involve a second gatekeeper or even a team of gatekeeper in order to reduce this risk and to divide the required skills on different persons.

The review of the technological gatekeeper literature shows that most of the articles and findings are more than 20 years old. The typologies of the technological gatekeeper are very simple, and inherent roles and activities are only roughly described and mainly limited to a pure ‘search-and-transfer’ scheme. Only few contributions or expansions to the concept of the technological gatekeeper are made in recent years and an adaptation of the role of the technological gatekeeper to meet today’s challenges is missing. Especially in the context of Open Innovation an investigation into today’s roles and activities of the technological gatekeeper who is needed to acquire, transform and transfer critical external knowledge into the organization, is essential. Consequently, in the next subchapters I review the literature pertaining to further important roles and activities within a firm’s innovation process in order to enrich the knowledge about crucial individuals and mechanisms that secure the successful flow of information from external sources to internal domains.

3.2.2 Champion Concept

Beside the central role of the gatekeeper, the literature reveals also further individuals that take an important role in the organizational innovation process. The champion theory examines how technologies, innovations and changes are diffused within an organization. Thereby, in contrast to the gatekeeper theory, the champion concept focuses solely on internal
innovation activities and disregards the external integration of the champion. The role of the champion has been extensively examined in the management literature. According to the Great-Man-Theory that aims to explain history by the impact of “Great men”, the creation of something new is often used to be accredited solely to one outstanding individual. In the same way that historical achievements are linked to certain individuals (e.g. Columbus discovered America) also innovations are accredited to their inventors (e.g. Otto four-stroke cycle) (Hauschildt, 2004).

The concept and the role of one outstanding individual promoting the innovation process was initially identified and coined by Schon’s (1963) study on radical military innovation. Schon names this individual ‘the Champion’. In his 1963 paper, Schon studied the nature of resistance to innovation in organizations, the requirements of successful technical innovation, and the steps that management can take to ensure that the necessary development work leads into promising proposals for radical new products and processes. Thereby he identified a gap between the wish for elaborate and systematic procedures of innovation and the uncertainty and risk inherent in the innovation process, that every organization faces (Schon, 1963). On the one hand, the recognized need for change and radical product innovations in order to grow, expand, diversify and to get ahead of the competition conflicts with the risk and uncertainty of the innovation process on the other hand. In fact, established systems, structures, processes and procedures in firms are designed to maintain the status quo and avoid risks. However, the pernicious problem is not the existing resistance to change, but the failure to recognize it (Schon, 1963). Unrecognized resistance becomes capable of destroying most product innovations and enables masked defenses against change. Nevertheless, innovation does take place but therefore typically one individual emerges as champion of the idea. Especially where radical innovation is concerned, Schon (1963) argues that a champion is required to overcome the resistance to change and to
promote new ideas. Referring to Schon (1963), the champion of new developments has to identify with the idea and its promotion to a great extent, and has to take the risk to fail with the championed idea. Therefore, he characterizes champions based on the attributes of considerable power and prestige, informal sales and promotion, a wide variety of interests (e.g. technology, marketing, production and finance) and courage of heroic quality (Schon, 1963).

Later, the concept and the term of “the champion” became the prevailing notion in Anglo-American innovation research, were extended and are still leading the discussion (Rost et al., 2006; Hauschildt, 2004). The functions of the champion were specified and names like product champion, innovation champion, project champion, executive champion, and management champion can be found in the literature. Yet the consentaneous perception identifies one outstanding individual in charge of pushing and promoting an idea into an implemented innovation, and empirical research and data has provided evidence of the champion as a crucial factor of success for the entire innovation process.

Chakrabarti (1974) ascribes the importance of the role of the product champion within the innovation process to the selling of the idea to the management. Based on the assumption that successful innovation requires attention of the top management and a nurturing atmosphere, the key task of the product champion is to get the management interested in an idea or project (Chakrabarti, 1974). He defined the champion as ‘an individual who is intensely interested and involved with the overall objectives and goals of the project and who plays a dominant role in many of the research-engineering interaction events through some of the stages, overcoming technical and organizational obstacles and pulling the effort through its final achievement by the sheer force of his will and energy’ (Chakrabarti, 1974:58). Moreover, to influence and stimulate a positive decision-making the champion has to go beyond his formal organizational role and over the hierarchical chain (Chakrabarti, 1974). Based on the
notion that the decision to adopt an idea is a collective process that, referring to Rogers and Shoemakers (1971), consists of five sequential stages (namely stimulation, initiation, legitimation, decision, and execution), Chakrabarti concludes that the champion has to play multiple roles (Chakrabarti, 1974). These roles are related to the five stages of the collective decision process and further on, the champion acts as a link between these different phases. Thus, champions are advocates of new ideas, products or projects who are actively involved in all stages of the innovation process, and may use different skills during each of these stages (Chakrabarti, 1974).

Also Rogers (2003) points out the important role that an innovation champion can play in fostering and promoting a new idea in an organization. He describes the champions as ‘a charismatic individual who throws his or her weight behind an innovation, thus overcoming indifferences or resistance that the new idea may provoke in an organization’ (Rogers, 2003: 414).

Day (1994) identifies dual-role champions who combine the role of product champion (bottom up) and organizational sponsor (top down) through their ability to mobilize knowledge, information and power.

The champion theory often considers the champion as a powerful individual with a high rank within an organizational hierarchy. Day (1994) discovers the existence of powerful champions particularly for cost-intensive, risky and radical innovations. Her findings were supplemented by studies that showed that less radical innovations were championed by less powerful individuals (middle management) who acted as brokers and arrangers for an innovation, helping to fit it into the organizational context (Rogers, 2003). Howell and Higgins (1990) came to the result that a champion doesn’t have to be inevitably more powerful than other involved individuals but rather they tend to be more focused on innovations, influential with others, and higher risk takers. Moreover, Howell et al.
(2005: 642) define Champions as ‘individuals who informally emerge to actively and enthusiastically promote innovations through the organizational stages’.

The literature shows that champions are well connected to people and the organizations resources which support them in championing an innovation successfully. Furthermore, the championing individual emerges unsolicited, come in all ages, with varying degrees of formal power, and with different types of abilities. Champions identify themselves as champions, but are also regarded as champions from all levels within a firm including senior management. Perhaps their exact characteristics depend on the nature of the innovation and the organization. But in any event, the champion’s role is to initiate the innovation process and to guide the new idea through to approval and implementation (Rogers, 2003). Persuasive and willing to take calculated risks, champions adopt innovations, ideas or projects as their own and relentlessly promote them. Thus, the champion’s overwhelming enthusiasm and visionary qualities distinguishes him from other roles and makes him outstanding and unique.

However, the literature review reveals that the champion theory and definitions of champions is solely focus on internal innovation activities and the champion’s integration and connection to the organization’s external environment is not taken into consideration. Thus, the solely application of the champion concept and its described internal innovation promotion is improper and not appropriate for firms to ensure a successful innovation process in the context of Open Innovation, where the critical sources of information and knowledge lay outside the organization’s boundaries rather than inside. Rather, the role of the champion might contribute to an open innovation process by supporting the internal promotion of the externally acquired knowledge.
3.2.3 Promotor Concept

This section reviews the literature about the promotor concept. In the same way like the champion concept, also the promotor is only focused on internal innovation processes.

The Champion concept and the theory of one outstanding individual that solely promotes a new idea were first challenged by Eberhard Witte. He argues that an innovation rather depends on highly complex and multi-person decision processes that cannot be activated only by one individual (Witte, 1973). Since we cannot take it for granted that, once the problems of decision-making are coped intellectually, the rational solution will be immediately comprehended and implemented by the competent authorities, Witte (1973) rather identifies barriers against innovations that delay, endanger or even prevent the implementation of the new idea. First, motivational barriers to willingness are caused by the employees' wish to maintain the status quo in order to avoid changes, risks and uncertainty inherent to the innovation (Witte, 1973). Secondly, ability barriers result from the employees' incapability to comprehend the innovation and its requirements which leads to cognitive resistance (Witte, 1973; Hauschildt, 2005). Hence, the employees’ willingness and ability to cooperate are necessary for the progress of the innovation process (Witte, 1973). Consequently, in order to overcome these existing barriers, organizations require persons who initiate, support and provide the entire innovation process until the final implementation of the innovation. Witte named those persons ‘promotors’ and describes them as individuals who actively and enthusiastically promote innovations throughout the crucial organizational stages from initiation to implementation (Witte, 1973; Rost et al., 2007). Generally, the promotor’s activities go beyond its formal organizational role and job description. The promotion of an innovation is not the promotor’s full-time job, rather he attends to and identifies with one
specific innovation and uses his previous knowledge and conviction to promote it throughout the entire innovation process.

Unlike the champion concept and based on the assumption that skills, knowledge, and problem-solving capacities of every human is limited, Witte (1973) concludes that activities to surmount barriers in the innovation process are contributed by specialized persons with different previous knowledge (Rost et al., 2007). The roles of these specialized promoters are clearly defined to overcome the above-mentioned barriers of willingness and ability barriers. Thus, Witte (1973) distinguishes between two kinds of specialized promoters required within the internal innovation process: the power promoter and the expert promoter.

Power promoter is that person who actively and enthusiastically promotes innovations with and due to their hierarchical power (Witte, 1973). In order to overcome the motivational resistance (barriers of willingness) of some employees, the power promoter applies all his available power and energy to advance the desired innovation. Therefore, the crucial characteristics and attributes of the power promoter are a certain high ranked position within the firm’s hierarchical structure and a certain set of behaviour that enables the power promoter to sanction opponents, and to protect and support the innovation willing employees of the innovation process (Witte, 1973).

The expert promoter fosters and encourages the innovation process by means of his specific knowledge and expertise (Witte, 1973; Gemünden, 1985). Thus, the hierarchical rank of the expert promoter is irrelevant. Witte (1973) assumes that typically the person that appears as expert promoter within the innovation process has a line function in a department that is closely connected to the innovation (Rost et al., 2007). The recognition of weaknesses and deficiencies in routine work processes as well as the identification of an innovations’ potential might motivate individuals to play the role of the expert promoter. His contribution to the
innovation process is his expert knowledge that has to be constantly
developed and increased throughout all phases of the process. This
expert knowledge is used by the expert promotor both to assist and
support those employees who are open to innovation, and to argue
against opponents of the desired innovation (Witte, 1973). Thus, the
expert promotor significantly contributes to overcome the cognitive
resistance and ability barriers of incapable employees (Witte, 1973).

Witte (1973) argues that the described roles of the power promotor and
the expert promotor are interdependent. Neither the power promotor has
the required expert knowledge to overcome the ability barriers, nor has the
expert promotor the hierarchical power to surmount the motivational
resistance and barriers of willingness. Thus, the innovation process will be
successful if both specialized promotors work closely together. Thereby,
power and expert promotor can hold totally different hierarchical positions,
in different firm’s departments, and in spite of the absence of a formal
commitment to cooperate, Witte (1973) concludes that they have to ally
and build a coalition in order to overcome the defined barriers and to
promote the desired innovation throughout the crucial organizational
stages successfully. Even though Witte (1973) confirms the existence of a
universal promotor who combines the roles of power and expert promotor
by using both hierarchical potential and specific expert knowledge, the
concentration of promotor roles is inferior to the model of specialized
promotors. Specialized promotors stimulate a constructive dialogue and
supply the innovation process with more energy, and are most efficient for
complex processes like innovations (Gemuenden, 1985; Hauschildt &
Kirchmann, 1997).

Witte’s two-center promotor model of power and know-how was extended
by Chakrabarti and Hauschildt who identified a third barrier to innovation
which predominantly is caused by organizational and administrative
resistances against the innovation (Hauschildt, 2004). This barrier
particularly emerges in those firms that are mainly run by routines, e.g. by
a risk-averse financial controlling strategy (Hauschildt and Gemuenden, 1999). Consequently, a third specialized promotor – the process promotor – is necessarily required to overcome these administrative barriers, particularly when the desired innovation is of complex nature and has to be implemented in large and diversified organizations (Hauschildt, 2004). The process promotor plays a crucial role since he has the overall view upon the entire innovation process, identifies various interfaces, and operates as a ‘process-helper’ and ‘resource-linker’ (Hauschildt, 2004). The process promotor is an important broker between power and expert promotor and mediates between those parties that are involved in and those that are affected by an innovation (Hauschildt, 2004). Thus, Hauschildt and Chakrabarti conclude that a troika of power promotor, expert promotor and process promotor is required for a successful innovation implementation (Hauschildt, 2004).

Rost et al. (2007) extend the troika of power promotor, expert promotor and process promotor by two more specialized promotor roles. Their extension of the promotor model resulted from the identification of further barriers that might prevent an innovation. Consequently, in order to overcome these barriers and secure the successful innovation process, two more specialized promotors are required.

First, dependency barriers are caused by imbalanced relationships. The asymmetric power of relationships might be used by the more powerful party to dictate or even prevent activities to the less powerful party (Rost et al., 2007). The dependency barriers can be overcome by a relationship promotor who brings in his extensive network competence. He ensures a successful knowledge transfer and prevents possible hurdles by establishing, designing and fostering relationships between crucial internal and external parties (Rost et al., 2007). Thus, the relationship promotor contributes to the innovation process through his powerful relationships both inside and between the organization and its external environment (Rost et al., 2007).
Secondly, cooperation barriers are caused by considerable mental, language and intercultural distance between employees (Rost et al. 2007). Based on the assumption that the combination of internal knowledge with external information constitutes a fertile ground for innovations, a specialized individual is required to overcome the cooperation barriers. Since external information is simply not seen and considered, or often ignored and suppressed, technological gatekeepers actively support cross-organizational knowledge transfer by recognizing relevant information and communicating it to their colleagues (Rost et al., 2007). The role of the technological gatekeeper is rarely integrated into the promotor concept; rather the technological gatekeeper is the classical role of innovation management and has been already researched and described in a previous chapter.

The literature and findings of the promotor concept reveals a lot of similarities, parallels and overlaps with the aforementioned concept of champions. However, the champion theory concludes that one outstanding individual solely promotes a new idea internally, while the promotor concept assumes two or more specialized promotors who initiate, support and contribute to the innovation process in a team. Nevertheless, like the champions concept also the promotor theory with its internally focussed promotor team lacks the implication of a firm’s external environment. Thus, champion concept as well as promoter theory makes a contribution to an organization’s internal innovation process and the diffusion of new ideas and technologies. However, both concepts can’t be applied to support the Open Innovation process in an appropriate way because externally linked individuals or units are needed to tap various knowledge domains in order to acquire and transform critical knowledge and transfer it for internal exploitation.
3.2.4 The Change Agent

The concept of change agent has been an important feature of academic research for almost 60 years and has been studied in different academic fields. This chapter focuses on the role of the change agent that is studied in details within the diffusion literature. Extensive research in this field reveals important findings and provides a deep insight in the roles and activities of change agents in the process of diffusion. Moreover, the research on the change agent phenomena in the context of diffusion theory is more advanced compared to the theory of the technological gatekeeper and his roles and activities. Thus, the review of change agents provides valuable information that can be applied also in an organizational context, since diffusion is also part within an organizational innovation process.

Inter alia, the socioscientific research is devoted to social change in general and the change of individual behaviour and opinions in particular. In this context, research developed the change agent theory in which change is credited to the change agent (Witte, 1973).

According to Witte (1973), the change agent is an expert such as a psychologist, psychiatrist, social worker or educator who influences and affects people’s behaviour patterns and tries to encourage a change of a targeted group of people regarding a certain issue. The target group which is addressed by the change agent and his intention to alter a certain behaviour or opinion is called client system. The clients are typically aiming to maintain the status quo in order to avoid the risk and uncertainty which is inherent in a change situation. This resistance to social change of behaviour that is recognized in the socioscientific context is along the lines of afore mentioned resistances and barriers to innovation existing in organizational context. Due to the fact that the members of a client system usually don’t have the motivation to change certain behaviour by
themselves, a change agent’s informal power as well as his selling abilities and persuasive power is needed to initiate a desired behavioural change (Witte, 1973). Thereby, the change agent’s expertise affects the extent of influence he can exert on the client system. Within the differing literature, the role of the change agent can be taken by an individual as well as by a team of change agents or a consultant agency (Witte, 1973).

Beside the socioscientific context, change agents often take an important role in initiating, managing or implementing change in organizations.

Caldwell (2003: 139) defines the change agent as ‘an internal or external individual or team responsible for initiating, sponsoring, directing, managing or implementing a specific change initiative, project or complete change programme’. Based on this definition, Caldwell (2003) specifies four different models of change agents:

Within the ‘leadership model’ the change agents are identified as leaders or senior executives who are positioned at the top of the organizational hierarchy. They can be described as visionary and entrepreneurial, and are activating extensive strategic change (Caldwell, 2003).

The ‘management model’ conceives a change agent as middle level manager and functional specialist who adapt, match and proceed the strategic change throughout business units or key functions (Caldwell, 2003).

The change agent within the ‘consultancy model’ is identified as internal or external consultant who provides advice, expertise, project management, change programme coordination and process know-how on a operational task or process level (Caldwell, 2003).

The ‘team model’ conceives managers, functional specialists and employees at all levels, as well as internal or external consultants as a
change agent team that operate at strategic, operational, task or process levels within an organization (Caldwell, 2003).

Jones (2006) research is dedicated to how middle managers influence organizational learning by adopting the role of change agent. Therefore, he focuses on how change agents influence an organization’s absorptive capacity by introducing new managerial practices and new ways of working (Jones, 2006).

Rogers (2003: 368) defines a change agent as ‘an individual who influences clients’ innovation-decisions in a direction deemed desirably by a change agency’. Thus, the change agent theory contains three important parties: the change agency, the change agent and the client system.

The change agency is a resource system with some kind of specific knowledge and expertise that recognizes and ascertains a desired innovation or behavioural change in a certain client system (Rogers, 2003). According to Rogers (2003) a social and technical chasm between the change agency and the client system requires the change agent whose crucial task is to facilitate the flow of innovation from a change agency to the targeted client system and thus to overcome this chasm. Thus, the change agent can be understood as a communicational link that has to bridge two differing systems, the change agency and the client system.

3.2.4.1 The change agent’s roles

In accordance with Rogers (2003) the following paragraphs describe the sequence of seven roles and activities that the change agent has to take and fulfill in the process of introducing an innovation into a client system.

The first step is to create a need for change within the client system. Therefore, to raise the clients’ awareness that a need to change exists, and in order to initiate the innovation-decision process, the change agent
has to point out the problems and deficiencies of the current situation regarding a certain issue. Furthermore, he has to highlight the benefits of alternatives to the existing status quo. In order to leverage the clients’ willingness to change, the change agent has to ensure that the clients are capable to confront the existing problems (Rogers, 2003).

Secondly, after the need for change is created, the change agent is asked to establish an information exchange relationship with his clients. This relationship is crucial to stimulate the client’s innovation-decision process, since innovations are often judged based on how the change agent is perceived by the clients (Rogers, 2003). Thus, the clients’ willingness to adopt an innovation depends not only on the benefits of the promoted innovation, but also on the change agent’s credibility, competence, and trustworthiness. Therefore, it is critical that the change agent empathizes with the clients’ problems in order to select innovations that meet the clients’ needs and to overcome the before mentioned social and technical chasms that exist between the change agency and the client system (Rogers, 2003). One of these social barriers has been described prominently by Katz and Allen (1977) in their study on the Not-Invented-Here (NIH) syndrome. Thus, the change agent’s ability to understand the clients situation and to learn about their problems is an important step to be accepted by the client system that has to be taken before the clients usually will accept the promoted innovation (Rogers, 2003). Furthermore, according to Rogers (2003) repeated contacts between the change agent and the clients are usually necessary to change clients’ behaviour and to diffuse innovations. Hence, change agent’s ability and repeated contacts help to overcome the “Not-invented-here” phenomena. This is also reflected in Harryson’s (2007) findings on the importance of personal contacts, i.e. know-who in order to facilitate knowledge transfer.
Once the change agent has established an information exchange relationship with his clients, in the third stage he is responsible to analyze and diagnose client’s problems. Therefore, the change agent benefits from the established relationships and regularly contacts to the clients to get the required insights and to view the current situation from the client’s perspective in order to arrive at diagnostic conclusions (Rogers, 2003).

After the change agent has identified and pointed out various ways how to confront and solve the clients’ problems, his task is to create intent to change in the client (Rogers, 2003). Therefore, the change agent has to motivate the clients’ interest in the promoted innovation (Rogers, 2003).

The next crucial step within the innovation process is to translate the created intent into an appropriate action (Rogers, 2003). In accordance with the clients’ situation and based on their specific needs the change agent seeks to influence clients’ behavior change and decision-making to adopt a promoted innovation (Rogers, 2003). This fifth phase is that the change agent has to motivate the client to transform his intent into action, which is supported by interpersonal network influences from near peers, is most important at the persuasion and decision stages in the innovation-decision process (Rogers, 2003).

In order to stabilize the adoption of the promoted innovation and to support its continuance throughout the targeted client system, the change agent has to encourage the clients’ new behavioral pattern through reinforcing messages to those clients who have adopted the innovation. This sixth phase is that the change agent gives assistance to the client in order to stabilize the adoption takes place when a client is at the implementation or confirmation stage in the innovation-decision process (Rogers, 2003).

The change agent’s seventh and last task within this sequence of change agent roles in the process of introducing an innovation in a client system is
to develop the clients’ ability to renew their behavior by themselves in a desirable way (Rogers, 2003). Thus, the change agent has to achieve a terminal relationship through shifting the client into a position of self-reliance and developing the clients’ capability to be their own change agents (Rogers, 2003). Does the change agent achieve to build the client up to be his own change agent, he can withdraw himself from the process.

3.2.4.2 Factors in change agent's success

According to Rogers (2003), a change agent’s success is usually measured in terms of the rate of adoption of innovations by members of the client system. The reason therefore is that the change agency’s main objective is to secure the adoption of new ideas by their clients. Hence, depending on the nature and the goal of an innovation, alternative measures of change agent success may appear more appropriate. That might be the degree to which the desired consequences of innovation adoption actually occur to clients, or the quality of innovation decisions that may be more important than just the number of adoptions achieved (Rogers, 2003).

Change agent effort

One crucial factor in change agent success is the amount of effort spent in communication activities with clients. Thus, Rogers (2003) generalizes that the change agents’ success is positively related to the extent of change agent effort in contacting clients. Not only is the sheer amount of client contact supporting the change agents’ success, but also the timing of the client contact in relation to the stage of diffusion of an innovation, is a crucial success factor (Rogers, 2003). Empirical studies revealed that especially in the first phase of the diffusion campaign the rate of adoption of an innovation is mirrored in the amount of change agents’
communication efforts (Rogers, 2003). Hence, once the innovation is adopted by opinion leaders and a critical mass of about 30% of the client system is reached, the adoption of the new idea will continue largely independent of further change agents` efforts (Rogers, 2003).

**Client orientation**

For the reason that the change agent is positioned as a communication link midway between the change agency and the client system, he becomes subject to role conflicts since both parties have different expectations in the change agents` actions. In regard to the change agents` success, Rogers (2003) states, that a client orientation is more crucial in order to secure the adoption of innovation by clients, rather than a change agency orientation. With a client orientation the change agent gains a higher credibility in the eyes of the client by matching the innovation activities predominantly on clients` need. Furthermore, the change agent is able to establish a closer relationship with the client system which provides him with useful feedback (Rogers, 2003).

**Compatibility with clients` needs**

Along with the client orientation, the change agents` success depends also on the degree to which an innovation program is compatible with clients` needs (Rogers, 2003). Thus, change agents should adapt the desired innovation to their clients` needs.

**Change agent empathy**

The change agents` empathy with clients is a crucial factor of success in securing the adoption of innovation. If the change agent has the ability to
put himself into the clients’ role, he can achieve a higher quality of adoption in that way that the client is more satisfied with the adopted innovation (Rogers, 2003). A satisfied client will spread his positive experience with the adopted innovation to potential adopters and supports the change agents to achieve a widespread client adoption of the desired innovation (Rogers, 2003).

**Homophily**

Homophily is the degree to which pairs of individuals who interact are similar. Rogers (2003) concludes that the higher the degree of homophily between the change agents and their clients, the more effective communication flows between them. Such effective communication is rewarding and encourages contacts between change agents and clients who are similar and have a high degree of homophily (Rogers, 2003).

**3.3 Summary of Roles in the innovation process**

This section provides a summary of the previous chapters about the different typologies of individuals, roles and activities as well as the mechanisms used in the innovation process, which can be discerned in the literature. The literature review showed that the theory of the technological gatekeeper is primarily older than 20 years. Thereby, the notion of the technological gatekeeper is mainly focused on a two-step process and a simple ‘search-and-transfer’ pattern. The prevailing two-step process is too restricted to bring radical innovation into an organization. Furthermore, roles and activities are too narrow and premature, and the theory lacks a recent, sound and comprehensive description of the technological gatekeeper in today’s more complex innovation processes, especially in the context of the open innovation concept. Only few extensions of the concept were made in recent years,
but Harada (2003) enriches the theory with the addition of the knowledge transformer to a three-step-process and thus contributes to adapt the role of the technological gatekeeper. Nevertheless, future research is needed in this field to cope with more complex processes in changing and global markets, and to give an appropriate description of the technological gatekeeper who is able to support and develop a firm’s absorptive capacity.

The literature review about the champion and promotor concept gives valuable information how individuals can support the internal promotion of innovations within a company, and how to overcome internal barriers to innovation. However, both the champion and the promotor concept disregard the linkage to external knowledge domains and thus are not appropriate to tap crucial external sources and to support the external-internal knowledge transfer, especially in the context of open innovation. Champions and promotors rather support the internal implementation once external knowledge is acquired and transferred to the company.

The change agent literature reveals valuable knowledge about crucial roles, activities and success factors of the change agent in the diffusion process. The diffusion theory is much more advanced and complex compared to the technological gatekeeper theory and gives important ideas and details how to support the process of implementation of externally acquired knowledge, and how to initiate change or innovation in a desirable way.

The following table summarizes the four typologies of technological gatekeeper, champion, promoter, and change agent by describing their characteristics, roles and activities, and compares them by means of the following dimensions:
- Project-related vs. project independent: It defines if the role is taken in relation to a specific project or if the individual is acting project-independent.

- Formal vs. informal role: It distinguishes if the technological gatekeeper, champion, promotor, and change agent emerge formally (function of formal position) or informally (driven by job satisfaction, morale, and promotion)

- Internal vs. external linked: This dimension describes if the technological gatekeeper, champion, promotor, and change agent are linked and connected to the firm’s internal domains and environment, and/or to the external environment and communities.
| Definition | Key individuals who are both strongly connected to internal colleagues and strongly linked to external domains (Tushman and Katz, 1980: 1071) | One charismatic individual who throws his or her weight behind an innovation, thus overcoming indifferences or resistance that the new idea may provoke in an organization (Rogers, 2003: 414) | Promotors are individuals who actively and enthusiastically promote innovations throughout the crucial organizational stages from initiation to implementation (Witte, 1973: 52) | The change agent is an individual who influences client's innovation-decisions in a direction deemed desirably by a change agency (Rogers, 2003: 368) |
| Attributes / Characteristics | Often middle ranked in the hierarchy, Great knowledge of scientific and technological literature, Informal contacts with external community | Often high ranked in the hierarchy, power and prestige, wide variety of interests, courage and risk taking, innovation focused, visionary, well connected to people and resources within the organization, influential | Power promoter are high ranked in the hierarchy  
Expert promoter have specific knowledge and expertise  
Process promoter have an overview about the entire innovation process  
Relationship promoter bring in extensive network competence | Informal power, persuasive power, selling abilities, change-related expertise, empathy with the client system, client orientation, |
| Roles / Activities | Promoting formal and informal communication, Information transmitting and translating, Linking the organization to its external sources of information | pushing and promoting an idea, informal sales and promotion, overcoming indifferences or resistance | Power promoter: sanction opponents, support and reward innovation willing employees  
Expert promoter: assist and support employees with knowledge  
Process promoter: supporting the innovation process, linking resources, administrative tasks  
Relationship promoter: ensuring knowledge transfer, establishing and fostering relationships | Communicational link between change agency and client system; Create a need for change within the client system; Establish an information exchange relationship with the client; Analyze and diagnose client's problems; Create intent to change; Translate client's intent into action; Encourage and reinforce clients' new behavior; Develop the client's ability to renew their behavior by themselves in a desirable way |
<table>
<thead>
<tr>
<th>Technological Gatekeeper / Boundary Spanner</th>
<th>Champion</th>
<th>Promotor</th>
<th>Change Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process</strong></td>
<td>2-step-process (Allen and Cohen, 1969; Tushman and Katz, 1980)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3-step process (Harada, 2003)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Project-related vs. project independent</strong></td>
<td>Project independent, long-term perspective</td>
<td>Project-related</td>
<td>Project-related</td>
</tr>
<tr>
<td><strong>Formal vs. informal role</strong></td>
<td>Informal role</td>
<td>Informal role</td>
<td>Informal role</td>
</tr>
<tr>
<td><strong>Internal vs. external linked</strong></td>
<td>Both: strongly linked to internal and external domains</td>
<td>Focus on internal innovation activities and promotion</td>
<td>Focus on internal innovation activities and promotion</td>
</tr>
</tbody>
</table>

**Figure 12: Gatekeeper typologies and roles in the innovation process**

Source: own
4 Empirical Study

In this chapter, the empirical findings of the case study at the BMW Group and its Technology Office in Palo Alto, California, USA will be presented. These findings are based on the data collected – primarily through interviews – during my placement at BMW Group. The first subchapter introduces the case company, while the second section presents and describes the Technology Office which is the subject of the empirical study. Thereby, I expose and outline how the Technology Office acquires and transfers external knowledge to the central R&D units. The empirical findings will then create the basis for the analysis.

4.1 BMW Group

The history of BMW – Bayerische Motoren Werke GmbH – began in 1916 in Munich, Germany with the founding of Bayerische Flugzeug-Werke (BFW). BFW was a manufacturer of aircraft engines. After the Second World War BMW restarted its manufacturing and got back in business with the production of automobiles for the Soviet Union. In 1948 BMW also started to produce motorcycles. Four years later, in 1952, BMW’s first post-war automobile was manufactured. The following years BMW had to fight to establish itself on the automobile market and came close to being sold to Daimler-Benz in 1959. But BMW’s independence was saved by Herbert Quandt who was the company’s major share holder at that time. After he had increased his share up to 50 % he was reorganizing the company.

Under the leadership of Eberhard von Kuenheim who became BMW’s chairman of the management board, BMW developed in the years from 1970 until 1993 from a national automobile manufacturer of European significance into a global premium brand. In this period of time, BMW
increased its turnover 18-fold, the car production was raised by a factor of four, while the firm’s motorcycle sales tripled.

In 1994, BMW set the goal of expansion and took the decision to enter new market segments. BMW purchased the British-based Rover Group – including the brands of Rover, Land Rover, MINI and MG – and planned to modernize the Rover Group’s production plant and rejuvenate the brand product lines. However, in the year 2000, in consequence of the pound sterling that had appreciated by almost 50%, the costs for restructuring the Rover Group had risen sharply and the reorganization became unfeasible. Hence, the Rover and MG brands were sold for a nominal price of £10, and Land Rover was sold shortly afterwards. The MINI brand on the other hand was retained by the BMW Group. In the course of market expansion, in 1998, the BMW Group acquired the rights to the name Rolls-Royce for cars – which at that time were built by the Volkswagen Group – with the permission to exercise the brand rights from 2003.

Today the BMW Group is a global automotive company. With their three car brands – BMW, MINI and Rolls-Royce Motor Cars – The BMW Group has its sights set firmly on the premium sector of the international automobile market. Along with its automotive concerns, the BMW Group comprises of BMW Motorcycles and BMW Financial Services. At the end of the year 2007 the BMW Group’s workforce consisted of 107,539 employees. With the corporation’s head office in Munich, the BMW Group covers 150 countries and runs several R&D centers worldwide. Furthermore, the BMW group manufactures its products at 23 sites in thirteen countries on four continents: seven vehicle plants for BMW automobiles and motorcycles, one plant for MINI, three engine plants, four plants for components and special functions, and eight assembly plants.

In its automobile business, the BMW Group registered new sales volume records for all three brands in 2007. For the first time ever, sales volume exceeded 1.5 million units, with a total of 1,500,678 BMW, MINI and Rolls-
Royce brand cars sold. This represented an increase of 9.2% over the previous year. Also, BMW's motorcycle business increased its sales volume in 2007. A total of 102,467 sold motorcycles represented a new sales volume record with an increase of 2.4% over the previous year. The revenues of the BMW Group rose to EUR 56,018 million in 2007 due to the positive sales volume performance and the dynamic growth of the BMW Financial Services. The automobile business revenues rose by 12.7% to EUR 53,818 million while the motorcycle business revenues fell slightly by 2.9% to EUR 1,228 million. Thus, the BMW Group continued to perform successfully in 2007 despite difficult conditions and the impact of external factors such as the continuing weakness of the US dollar and the Japanese yen, the generally high cost of raw materials, and less favourable financing conditions (www.bmwgroup.com, 20.07.2008, BMW Group Annual Report 2007).

The ability to innovate will continue to be an essential factor of the BMW Group’s success in worldwide competition. Thus, in order to secure the long-term innovation and technology leadership, BMW is permanently looking for unusual innovations in the subject “mobile future”. Therefore, the BMW Group is not only interested in the firm’s own research and development departments but also in the creative minds outside the BMW Group.

### 4.2 BMW Technology Office Palo Alto

The BMW Technology Office Palo Alto was opened in November 1998 and is a legal affiliate of BMW North America LLC, which is a subsidiary of the BMW US Holding Corporation. At the same time, the Tech Office is a functional affiliate of the BMW Research and Technology GmbH in Munich.
The Tech Office’s mission is to “explore, evaluate, and transfer cutting-edge technologies primarily from non-automotive US industries to its partners within the BMW Group”. Thus, the Tech Office is a decentralized technology scouting unit on the North American market that is in charge of exploring continuous technology and to study, evaluate and apply it. An important task is then to develop a prototype to prove feasibility and transfer the technology to the BMW Group’s partner unit. Furthermore, the Tech Office is consulting and answering technical requests coming from the BMW Group and transmitting know-how to the decision-makers at the BMW headquarter. Finally, the Tech Office’s business is scouting, networking and communication. Therefore, the employees are visiting exhibitions, conferences, high-tech events, lecturing at universities, contacting start-ups, companies and venture capitalists.

The technology scouting activities of the Tech Office are focused on the following areas and core topics:

- Advanced Electronic Devices
- User Interface & Enabling Technologies
- Communications
- Consumer Electronics & Entertainment
- Sensing Technologies
- Energy Management Systems & Powertrain
- Advanced Materials
- Production Technologies

The goal of the Tech Office is to contribute with innovative solutions to the major changes BMW is facing currently and in the near future.
The figure below is visualizing how the Tech Office as a decentralized technology scouting unit is positioned between the automotive BMW Group and primarily non-automotive North American industries.

Located in Palo Alto in the region of Silicon Valley the Tech Office is in proximity to thousands of high-tech companies and creative design firms, unique universities and research institutions. The Tech Office benefits from the Silicon Valley’s outstanding and unique business and engineering culture that is focussed on innovation, and has easy access to networking and high-tech events.
The figure above shows the partner network of the Tech Office. In order to explore, study, evaluate and apply technologies the Tech Office is focused on start-ups, established non-automotive companies, universities, research labs and the BMW Group to whom the scouted technology is going to be transferred. Also, established automotive companies and venture capital firms belong to the partner network but are not in the focus of the Tech Office. BMW qualified suppliers are not addressed.

4.2.1 The Tech Office’s Workforce

The Palo Alto Tech Office regularly consists of an intercultural team of 15 employees that are divided into expatriates, local engineers and trainees. The regular workforce of 15 employees can be increased by one or two additional employees depending on the upcoming workload.
The expatriates are German engineers and are divided into two groups: permanent expatriates are permanent employees of the Tech Office. Thus, they are under the functional guidance of the Tech Office itself. Their tasks are broader, independent and long term oriented with a focus on research. Project-centered expatriates are still managed by and under responsibility of their Munich development unit. These development units send their engineers with specific problems and tasks to the Tech Office in Palo Alto. Compared to the more research driven work of the permanent expatriates, the project-centered expatriates have a product-oriented perspective and attend to solve specific problems. The working time of the project-centered expatriates in Palo Alto varies between one to three years depending on the problems, tasks and the projects they are in charge of. During the projects they act as communication link to the development units and represent the interest of the central R&D organization in Munich.

“Especially in the daily work with predominantly non-automotive companies from the Silicon Valley the project-centered expatriates with their expertise and experience secure that projects are running on the right track and meet the automotive and BMW internal needs and requirements.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

All the expatriates have at least five years of working experience at the BMW R&D headquarter. Thus, it is assured that they are strongly linked to the BMW R&D headquarter and its development units, and maintain and tap an internal network. At best these internal networks cover most hierarchical levels and all relevant departments and technological fields within the R&D headquarter.

The so-called locals are American engineers which are directly hired from and subordinated to the Tech Office. They are employed to establish and maintain contacts to American companies in the region of Silicon Valley.
Therefore, one crucial criterion for the employment of local engineers is their history and work experience with firms in Silicon Valley and their embeddedness in the region.

“All our current local engineers graduated at the local universities of Stanford and Berkeley and have good contacts to both universities with which we actively run projects. They help us to use existing contacts and networks to companies and universities and to find new potential partners.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

The trainees are primarily from Munich and the Tech office acts as a platform for internal trainees to gain international work experience. For specific tasks and projects the Tech Office also recruits trainees from American universities.

“If we are in cooperation with an university and one of its students worked already on a certain topic or project, then we can offer this student a 6-month internship from time to time” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

The intercultural team of permanent expatriates, project-centered expatriates and local engineers provides important advantages. The project-centered expatriates represent their home development unit locally in Palo Alto and provide a direct link into their department and network. Thus, permanent expatriates and local engineers have direct contact persons in Palo Alto to ask if projects and topics could be interesting for the development unit in Munich and furthermore can use their internal contacts and network. Due to the reason that the expatriates are only working in the Tech Office for a limited period of time of one to three years, the job rotation within the Tech Office is high what has two important side effects. First, the new coming expatriates from Munich bring in new contacts and networks and thus enlarge the Tech Office’s existing network in the BMW headquarter. Secondly, the leaving expatriates
enlarge the Palo Alto alumni network in Munich which allows a simplified contact via the alumni network for future projects of the Tech Office.

4.2.2 Push vs. Pull Project

The projects running in the Tech Office are divided into push and pull projects. Push projects are initiated from the Tech Office in Palo Alto. If the employees identify interesting and promising trends, technologies and innovations during their scouting activities, they have to find a partner unit at the BMW headquarter in Munich to establish and realize the project, and to have a valid partner to whom they transfer the technology/results after the proof of feasibility. Ideas for push projects that don’t spark the interest of a partner unit in Munich and thus will not get support from the BMW headquarter usually don’t lead into a running project. Hence, it is important for the Tech Office to find the right partner unit in Munich and to know in which department the project is best placed. In order to find a partner unit the project manager of the Tech Office contacts the targeted unit either in a more informal way by using already existing contacts or in a formal way by contacting the head of department.

“For the first contact at best you already know some people and you have a network you can use in order to start a project with a development unit in Munich. The contacts and people I already worked with or talked to are mostly engineers. You can ask them easily if a project could be interesting for them or not. If I don’t know anyone I usually get in contact with the head of the targeted department because he knows of course his engineers and which topics they are working on or have expertise in. Finally, I get in contact with the engineer the head of the department is telling me to present and discuss the project idea. The engineer usually decides whether the project is interesting for the department or not. If the engineer is interested to realize the project, he gets back to the
head of department to ask for the official project agreement and funding.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

A good way to get a first contact in Munich is to use the alumni-network of Palo Alto that is linked to all hierarchical levels. Those alumni often broker between the Tech Office and the development unit. Finally, there is no official process how to get in contact with a potential partner unit in Munich but the first request most often takes place through the existing network.

In the past, the Tech Office’s search for a partner unit in Munich in order to establish a push project showed, that some central units and departments are more interested and open to projects than others. The main reason for the contacted unit to refuse to run a project with the Tech Office was lack of budget and resources. But it also depends on the department’s and engineer’s openness, what kind of priorities the department has and how much they can benefit from a project. Another reason why ideas and technologies – especially from non-automotive fields – often arouse the interest of the development department, but nevertheless are not going to lead into projects is, that they are too radical and are not able to fulfill the rules and norms of automotive issues or BMW internal requirements.

In contrast to the aforementioned push projects, pull projects are initiated from a central development unit of the BMW headquarter in Munich by facing a problem or identifying needs for change and innovation. The Tech Office is then asked to solve these problems. These pull projects often concern trend scouting activities or university collaborations that conclude with a final report instead of a functional prototype.

“There is no difference within the project procedure of push and pull projects and the handling is quite the same. But projects that are initiated by a development unit in Munich start usually faster and the Tech Office is asked to come up with results promptly. In contrast,
push projects which are established by the Tech Office often need some time until they can be started. The reason therefore is that we have to find a partner unit in Munich that is interested to realize the project with the Tech Office and it can take some time to find this partner and to get their project commitment.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

The Tech Office is able to start 40-50% of their ideas and scouted technologies as a project with a partner unit in Munich. Approximately 10-20% of these projects are successfully transferred to the partner unit in Munich, including the proof of feasibility and/or a functional prototype. Thus, 10-20% of the projects are leading into follow-up projects and achieve the pre-development phase at the Munich research and development unit.

“The Tech Office in Palo Alto has a success rate of approximately 10% which is a quite good rate. When we speak with the venture capitalists in Silicon Valley, they confirm that on average one out of ten ideas are successful.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)

4.2.3 Technology Transfer Process

For the technology transfer, the Tech Office follows a process guideline in order to embed its trend and technology scouting in the form of push and pull projects in the BMW development process. The figure below visualizes the workload of the Tech Office and the partner unit during the project duration. This ideal process can vary due to the diverse projects and is just a guideline. Usually projects are not taking longer than 6 months before they are transferred to the development unit.
As mentioned above, either projects are initiated by the Tech Office (push project) that has explored and scouted a promising technology, or projects are triggered by internal BMW units that face a problem or send a request. After the Tech Office and the BMW unit have confirmed their commitment for a project, the project starts. At the Tech Office the project is managed by the person who has the required expertise, know-how and contacts. In the case of pull projects the requesting partner unit at BMW often sends an engineer as project-centered expatriates to Palo Alto who is then in charge of the project. At the same time, one employee at the partner unit Munich who has the required expertise for and interest in the technology is in responsibility for the project. This person, who is in the majority of the cases an engineer, is in charge of supporting and promoting the project and to enforce it within the development unit.

As the figure above shows, the workload of the Tech Office is high in the beginning of the project. The absolutely crucial task of the Tech Office is
networking. Establishing relationships and partnering with companies, universities (lectures and presentations at universities) and research labs is indispensable to explore, evaluate and apply trends and promising technologies and realize projects in cooperation with the BMW partner unit.

The main task of the Tech Office during the project is to establish proof of feasibility and to develop a prototype. During the development of the prototype a crucial task of the Tech Office is to keep the balance between the strict automotive requirements from the development unit in Munich and the creativity, standards, and norms of the mainly non-automotive companies or universities that are involved in the project. Thus, one of the Tech Office’s critical tasks during a running project consists of what Gassmann and Gaso (2004) define as matchmaking activities.

In the first phase of the project the workload of the partner unit in Munich is low. They collaborate with the Tech Office and are available to answer questions and to convey requirements. After the proof of feasibility the workload of the Tech Office decreases and they prepare the technology/project transfer to the partner unit. In contrast, the workload of the partner unit increases with the project transfer and they are in charge of securing that projects are ready for serial development, to establish and create a business plan and prepare the start of production.

4.2.4 Communication between Technology Office and BMW Partner Unit

This chapter describes the communication between the Tech Office and the partner unit at BMW during a project. Thereby, the focus lies on the persons involved in the communication and the channels that are used to secure the crucial communication and information flow for a successful internal implementation of external knowledge.
After the Tech Office and the development unit in Munich agreed to run a project, the project manager of the Tech Office and the responsible engineer of the partner unit are the main contact persons for the transatlantic communication and cooperation during the project. The project manager of the Tech Office manages occurring questions, problems and requirements with cooperating and collaborating firms and universities in North America, bundles project-related information and communicate them to the responsible engineer of the development unit in Munich. In the same way, the engineer of the development unit centralizes internal project-related information from other engineers and/or developing units to transmit them to the project manager of the Tech Office in Palo Alto.

The communication mainly takes place via e-mail, blogs, telephone and video conference. Furthermore, the Tech Office’s employees regularly travel to the BMW headquarter in Munich. The project manager schedules at least two or three trips per year to coordinate ongoing projects, to
deliver and transfer finalized projects, and to find partner units for future projects. On the one hand, these face-to-face meetings are important to encourage the identification and empathy of the parties involved in the project. On the other hand, the trips to Munich provide the opportunity to maintain and expand the internal network.

“The Tech Office Palo Alto is dependent on the network and the employees’ trips to Munich. Before we stop sending our employees to Munich we should close the Tech Office because it is quite impossible to establish new projects without face-to-face contacts. A well working communication ensures the success of the Tech Office and beside e-mails, telephone and video conferences, regularly visits from the Palo Alto staff in Munich are crucial and secure the integration of the Tech Office into the BMW development process.” (Interview, Max Kicherer, Alumni Tech Office Palo Alto, 07.05.2008)

Conversely, engineers from the partner unit in Munich also travel to Palo Alto when the department has enough budget and when the project is important and a trip is necessary.

4.2.5 Communication within the Technology Office
The communication and information exchange within the Tech Office concerning the different running projects, studies and their current status are taking place in formal as well as in informal ways. The employees refer about their projects in formal weekly meetings, and detailed project presentations take place in so-called project meetings that are primarily set after one project is finalized. Project manager also present their project status during the project phase in order to get independent input from colleagues. In addition, project managers use the opportunity to present and promote their projects when decision maker from the BMW headquarter travel to Palo Alto and visit the Tech Office. These
presentations are further options for other Tech Office engineers to keep themselves informed and updated about running projects.

Moreover, the flat hierarchical structure in the Tech Office and the small size of the unit in terms of working staff supports an informal daily communication between the Tech Office’s employees. Simon Ellwanger (Project Manager Tech Office Palo Alto) mentioned in this context conversations and informal meetings in the office kitchen.

4.2.6 Exemplary Push Project Description

The following section describes a typical Tech Office initiated push project that took place in 2007. Due to the highly sensitive and confidential content of the project, as well as a non-disclosure agreement between BMW and the external partner involved in the project, this project description only displays general project independent information and processes, and excludes technology-related data and pictures.

The Tech Office sought to realize a concept of a novel, so-called “after market”-product. The idea to develop this product came up during technology scouting activities of local engineer Ryan Kottenstette of the Tech Office who discovered the concerned technology, which has been developed by an American company, on a conference. After having the idea to integrate the scouted technology into a BMW product, he was evaluating this idea as a promising product innovation. Hence, Ryan Kottenstette presented and promoted his project idea to the central development units in Munich in order to find a partner to start the project. Finally, at BMW motorcycles Matthias Runde of the product management of riders’ equipment (UX-VA-2), responsible for helmets, clothing and boots, was highly interested in the project and confirmed his commitment to the project. Thus, the partner unit assured the Tech Office of support, resources, and budget. The budget is usually shared by the Tech Office and the partner unit so that both parties fund the project by 50%.
Furthermore, the project commitment includes the partner unit’s aimed results, requirements and deadlines. With the project commitment between the Tech Office and the Munich department of UX-VA-2 this push-project was established in March 2007. The Tech Office started to work on a prototype in cooperation with the aforementioned Californian company.

During the development of the prototype the main workload was incurred by the Tech Office that was mainly in charge to secure that BMW internal requirements and norms are kept while the central development unit in Munich (here UX-VA-2) was available to answer any queries. At that time, Simon Ellwanger (permanent expatriate and project manager in the Tech Office) was taking charge of the project and became responsible for the project management. He was also evaluating the results of the prototype, testing the technology, and taking care of problems. An important task during the development phase of the prototype is matchmaking activities of the Tech Office. Simon Ellwanger had to mediate, communicate and coordinate between the automotive interests and requirements of the partner unit of the BMW headquarter and the American partner company, which is a non-automotive company.

“My task was to brief our American partner firm with the BMW internal needs and requirements for automotive products. Thereby I supported them actively with the development of the prototype but I did not have the expertise in the concerned technology, in this area the American partner is the specialist with the necessary know-how so that I kept out of this part. More important for me was to secure that the external partner considered what BMW was asking and looking for.” (Interview, Simon Ellwanger, Project Manager Tech Office Palo Alto, 15.05.2008)
After the first prototype was finished, the Tech Office in Palo Alto tested and verified the prototype extensively. The test results were not fully satisfying so that the Tech Office decided to develop a second prototype with several improvements. The second prototype was tested again in cooperation with the Munich unit of UX-VA-2. In September 2007 the Tech Office were able to deliver a functional prototype to the BMW headquarter to Matthias Runde and his team of UX-VA-2. Thus, the project was successfully transferred to the Munich partner department. In the phase of the project handover both parties – Tech Office and partner unit are still involved in the project. This overlap is important to ensure a successful progress of the project and Simon Ellwanger still answers technical questions and establishes contacts between UX-VA-2 and the American partner unit. Even though the officially project work for this product ended for the Tech Office with the transfer of the prototype, the Tech Office withdrew from the project slowly, while the workload of UX-VA-2 has been increased after the project transfer and the task of Matthias Runde and the unit of UX-VA-2 were then to establish and create a business plan including negotiating prices, timing schedules etc. with the American partner firm.
BMW as the case company of this thesis’ single-case study, has displayed great ability to source external knowledge in centers of technological excellence and innovation clusters through its Tech Office in Palo Alto. With direct access to Silicon Valley, the Tech Office is a strategic decentralized R&D unit that scouts and gathers sophisticated technological knowledge from primarily non-automotive areas, and transforms and transfers technologies to the central R&D units in Munich.

In this chapter, I present the analysis of the empirical results to provide a sound and comprehensive overview how BMW incorporates innovation impulses from its corporate technology scouting outpost. The analysis will reveal which gatekeeping activities and external-internal transfer mechanisms are deployed by BMW’s Technology Office in Palo Alto. Therefore, I link the empirical results to the theoretical framework in order to align/compare the roles and activities of and mechanisms used by gatekeepers in theory and praxis. First, I pursue the structural order of the theoretical framework and run through the different typologies of gatekeepers and roles in the innovation process, quote excerpts from the theory (italic paragraphs) and compare it with the empirical findings of the case study. Secondly, I raise and analyze findings of the case study which cannot be linked to theoretical findings. In this way, the analysis intends to highlight similarities and differences between theory and praxis and creates the basis for the conclusions and recommendations.
5.1 Technological Gatekeeper / Boundary Spanner

Technological Gatekeepers are both strongly connected to internal colleagues and strongly linked to external domains by having a great knowledge of formal media as the scientific and technological literature, as well as maintaining informal contacts with the external scientific and technological community to a great extent (Tushman and Katz, 1980; Allen and Cohen, 1969).

The intercultural team of the Tech Office, consisting of local engineers and expatriates (as described in chapter 4.2.1), secures and ensures the internal and external linkage in order to act as a gatekeeping unit. On the one side, the expatriates have at least five years of working experience in the central R&D of BMW and provide and maintain a wide internal network. Particularly, the project-centered expatriates which are relocated from their home-base R&D unit to the Tech Office for specific tasks and projects are strongly connected to their colleagues in the BMW headquarter and still working under the guidance of their home-base department. On the other side, all local engineers graduated at the renowned local universities of Berkley and Stanford, and already have working experience in the region of Silicon Valley. Thus, they maintain and provide external contacts and networks to scientific and technology communities in this center of excellence. Hence, the Tech Office is strongly internally linked as well as externally connected through its intercultural and multidisciplinary team and its workers’ vita and past experience.

Gatekeepers are likely specialized in certain information domains since they may not attend to all external knowledge areas (Tushman, 1977).
The Tech Office’s scouting focus lies on core topics such as advanced electronic devices, user interface & enabling technologies, communications, consumer electronics & entertainment, sensing technologies, energy management systems & powertrain, advanced materials, and production technologies. The team members display diverse high-tech backgrounds and complement with their specific expertise the Tech Office’s portfolio. Especially the expatriates are specialized in a certain technological field and represent their specific home-base R&D department’s perspective. Hence, each employee has specific skills and expertise in a certain technological area and the multidisciplinary team enables the Tech Office to tap several external knowledge areas, and to explore and evaluate the acquired knowledge.

*When the expertise of most individuals within the organization differs considerably from that of external actors who can provide useful information, some members of the group are likely to assume relatively centralized ‘gatekeeping’ or ‘boundary-spanning’ roles (Cohen and Levinthal, 1990: 132).*

The Tech Office is consciously located in Palo Alto with proximity to Silicon Valley and its innovative and unique high-tech business culture in order to explore, evaluate and transfer cutting edge technologies from primarily non-automotive industries to the automotive partners within the BMW Group. Thus, the task of the Tech Office is to complement BMW’s internal idea generation with valuable external knowledge and technologies which might differ considerably from internally existing information and knowledge. Consequently, the Tech Office and its team take a centralized gatekeeping role for information and knowledge originating from the US industries and markets in general and from the region of Silicon Valley particularly.
The technological gatekeeper emerges informally to transfer information and technology effectively into the organization, when the formal organization is incapable of fulfilling it. Thus, his role is not a function of formal position, but rather an informal phenomenon where scientists and engineers from lower hierarchical levels are driven by job satisfaction, morale, and promotion to mediate crucial information between the organization and the external environment (Allen et al., 1979; Tushman & Katz, 1980).

The Tech Office in Palo Alto as R&D listening post is part of BMW’s innovation strategy and takes the role of a gatekeeping unit formally. With the mission to explore, evaluate and transfer technological knowledge from primarily non-automotive US industries, the Tech Office is consciously located in Palo Alto with proximity to Silicon Valley in order to benefit from the unique high-tech knowledge available in the region. The Tech Office’s expatriates emerge as non-permanent worker of the Tech Office. Due to their expertise and interest in a specific technological field and often linked to a certain problem/technological request of their home-base R&D department, the expatriates are relocated to Palo Alto to gather and acquire information and knowledge in order to solve the problem, and thus to act as a technological gatekeeper.

The required technological expertise to act as a gatekeeper is most often found among employees who operate at lower levels of the organization (first level supervisor and below) and then play the role of the gatekeeper by linking colleagues within and outside the organization (Allen et al., 1979).

The Tech Office’s expatriates are always engineers from middle or lower hierarchical levels who are placed at the Tech Office due to their technological expertise and interest. Due to the reason that the Tech Office is a functional affiliation of the BMW Research and Technology
GmbH, and has the goal to explore, evaluate and transfer technological information and knowledge to the central R&D in Munich, which is integrated into a formal process, the Tech Office’s employees don’t need to come from higher hierarchical levels or use their power to support the transfer and implementation of the acquired technology and/or innovation.

➔ In order to reduce the communication boundary between a firm’s subunits and external knowledge domains, an important active role of the gatekeeper is to direct, train and coach the external communication of other subunit members.

This active role of the gatekeeper which is mentioned in the literature, is not observable in the case of the Tech Office in Palo Alto. However, instead of to direct, train and coach the external communication of internal colleagues directly, the frequently relocation of engineers from their home-base R&D department to the Tech Office (which is described as job-rotation later in this chapter) is on the one hand supporting and fostering the employees external communication and their openness to external knowledge domains. On the other hand, after the engineer has returned to his home-base R&D department, his colleagues and the entire department might benefit from the external contacts and networks, as well as the experience the engineer brings in.

➔ Unlike the notion that the technological gatekeeper is external and internal communication star at the same time, Harada (2003) finds that boundary spanning individuals who transfer external information to the organization do not frequently communicate with colleagues inside the organization. Rather, they are strongly connected to internal communication stars that translate and transform the external information into organization specific knowledge and use their internal network
capabilities to transmit it to other members inside the organization. Thus, a new role is added to the information process that is fulfilled by persons that are defined as knowledge transformers (Harada, 2003).

The Tech Office that can be defined as gatekeeping unit, consist of local engineers and BMW internal expatriates. As already mentioned before, this workforce structure ensures an optimal internal and external linkage. Thereby, the expatriates are both external and internal communication star, since they are maintaining a wide internal network and are closely connected to their home-base R&D department. Due to the fact that the majority of the expatriates are still under the guidance of their home-base R&D department and relocated to the Tech Office for specific tasks and projects, they also take knowledge transforming activities. During the projects, the project manager at the Tech Office and the engineer at the partner unit in Munich are in charge of transforming the externally acquired knowledge or technology that it meets the BMW internal needs and requirements. Especially prototyping and the proof of feasibility is a first but crucial step of knowledge transforming in order to enable the implementation of the external knowledge. However, after the proof of feasibility and the project handover to the central R&D unit, further knowledge transforming activities are necessary to bring the transferred technology into series readiness. Thus, the role of the knowledge transformer is taken by the interplay of expatriate/project manager of the Tech Office and the responsible engineer of the partner unit in Munich.

The distinction and the task split of boundary spanning and knowledge transforming roles is a consequence of the dilemma of information gathering and translation capabilities which are mutually incompatible. The translation capability requires not only a sound understanding of external coding schemes and languages, but also a certain period of intra-organizational experience in order to be familiar with the local coding scheme and language shared among organization members (Harada, 2003). In contrary, long organizational experience impedes a persons’
external communication and thus is negatively related to external information gathering (Harada, 2003).

In order to address the dilemma of information gathering and translation capabilities, the Tech Office’s workforce with an intercultural team of local engineers and relocated BMW internal expatriates ensures extensive external communication and sound understanding of external coding schemes and languages, as well as intra-organizational experience and familiarity with the organizations needs and requirements.

5.2 Champion

Chakrabarti (1974) ascribes the importance of the role of the product champion within the innovation process to the selling of the idea to the management.

Once the Tech Office has acquired a promising technology, it has to find a partner unit in Munich in order to establish a project. Therefore, the Tech Office uses often informal contacts and networks – such as the Palo Alto alumni network – to get in contact with interested persons and central R&D units. Most often engineers of a R&D department are contacted and if they are interested in the scouted technology, they can emerge as champions by selling the idea to the department chief and convincing him to start a project and allocate the needed budget and resources.

He defined the champion as ‘an individual who is intensely interested and involved with the overall objectives and goals of the project and who plays a dominant role in many of the research-engineering interaction events through some of the stages, overcoming technical and organizational obstacles and pulling the effort through its final
achievement by the sheer force of his will and energy’ (Chakrabarti, 1974:58).

Once the Tech Office has started a project with a partner unit in Munich, the responsible engineer of the home-base R&D unit becomes a champion who is in charge of supporting the project and the development of a prototype, as well as ensuring that the technology fulfills the internal requirements. He takes a crucial role in the interaction between Tech Office and central R&D unit and provides needed resources. After the project handover, the responsible engineer and the partner unit have to champion the transferred technology and integrate it into the pre-development process in order to bring it to series readiness. Thereby, technical obstacles have to be overcome.

Thus, the role of the champion cannot be taken by the Tech Office itself, but in the technology transfer process from R&D listening post to central R&D unit, the responsible engineer or the entire R&D department can act as champion to support the implementation of the transferred technology and to exploit and commercialize it.

5.3 Promotor

➔ The power promotor promotes innovations with and due to their hierarchical power in order to overcome the motivational resistance and barriers of willingness that are caused by the employees’ wish to maintain the status quo in order to avoid changes, risks and uncertainty inherent to the innovation

The internal promotion of externally acquired technologies and innovations through the Tech Office, is task of the central R&D unit to which a project is transferred. Thereby, the role of the power promotor is taken by the
chief of the R&D unit. First, he decides if either an existing problem or technical request within the home-base R&D department leads to a pull project with the Tech Office or if a technological innovation or trend scouted by the Tech Office and then presented to the central R&D unit leads to a push project. Due to his power and authority, he confirms the partner unit’s project commitment including the allocation of budget, time and resources. Secondly, after the technology is transferred from the Tech Office to the partner unit in Munich, the integration of the transferred technology into the pre-development process of the central R&D unit requires the R&D department chief’s decisions, support and instructions.

➢ *The expert promoter fosters and encourages the innovation process by means of his specific knowledge and expertise and has typically a line function in a department that is closely connected to the innovation*

The role of the expert promoter is usually taken by the responsible engineer in the central R&D department. He supports and promotes the projects with the Tech Office by means of his technical expertise and interest. Thereby, he accompanies the project from the beginning, is the main communication partner for the Tech Office, and secures that the transferred technology meets the BMW internal requirements and helps to integrate it into the pre-development processes at the central R&D unit.

The technology transfer process from Tech Office to central R&D unit, and especially the integration of the transferred technology into the pre-development process can be supported and promoted by the department chief who emerges as power promoter and the responsible engineer who acts as expert promoter. Thus, the similar role of champion and promotor are taken by the partner unit in Munich that supports the successful implementation of externally acquired knowledge und promote the transferred technology internally.
5.4 Change Agent

In this section the change agent’s roles and success factors which can be find in the literature are linked and compared to the Tech Offices roles and activities.

- Creating a need for change within the client system. Therefore the change agent has to point out the problems and deficiencies of the current situation regarding a certain issue. Furthermore, he has to highlight the benefits of alternatives to the existing status quo.

In contrast to the change agent theory where the change agency and the change agent is an external force outside the client system, the Tech Office Palo Alto as R&D listening post is a functional affiliation of the BMW Research and Technology GmbH, Munich. Thus, the Tech Office is a decentralize part of the client system (BMW Group) itself.

On the one side, problems and deficiencies of the current situation are often recognized by the central R&D unit in Munich, so that the need for change is often realized by the client itself which leads to pull projects initiated by the development unit in Munich.

On the other side, the Tech Office scouts trends and discovers promising technologies in North America, especially in the region of Silicon Valley, and tries to find partner units in Munich to establish push projects in order to transform and transfer the externally acquired technology to the central R&D unit.

- Establishing an information exchange relationship with clients

The establishment of an information exchange relationship can be seen in the process when the Tech Office tries to find a partner unit in Munich for a push project. Once the the partner unit is interested and confirmed its
project commitment, an information exchange relationship is established and communication between the Tech Office and the responsible engineer of the partner unit is held continuous via e-mail, telephone/video conference, blogs and face-to-face meetings.

➤ *The clients’ willingness to adopt an innovation depends not only on the benefits of the promoted innovation, but also on the change agent’s credibility, competence, and trustworthiness.*

The expatriates are relocated from their home-base R&D unit to the Tech Office due to their technological expertise and interest. Thus, they are not external change agents but rather have the required competence and credibility, and help to reduce the NIH syndrome. Furthermore, frequent communication, especially face-to-face meetings and regularly visits of the Tech Office employees in Munich help to improve relationship and to overcome barriers against new technologies and innovations.

➤ *Analyzing and diagnosing client’s problems*

As already mentioned before, the central R&D units often analyze and diagnose their problems themselves and ask the Tech Office for help to solve these problems, which leads then to pull projects. Moreover, the expatriates’ working experience in Munich and their knowledge of BMW internal requirements, as well as frequent communication between Tech Office and partner unit helps to analyze and diagnose problems and requirements in order to mediate successfully between partner unit in Munich and the involved companies, universities and research labs in North America.
→ Creating the intent to change

The benefits and advantages of the scouted technologies and trends can spark the intent to adapt the technology. When the Tech Office finds a partner unit in Munich and the project is started, the development of a functional prototype and the proof of feasibility give further incentives to the partner unit to implement the acquired technology.

→ Translating the created intent into an appropriate action

After the Tech Office finds an interested partner unit in Munich in order to start a push project, the project commitment asks the partner unit to support the project by means of budget and resources. With the project handover, including results, prototypes and proof of feasibility, the partner unit in Munich is asked to adopt and develop the technology and bring it into series readiness.

→ Change agent gives assistance to the client in order to stabilize the adoption of innovation.

After the project is transferred to the partner unit in Munich, the Tech Office is still mediating between the partner unit in Munich and the involved partner organizations in North America, establishes contacts between them, and supports the implementation of the technology.

→ One crucial factor in change agent success is the amount of effort spent in communication activities with clients. Thereby, not only is the sheer amount of client contact supporting the change agents' success, but also the timing of the client contact in relation to the stage of diffusion of an innovation, is a crucial success factor (Rogers, 2003).
On the one side, regularly and frequent communication via phone, e-mail, and blogs during the entire project, on the other side face-to-face meetings and visits in Munich, especially at crucial stages of the project (project start, project hand-over) support a successful technology and knowledge transfer to the central R&D unit.

➔ **Client orientation is crucial in order to secure the adoption of innovation by clients**

In the case of the Tech Office, client orientation is given from the beginning since the Tech Office is not an external but a corporate R&D listening post with the mission to acquire and scout technologies. Thus, the client system (BMW Group) itself established the Tech Office which is in charge to explore, evaluate and transfer innovations that are desirable and valuable for the central R&D units. Furthermore, the Tech Office’s expatriates with their working experience in Munich secure client orientation. Thus, the Tech Office gains higher credibility in the eyes of the partner unit and is able to match the innovation activities on the partner’s needs.

➔ **The change agents’ success depends also on the degree to which an innovation program is compatible with clients’ needs**

Again, the expatriates secure that innovations meet the requirements of the partner in Munich. But also the project commitment, as well as frequent communication between Tech Office and partner unit ensures that the technology is compatible with the development unit’s needs and fulfills the internal requirements. Furthermore, prototyping and the proof of feasibility already transform the acquired technology and knowledge in order to meet the internal needs.
The change agent’s empathy and ability to put himself into the clients’ role, as well as the change agent’s homophily with the client system, supports an effective flow of communication and a higher quality of adoption of the innovation.

Also here, the expatriates with their Munich background increase and secure the Tech Offices empathy tremendously, and the homophily between Tech Office and central R&D unit are high since the expatriates are relocated engineers from the home-base R&D departments.

The match of roles and activities of, and mechanisms used by technological gatekeeper, champion, promoter, and change agent described in theory with the empirical findings shows a lot of similarities and parallels. The following section analyzes.

5.5 Tech Office

In the previous sections, I matched the typologies discerned in the literature with the empirical findings of the case study. This section aims to raise and analyze points that showed up solely in the case study.

The Tech Office as R&D listening post is located in Palo Alto Tech Office, but formerly anchored in the organization. Thereby, the physical collocation with proximity to Silicon Valley helps to overcome spatial, cultural and language barriers between central R&D unit and the innovation cluster. In order to benefit from the high-tech knowledge existing in this innovation cluster, the Tech Office is regional embedded in Silicon Valley’s technology landscape and integrated in local scientific and technology communities through the employed local engineers who have graduated at local universities and have further working experience and contacts to firms, research labs, universities and venture capitalists in the region of Silicon Valley. The choice to locate the Tech Office in an
innovation cluster such as Silicon Valley is crucial to tap the valuable external knowledge sources in those centers of excellence. This is supported by Gassmann and Gaso (2004: 4) who state that ‘the regional character of tacit knowledge makes presence in and access to these innovation clusters so important since only ideas, knowledge and technology that are not widely available via the internet and modern information technologies can provide sustainable advantage’. Thereby, the acquisition of external knowledge requires access to direct knowledge sources through first-hand and personal contacts which the Tech Office’s employees achieve through attending conferences, seminars, exhibitions and venture capital events; establishing and maintaining contacts and expert networks; talking with friends, suppliers, venture capitalists, customers, and competitors; reading scientific and technical papers, journals and literature; cooperating and collaborating with universities and research labs.

Thus, the Tech Office searches for new trends, highly specialized and unique technical knowledge and technologies; establish contact with external partners (firms, research labs, universities), and deliver applicable innovation concepts for BMW’s advanced development. Thereby, the Tech Office acts as broker among experts from its own central R&D and specific partner firms, research labs and/or universities. Furthermore, the Tech Office also overtakes matchmaking activities by initiating, leveraging and establishing contacts and cooperations.

In order to act as R&D listening post, the Tech Office’s intercultural workforce with local engineers and expatriates from the home-base R&D units in Munich is a crucial success factor. The employees are highly qualified specialists from different technical areas. As already mentioned before, the local engineers are ensuring the embeddedness and integration in the region of Silicon Valley and enable to tap external knowledge sources and acquire valuable knowledge. The expatriates who are relocated in the Tech Office guarantee the internal linkage to the
home-base R&D units through their formal and informal contacts and networks. First, they help to search, identify and acquire valuable and appropriate knowledge due to their working experience and previous knowledge in the central R&D in Munich. Secondly, they use their contacts and networks in order to find partner unit in Munich to which the scouted technology can be transferred and support and provide the communication during the projects. Their technical expertise is necessary to meet the BMW internal needs and requirements and to develop a prototype/proof of feasibility.

Another success factor is the job-rotation of engineers from their central R&D department to the Tech Office and back to the home-base R&D unit. During their time at the Tech Office in Palo Alto, the expatriates expand the Tech Office’s internal network and bring in new contacts and thus support the connection to the central R&D headquarter. At the same time, their working experience and previous knowledge secures that projects in their technological field lead to applicable knowledge and technologies. After the relocation at the Tech Office, the expatriates return to his home-base R&D department supports and secures an effective knowledge transfer from the R&D listening post to the central R&D department. Hence, the job-rotation of engineers to the Tech Office and back to their home-base R&D department is used to transfer tacit knowledge efficiently and significantly supports the knowledge and technology transfer process. This is supported by Allen (1977) who suggests that the best and most efficient way to transfer technical information is achieved by moving a human carrier. Furthermore, when the expatriate is going back to his home-base R&D department, he enlarges the Tech Office’s alumni network and helps to make contacts between the Tech Office and central R&D units in the future.

Tech Office’s information needs are derived from pull projects (solution of a task created in Munich), or push projects (Tech Office employee
discovers and scouts a new technology in his adjacent environment which could be interesting for BMW).

The transfer of results from Tech Office to central R&D in Munich is different for pull and push projects. As described above, for pull projects, an engineer from the home-base R&D unit relocates to the Tech Office and develops together with the on-sites employees a functional prototype of a new technology and returns back to Munich and transfer the new technology into the development processes of his home-base R&D department. For push projects, the Tech Office initiates a project in coordination with the home-base R&D partner unit and develops a first functional prototype or proof of feasibility with various external partners. For the transfer of the prototype/proof of feasibility, the Tech Office’s project manager most often travels to Munich to handover the project to the partner unit.

The frequent communication between the Tech Office and the home-base R&D departments is another crucial point for successful project. Beside the daily/weekly communication via email, telephone/video conference, and blogs, especially face-to-face meetings are important for an effective communication and to increase the identification with the project. Regularly visits of Tech Office employees in Munich – especially at critical stages of the project – are important for the transformation and transfer of knowledge.

Even though the Tech Office in Palo Alto displays a great ability to source external knowledge and transforms and transfers technologies to the central R&D units in Munich, the interviews for the case study revealed that radical innovations and respectively Palo Alto initiated push projects with radical character in many cases meet resistance and barriers at BMW’s central R&D. In consequence, the Tech Office is often not able to find a partner unit in Munich in order to start the project. BMW as an old and traditional car manufacturer is a highly skilled specialist in the field of
engines and related automotive disciplines, but this reduces the company’s sight and scope to implement highly radical innovations which might differentiate BMW from the competition and lead to competitive advantage. Moreover, the engineers at the home-base R&D units work highly specialized and possibly might not be open-minded enough to radical innovations, which is often mentioned in the literature as the NIH syndrome.
In this chapter I aim at drawing conclusions, based on the analysis, in order to answer the research questions posed in the introduction chapter of this thesis. Therefore, all three subquestions are presented again, followed by the answer and conclusions. After the three subquestions are answered and conclusions are drawn, the main research question will be answered.

6.1 Subquestion 1

What are the typologies for and mechanisms used by gatekeepers or boundary spanners which can be discerned in the literature?

The first subquestion is already addressed in the theoretical framework which reveals the different typologies of gatekeepers and important individuals in the innovation process and for the transfer of externally acquired knowledge from innovation cluster to central R&D, that can be discerned in the literature. The typologies and mechanisms have been described in detail throughout the theoretical framework (chapter 3.2.1 – 3.2.4), and the results have been summarized in chapter 3.3 and are visualized in figure 12 (p. 81-82). In the following paragraphs, the main findings in the theory concerning the gatekeeper typologies are represented.

Technological Gatekeeper / Boundary Spanner

The technological gatekeeper or boundary spanner is defined as 'key individual who is both strongly connected to internal colleagues and strongly linked to external domains (Tushman and Katz, 1980: 1071). He has great knowledge of scientific and technological literature, informal contacts with external community and frequently communicates with
colleagues inside the organization. Thereby, the technological gatekeeper promotes formal and informal communication internally and externally, and transmits and translates externally acquired information and knowledge to the firm’s internal environment. Thus, he links the organization to external information domains. The literature reveals an informal emergence of the gatekeeper where scientists and engineers from middle or lower hierarchical levels are driven by job satisfaction, morale, and promotion to mediate crucial information between the organization and the external environment. Due to his expertise in a specific technological field, as well as his linkage to the external and internal environment, the technological gatekeeper emerges project independent and might take the role with a long-term perspective.

The literature further distinguishes between central and decentral gatekeeper. Central gatekeepers occur when the expertise of most individuals within the organization differs considerably from that of external actors who can provide useful information, while decentral gatekeepers are likely to assume when the firm’s employees are able to understand external information and maintain external communication. These two typologies are visualized in figure 9 (p. 56).

The traditional two-step flow of communication from external domains into an organization via the technological gatekeeper is extended to a three-step process by the addition of the knowledge transformer. Assuming that the technological gatekeeper is externally linked but does not frequently communicate with colleagues inside the organization, the knowledge transformer is the internal communication star and supports the technological gatekeeper by transforming the acquired information and transmitting it to internal colleagues.
Conclusions

Champion

In contrast to the technological gatekeeper, the champion is only focused on the internal promotion of innovations and the champion theory is not taking the external linkage into consideration. Thus, the champion is only supporting the internal diffusion and implementation of externally acquired knowledge.

The champion is defined as ‘one charismatic individual who throws his or her weight behind an innovation, thus overcoming indifferences or resistance that the new idea may provoke in an organization (Rogers, 2003: 414). Furthermore, the champion is well connected to people and resources within the organization, and due to his power, wide variety of interests and visionary sight, he is able to push and promote ideas and innovations and overcomes internal barriers and resistance. The champion emerges informally and takes the role related to a specific idea or project.

Promotor

The promotor concept is similar to the champion theory and focuses only on internal innovation activities and promotion. Promotors are defined as ‘individuals who actively and enthusiastically promote innovations throughout the crucial organizational stages from initiation to implementation’ (Witte, 1973: 52). In contrast to the champion who solely promotes an idea, the promotor concept suggests a team of promotors which supports the promotion and internal diffusion of innovations and overcome internal barriers. The power promoter actively and enthusiastically promotes innovations with and due to their hierarchical power in order to overcome the employees’ motivational resistance and barriers of willingness. The expert promotor fosters and encourages the innovation process by means of his specific knowledge and expertise. Later extensions in the promotor theory add the roles of process promoter
(to overcome organizational and administrative resistances against innovation), and relationship promotor (to overcome dependency barriers caused by imbalanced relationships).

The promotor's activities go beyond his formal organizational role and job description and he takes the promotor role in relation to one specific innovation or project.

**Change agent**

The change agent is defined as 'an individual who influences client's innovation-decisions in a direction deemed desirably by a change agency' (Rogers, 2003: 368). Thereby, the change agent is positioned midway between a change agency (which intends the change) and its client system. However, in contrast to the technological gatekeeper, the change agent is an external force outside the client system and belongs to the change agency. Moreover, the change agent emerges formally by order of the change agency. Thereby, the role of the change agent can be related to a specific project as well as project independent with a long-term perspective.

The change agent accompanies the entire innovation-adoption process from 'creating the need for change within the client system' to 'final adoption of the innovation by the clients'. Therefore, he is characterized by persuasive power, selling abilities, change-related expertise, empathy with the client system, and client orientation.
6.2 Subquestion 2

Which activities are included in the gatekeeping role – what are the external-internal transfer mechanisms employed in practice?

Gatekeepers’ activities

The technological gatekeepers’s activities are:

1. *To monitor and scout external knowledge domains and acquire valuable technological information and knowledge.*

   This is achieved by attending conferences, seminars, exhibitions and venture capital events; establishing and maintaining contacts and expert networks; talking with friends, suppliers, venture capitalists, customers, and competitors (market research); reading scientific and technical papers, journals and literature; cooperating and collaborating with universities and research labs.

2. *To explore and evaluate the acquired knowledge.*

   This is done in collaboration with the home-base R&D departments. If an acquired technology is considered as promising and interesting, the Tech Office and the central R&D unit confirm their project commitment and the project starts.

3. *To transform the acquired knowledge.*

   In collaboration with the partner unit in Munich and various external partners (firms, universities, research labs), the Tech Office develops a prototype/proof of feasibility. Thereby, the technology has to be adapted in order to meet the BMW internal needs and requirements.
4. **To transfer the knowledge to the central R&D unit.**

The knowledge/technology is transferred in form of a functional prototype or concept including the proof of feasibility. Therefore, the project manager of the Tech Office most often travel to Munich to handover the project to the home-base R&D department. Especially for pull projects, engineers from the central R&D units are often relocated to the Tech Office and return back to Munich with the project results. In this case, the job-rotation is used to secure an effective knowledge transfer.

**Success factors and mechanisms used by the Tech Office**

1. **The Tech Office’s location in Palo Alto.**

   With the location in Palo Alto, the Tech Office has proximity and access to the unique and innovative high-tech business culture of Silicon Valley.

2. **The Tech Office’s intercultural team.**

   The intercultural team composed of local engineers and expatriates from the home-base R&D units ensure an optimal linkage to external knowledge sources and the internal organization.

3. **Informal contacts and networking.**

   Informal contacts and networking are crucial in order to tap external knowledge sources, as well as to find partners inside the BMW Group to whom the acquired knowledge can be transferred. Therefore, both local engineers and expatriates are establishing and maintaining external and internal networks which cover different areas and hierarchical levels.
4. **Extensive communication between Tech Office and home-base R&D department.**

During the projects the Tech Office and the partner R&D unit hold extensive communication and contact in form of e-mails, telephone/video conferences, and blogs. However, most crucial for a successful project and transfer of technological knowledge are face-to-face meetings. Therefore, the Tech Office employees travel to Munich every 2-3 months. The visits in Munich are timed in relation to critical project phases such as the project start and handover.

5. **Prototyping/Proof of feasibility**

The development of a functional prototype or proof of feasibility is an important first step of knowledge transformation in order to secure that the acquired knowledge is adapted and appropriate for internal implementation and future exploitation and commercialization.

6. **Job-rotation**

The relocation of engineers from their home-base R&D department to the Tech Office and back to Munich is an important transfer mechanism. First, the engineer brings in crucial previous knowledge and working experience from the home-base R&D and helps to meet the BMW internal needs and requirements. Furthermore, the expatriates are enlarging the Tech Office’s internal network with new formal and informal contacts. Secondly, the return of the expatriates to their home-base R&D department supports the effective transfer of knowledge and technology from listening post to central R&D.
6.3 Subquestion 3

What are the most important gaps in the literature and how can different mechanisms and typologies for gatekeeping deployed for optimal transformation and transfer of external knowledge into internal innovation?

The literature review of the technological gatekeeper which is presented within the theoretical framework (chapter 3.2.1) shows that most of the articles and findings are more than 20 years old. The typologies of the technological gatekeeper are very simple, and inherent roles and activities are too narrow and premature and mainly limited to a pure ‘search-and-transfer’ scheme. Hence, the theory lacks a recent, sound and comprehensive description of the technological gatekeeper in today’s more complex innovation processes. The prevailing two-step process is too restricted to bring radical innovation into an organization. Only few contributions and extensions to the concept of the technological gatekeeper are made in recent years and an adaptation of the role of the technological gatekeeper to meet today’s challenges is still missing. However, Harada (2003) enriches the theory with the addition of the knowledge transformer to a three-step-process and thus contributes to adapt and update the gatekeeping process. Nevertheless, especially in the context of Open Innovation future research and investigation in this field to cope with more complex processes in changing and global markets, and to give an appropriate description of the technological gatekeeper who is needed to acquire, transform and transfer critical external knowledge into the organization and thus is able to support and develop a firm’s absorptive capacity, is essential.

The study of the typologies of champions and promotors (chapter 3.2.2 and 3.3.3) reveal that both concepts only focus on internal innovation promotion and activities, and lack the implication of a firm’s external environment. Thus, the solely application of the champion and promoter
concept is improper and not appropriate for firms to ensure a successful innovation process in the context of Open Innovation, where the critical sources of information and knowledge lay outside the organization`s boundaries rather than inside. Rather, the role of the champion and promotor might contribute to an open innovation process by supporting the internal promotion of the externally acquired knowledge.

Nevertheless, like the champions concept also the promotor theory with its internally focussed promotor team lacks the implication of a firm’s external environment. Thus, champion concept as well as promotor theory makes a contribution to an organization’s internal innovation process and the diffusion of new ideas and technologies. However, both concepts can’t be applied to support the Open Innovation process in an appropriate way because externally linked individuals or units are needed to tap various knowledge domains in order to acquire and transform critical knowledge and transfer it for internal exploitation.

The literature review about change agent (chapter 3.2.4) reveals important findings and provides a deep insight in the roles and activities of change agents in the diffusion process. Moreover, the research on the change agent phenomena in the context of diffusion theory is more advanced compared to the theory of the technological gatekeeper and gives important ideas and details how to support the process of implementation of externally acquired knowledge, and how to initiate change or innovation in a desirable way. Thus, the review of change agents provides valuable information that can be applied also in an organizational context, since diffusion is also part within an organizational innovation process.
6.4 Main research question

How can R&D listening posts acquire and transfer external knowledge effectively from innovation clusters to the central R&D unit in order to complement internal idea generation, establish a network of external competence and support its integration into internal innovation processes?

The research on the three subquestions and the resulting answers enable me to finally address and answer the main research question. Thereby, the theoretical and empirical findings are combined to build a model that visualizes an appropriate configuration for an effective knowledge acquisition, transformation and transfer from centers of excellence to central R&D. This final model is presented below:
Figure 17: Configuration for knowledge acquisition, transformation and transfer from innovation cluster to central R&D

Source: own
In the following paragraphs, I will explain and describe the different elements, roles, activities and mechanism visualized above for an optimal knowledge acquisition, transformation and transfer from innovation cluster to central R&D.

The central element between a firm and its external environment (here an innovation cluster such as Silicon Valley) is the technological listening post that acts as a technological gatekeeping unit. Thereby, the technological listening post is a permanent, project independent unit with the task to monitor and scout external knowledge domains constantly. Located with proximity and access to the innovation cluster, the technological listening post consists of ‘locals’ and ‘expatriates’. This workforce configuration ensures an optimal linkage and connection to the firm’s external and internal environment. Externally, the technological listening post has direct access and contact to the technology and scientific community, as well as to related literature. Internally, the expatriates of the technological listening post provide and maintain formal and informal contacts and networks inside the organization. The job-rotation and relocation of engineers from their home-base R&D department to the technological listening post supports the knowledge transformation and transfer to the central R&D unit. Furthermore, through the relocation of engineers to the listening post several success factors raised in the change agent theory such as ‘client orientation’, ‘empathy’ and ‘homophily’ are considered and integrated within the model. But also employees from design and manufacturing departments (D&M), as well as from marketing and sales units (M&S) are relocated to the listening post in order to ensure that especially the customer’s and brand’s perspectives are considered in an early stage. This is supported by the integration of lead user during the projects.

Technological knowledge is acquired, transformed and transferred in the context of pull projects (initiated by the central R&D) and push projects (triggered by the technological listening post). For each project the listening post partners with a home-base R&D department. Thus, the
home-base R&D department occurs as project-related partner unit to whom the technological knowledge will be transferred. Thereby, the role of power promotor is taken by the chief of the partner unit who confirms the project commitment and support the project and knowledge integration by means of his hierarchical power, budget and resources. An engineer of the partner unit becomes responsible for the project and emerges as expert promotor due to his skills and expertise in a certain technological field. Thus, the typology of power and expert promotor are integrated to support the internal promotion of the externally acquired knowledge.

During the projects the listening post is constantly in contact with the partner home-base R&D department. Thereby, the communication channels are email, telephone/video conferences, and blogs. However, frequent and regularly face-to-face meetings are crucial in order to support an effective communication and knowledge transfer, as well as to strengthen the central R&D unit’s identification with the externally acquired knowledge to reduce the NIH syndrome. Thus, regularly visits both at the central R&D and the listening post – especially at critical stages of the projects – are essential.

An important activity of the listening post is the development of a functional prototype and the proof of feasibility. This is a crucial step in the process of knowledge transformation and helps to adapt the acquired knowledge for an effective internal implementation.

For radical innovations which are difficult to transform, transfer and integrate into the pre-development processes of the central R&D, and thus hardly find a partner unit, an alternative process is integrated in the model. These radical innovations are transferred to an R&D related unit that is here named “Skunk Works”. Skunk Works is a group within the R&D organization with a high degree of autonomy and which is unhampered by restrictions and bureaucracy. The skunk works’ task is to work on these
radical innovations and to find alternative ways to integrate and exploit them.
7 Recommendations

This chapter aims to give general recommendations how companies can successfully acquire, transform and transfer knowledge from innovation clusters to central R&D through a technological listening post. Based on the knowledge created throughout all the previous chapters of this thesis, the constructed general model presented in chapter 6.4 already illustrates the configuration of the technological listening post and key factors, roles and activities, and mechanisms to support the knowledge acquisition transformation and transfer. Along with the model, the following general recommendations can be presented.

7.1 Supporting knowledge-sharing culture
Companies should support the knowledge-sharing culture of their employees and create an open-minded work environment. Being open and cooperative, sharing information with the technological listening post, and mutual understanding are crucial to effectively transform and transfer knowledge from innovation cluster to central R&D.

7.2 Setting R&D internal objectives
Companies should set internal objectives in terms of number of innovations which every central R&D unit has to achieve in a given period of time. These objectives might help to overcome barriers and resistance to externally acquired knowledge and innovations, and increase the openness and will to implement them.


7.3 **Fostering and supporting networking, informal communication**

In the context of open innovation, companies should support and foster their employees’ internal and external networking activities and informal communication. Extensive internal and external networks simplify the acquisition, transformation and transfer of external knowledge and create a fertile ground for the implementation of innovations.

7.4 **Listening post: intercultural team of locals and expatriates**

Companies should compose an intercultural workforce at the listening post, consisting of local engineers and expatriates. Local engineers provide access to external knowledge domains within the innovation cluster, while the expatriates maintain internal contacts and networks so that the listening post is optimally external and internal linked.

7.5 **Face-to-face meetings and visits of listening post and central R&D**

Beside the daily/weekly communication between listening post and home-base R&D unit via email, telephone/video conference and blogs, companies should allow regularly face-to-face meetings of listening post and central R&D staff, and finance visits of employees at the listening post and/or the home-base R&D department. These face-to-face contacts improve the communication flow, help to strengthen the employees’ identification with a project and reduce the NIH syndrome. Furthermore, it supports an effective transfer on knowledge from innovation cluster to central R&D.
7.6 **Job-rotation**

Companies should rotate and relocate engineers from their home-base R&D department to the listening post and back. This supports an effective knowledge transfer from innovation cluster to central R&D, but also helps to transform acquired knowledge in an appropriate way due to the previous knowledge and working experience the engineers bring in.

7.7 **Relocation of marketing and sales employees to the listening post**

Companies should relocate employees from marketing and sales departments to the listening post in order to integrate the customer’s view as well as the brand perspective. This secures that the knowledge acquisition is not too narrow-minded and not only focused on technological issues, but also on marketing and brand related issues.

7.8 **Lead user and venture capitalist integration**

Technological listening posts should utilize intensely their location at innovation clusters and involve lead users and venture capitalists at an early stage of projects in order to estimate risks and chances of an innovation and to minimize the threats. The systematically involvement of lead users and close interaction with consumers in the R&D and new product development process increases the likelihood of project success and can lead to a competitive advantage.

7.9 **Prototyping / Proof of feasibility**

The development of a functional prototype or the proof of feasibility should be part of the technological listening post’s activities. Prototyping is a
crucial step to transform the acquired knowledge and helps to adapt it so that the technology meets the firm’s internal needs and requirements.

**7.10 Building a “Skunk Works” unit**

Companies should create an alternative process for radical innovations. With the building of a skunk works unit, the company allows a research unit within the R&D organization to have a high degree of autonomy, unhampered by restrictions and bureaucracy. The skunk works unit works on these radical innovations and tries to find alternative ways to integrate and exploit them.
Bibliography


**Interviews**

Jeff Ota, Local senior advanced technology engineer – Tech Office Palo Alto, face-to-face interview (25.04.2008)

Jeff Zabel, Local senior advanced technology engineer – Tech Office Palo Alto (Sensors & actuators), e-mail interview (10.06.2008)

Marc Lengning, Brand and Community Manager MINI, Alumni Tech Office Palo Alto, face-to-face interview (15.07.2008)

Max Kichener, Development Engineer - Department EI-220 (Vernetzungstechnologien), Alumni Tech Office Palo Alto, face-to-face interview (07.05.2008)
Simon Ellwanger, Permanent Expatriate – Tech Office Palo Alto (Sensors & actuators), telephone interview (15.05.2008)

Tobias Jahn, Ph.D. student - Department ES-12, former diplomate Tech Office Palo Alto, face-to-face interview (22.04.2008)

Internet Sources


http://www.patyo.sub/, intranet-website of the Technology Office Palo Alto (02.08.2008)
Contact Information

Master Thesis Candidate
Michael Ahlgrimm, B.A.
Innovation Management
BMW Group Munich/
Baltic Business School
University of Kalmar

Email: michael.ahlgrimm@gmx.de

Academic Thesis Director:
Sigvald Harryson, Dr Oec and PhD
Baltic Business School
University of Kalmar
Growth through Innovation and
International Marketing

Email: Sigvald.Harryson@hik.se
Phone:  +41 79 291 8478
        +46 70 834 896 6
The University of Kalmar

The University of Kalmar has more than 9000 students. We offer education and research in natural sciences, technology, the maritime field, social science, languages and humanities, teacher training, caring sciences and social service.

Our profile areas in research are: biomedicine/biotechnology, environmental sciences, marine ecology, automation, business administration and informatics, but we have research proceeding in most subject areas of the University.

Since 1999, the University of Kalmar has the right to accept students in postgraduate studies and to examine doctors within the subject area natural sciences.

Baltic Business School,  
at the university of Kalmar  
Visiting address: Kalmar Nyckel,  
Gröndalsvägen 19  
SE-391 82  Kalmar, Sweden  
Tel: +46 (0)480 - 49 71 00  
www.bbs.hik.se