Understanding new corporate innovation strategies: Hybrid high-involvement approaches and the increasing importance of individual absorptive capacity

Abstract: Driven by the challenges of digitalisation and increasing market dynamics, corporations must develop new strategies for innovation and knowledge management. This paper describes hybrid high-involvement innovation (HHII) as an emerging approach to corporate innovation. Through nine interviews, we explore the experiences and actions of experts in German corporate innovation programs in an effort to understand and systematise new approaches to corporate engagement in innovation. We categorise HHII benefits, antecedents, and emerging challenges, indicating the importance of innovation engagement activities and capabilities on the corporate and individual levels. We additionally identify and adapt key design elements of HHII to support its development and implementation in corporate environments, thereby examining the use of open innovation initiatives as vehicles to enable internal and external crowdsourcing of new ideas. This paper develops the concept of individual absorptive capacity (IAC) and explores its increasingly important role in open innovation initiatives such as HHII.

Keywords: high-involvement innovation, individual absorptive capacity, innovation management, innovation programs, knowledge management, organisational learning, hybrid high-involvement, open innovation, explorative approach, corporate innovation

Katja-Maria Prexl[1] and Antje Gonera[2]

1. 1. Research and Innovation, Norsk Vannteknologi AS, Solgaard Skog 139, 1599 Moss, Norway

2. 2. Department of Innovation, Sensory and Consumer Sciences, NOFIMA AS, P.O. Box 210, 1431 Ås, Norway

1   Introduction

Driven by digitalisation, technology push, consumer pull, and shorter product development cycles in increasingly dynamic environments and infrastructures, corporations have focused on increasing innovation performance and promoting radical innovation outcomes to assess risks and surmount challenges. Through strategies such as implementing a start-up culture, corporations seek to understand

the importance of speed, innovativeness, and growth through entrepreneurial activities that identify and absorb new developments and recognise potentially disruptive attacks. Innovation management no longer relies only on internal organisational resources, and while Allen (1983) introduced the concept of collective invention, corporations have increasingly embraced Chesbrough's (2006) concept of open innovation (OI).

Further research on innovation as an interactive process between corporations, internal and external stakeholders, and social networks, as well as on the interpretation, characteristics, processes, and practices of OI, has led to its practical evolution in various fields (Chauvel and Borzillo, 2017; Dahlander and Gann, 2010; Huizingh, 2010; Hussain and Lucas, 2004). Corporate openness is demonstrated, according to Gifford (2017, p. 42), by 'the degree to which firms are open to external sources of knowledge in their innovative and entrepreneurial process and practices', and it 'depends on the context and closeness of the relationship of the involved actors'. For example, established companies have started to support early-stage start-ups using different tools of open innovation, such as corporate accelerators, and new technologies, such as online platforms and interaction tools (Bader and Enkel, 2014; Gassmann et al., 2010; Weiblen and Chesbrough, 2015).

Corporations are adopting and using these online innovation platforms and new technologies in conjunction with real-world intrapreneurship activities, such as incubators, accelerators, hackathons, and innovation labs, to attract and develop innovative entrepreneurial actors capable of fulfilling their innovation potential. Examples of such initiatives are Next47 from Siemens, Zukunft Ventures and the ZF Denkfabrik Innovation Lab from ZF, Digital Factory from Deutsche Bank, Robert Bosch Start-up GmbH 'Grow', Startup Garage and Urban-X from BMW, Lab1886 from Daimler, Deloitte Greenhouse, and Google Digital Garage.

With this growing interest in radical approaches to innovation, corporations must modify their innovation management routines in light of challenging, dynamic infrastructures and environments. Involving employees in innovation, external knowledge absorption, and the translation of knowledge to innovation allows corporations to gain competitive advantages (Daghfous, 2004b; Jorna, 2006), for example, through tacit knowledge, which is nearly impossible to copy (Bessant et al., 2009; Daghfous, 2004a; Noblet et al., 2011; Volberda et al., 2010). Langfield-Smith and Smith (2008) have argued that necessary internal knowledge is a prerequisite to searching for and evaluating external knowledge, but corporations and their employees struggle to explore new knowledge with which to stimulate and support radical developments. One of the main obstacles in innovation management is enabling individuals to adopt, absorb, and use new knowledge to increase corporate innovation ability and performance (Bessant, 2003; Bessant et al., 2009; Boer et al., 2000; Bullinger et al., 2010; Tidd and Bessant, 2013). When combining the classical concepts and approaches of high-involvement innovation (HII) (Bessant, 2003) with new technologies, more creative and agile processes, and tools such as co-creation, design-thinking, and

hackathons, a new concept emerges, which we describe as hybrid high-involvement innovation (HHII).

The aim of this paper is to explore corporate HHII programs and their roles in enabling and encouraging more radical innovation. Consequently, we aim to determine how corporations can increase their ability and capability to absorb new knowledge and increase the individual absorptive capacity (IAC) of corporate innovators in this context. In analysing multiple innovation programs and HHII activities, perspectives on IAC, and new innovation management routines, and in exploring HHII concepts of corporate innovation and the increasing role of IAC, this paper contributes to the debate on the use of OI initiatives as vehicles to enable employee engagement in radical innovation. In the context of this article, HHII is considered one form of OI.

First, we aim to identify corporate management mechanisms to enable more radical innovation and to increase IAC. Second, we aim to enhance an understanding of the underlying concepts and design elements of these mechanisms and their influence on innovation management routines. Third, we aim to explore new HHII approaches and the role of IAC to enable corporations to innovate, to gain a sustainable competitive advantage, and to increase flexibility and the ability to explore and exploit new knowledge from different sources. We explore the degree of closeness of relationships in and between different OI initiatives, including those that are process-related (inside-out, outside-in, or coupled) and those related to social aspects, such as the crowdsourcing of ideas, which is reinforced by an increase in sharing and social networking activity (Chauvel and Borzillo, 2017).

We explore the use of these approaches as powerful mechanisms to engage and extend participation in the innovation process regularly from an early stage on to a much wider community in a dynamic environment. To understand the growing use of corporate engagement activities for new knowledge and innovation, researchers need to explore the concepts and approaches corporations are developing and implementing, considering their architecture and possible heterogeneity. Against this background, we have carried out nine expert interviews with managers/leaders responsible for corporate innovation programs in Germany.

The article is structured as follows: We first introduce the theoretical background and necessary definitions, concepts, and approaches from the perspective of high-involvement innovation and IAC and the continuous development of innovation practices. We then present the methodology of this study and discuss its results along with insights on involved innovation management issues, which may allow corporations to better prepare for future market developments. Finally, we conclude the article by examining the implications of our findings for theory and practice.

2 Theoretical Background

2.1 High-involvement and hybrid high-involvement innovation

Driven by the challenge of increasingly dynamic environments in the age of globalisation and digitalisation, corporations need to innovate continuously to satisfy new market demands. A question arises: How do corporations enable internal entrepreneurship, encouraging employees to come up with bright ideas outside their core functions or disciplines, and then develop and implement those ideas?

In the context of digital disruptions, high-involvement (HI) innovation approaches hold the potential to be combined with online and digital tools for innovation management, resulting in hybrid high-involvement innovation (HHII) concepts. Drivers of this development are an increased availability and variety of technologies and a wider range of involved participants (internal, external, combined) (Abu El-Ella et al., 2013). With regard to the question of how corporations can implement start-up-supporting strategies to enhance innovativeness as fast as possible, recent research has highlighted accelerators as the next evolutionary step after the rise of corporate incubators (Bessant et al., 2009; Pauwels et al., 2016; Weiblen and Chesbrough, 2015).

Thus, one way of increasing innovation capacity is to use HII approaches, as they widen the framework of participants and depend upon individuals being flexible and willing to accept and adapt to changes in strategy or leadership. HII addresses the challenge of mobilising and helping employees and their networks to solve problems and create and sustain a culture of continuous improvement (CI). According to Boer and Gertsen (2003, p. 805), CI is an 'ongoing interaction between operations, incremental improvement, learning and radical innovation aimed at effectively combining operational effectiveness and strategic flexibility, or "exploitation and exploration"'. Most corporations engage only a small proportion of their employees in activities formally linked to driving innovation. These groups and individuals are licensed to innovate by virtue of their place in the hierarchy, whether in R&D, product development, or process improvement. However, this more siloed approach to innovation ignores the contributions other employees could make, as well as the potential contributions of the broader networks of people and stakeholders with whom employees are connected (Bessant, 2003; Bessant and Caffyn, 1997). Thus, beyond CI, HII represents an 'organisation-wide process of focussed and sustained incremental innovation' (Bessant and Caffyn, 1997, p. 4), recognising that most innovative activity is not radical, as in a 'breakthrough' innovation, but incremental in nature, depending on sustained and focussed action to gain trust and credibility.

HHII builds on the concept of HII, according to Bessant and Caffyn (1997), and CI, according to, for example, Boer et al. (2000), with the individual acting as the centre of innovation, being a knowledge enabler and carrier, combined with novel technology, increased interaction possibilities, and more creative and agile processes and tools (e.g., design-thinking, hackathons, co-creation). HHII is a vehicle to enable more radical innovation, serving as a collaboration platform for innovation activities using different methods and tools, including new technologies. HHII thus enables a wider range of participants, whether internal (employees), external (stakeholders in general, users and customers, and other

partners inside or outside the industry), or coupled, for 'crowdsourcing' of new ideas.

According to McDermott and O'Connor (2002), more radical innovation involves high technology risk (new technology) and high market risk (new market). In addition, it is sporadic, not directly plannable, and high in risk and uncertainty because of the lack of knowledge and experience of the innovator. Increasing the reach and richness of innovation activities, meaning the involvement and enablement of a wider range of players and the improvement of the quality and substance of the activities themselves, through concepts such as HHII may also provoke and promote individual capabilities. Examples of HHII approaches are hackathons, accelerators, idea contests, innovation labs, scenario workshops, innovation platforms, innovation workshops, and intrapreneurship programs.

The HII trajectory for corporate innovation is neither new nor difficult, but the development and successful implementation of high-involvement approaches appears to come with some challenges. By advancing the theoretical background underlying HHII initiatives and exploring the role of IAC in the development and modification of innovation management routines, we aim to facilitate the development and implementation of these hybrid concepts of corporate innovation and culture for radical innovation within corporations.

2.2 The role of the individual in innovation

According to Tidd and Bessant (2005), innovation relies on knowledge and is defined as 'creating value from knowledge'; thus, innovation is 'essentially about learning and change and is often disruptive, risky and costly' (Bessant, 2003, p. 101). Absorptive capacity (AC), 'a new perspective of learning and innovation', plays an important role in this field because it allows corporations not only to explore but also to exploit external knowledge, a critical component of innovative performance (Cohen and Levinthal, 1990, p.1). Novelty and thus uncertainty are linked to radical and disruptive innovation and knowledge exploration. Regarding corporate engagement and openness to increase innovation performance and to accept uncertain risks in the context of HHII activities, the development of new innovation management routines and prior findings from this field provide a background on how corporations enable employees to explore and exploit knowledge to increase innovation performance. The ability to continuously develop and generate knowledge increases individuals' capabilities. In turn, this contributes to both corporate and individual openness and motivation towards more disruptive innovations, as innovation relies on knowledge (Tidd and Bessant, 2005) and related experience (Holsapple, 2003; Liebowitz, 1999). Individuals can contribute to corporate innovation performance and are key to the success of HHII approaches (Bessant, 2003).

To highlight the importance of internal and external knowledge absorption for innovation performance and competitive advantage, we have identified AC as a conceptual model which can be used as a lens to explore, describe, and shape the path of the individual employee as the centre of innovation in terms of

organisational learning. AC is more simply described as the capability to direct action and attention towards generating and processing knowledge. Research on AC stresses the importance of finding, evaluating, adapting, and utilising new sources of knowledge to increase the competitiveness and agility of start-up cultures (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998; Martinkenaite and Breunig, 2016; Volberda et al., 2010). According to Bessant et al. (2005), AC is the ability to absorb and use different types of knowledge, resulting in observably different roles in an innovation process. The cumulative nature of knowledge can also be related to another determinant of AC, which is education. The more education and training, the higher the individual ability to assimilate and use new knowledge and unconfirmed information (Rothwell and Dodgson, 1991).

The corporation itself must gain competence in acquiring, assimilating, transforming, and exploiting knowledge to cause specific corporate and individual reactions. For example, ideas not covered by a corporation's search zone may be overlooked (Rosenkopf and Nerkar, 2001) and may not emerge as part of the internal/external crowdsourcing of ideas. The same may be true of ideas not matching a corporation's dominant logic (Lane and Lubatkin, 1989). Knowledge in the assimilation phase is transferred to the corporation through interactions influenced by knowledge sharing, socialisation, and coordination between individual members of the corporation and the corresponding HII approach or ecosystem (Jansen et al., 2005). This means corporations need to understand their internal knowledge and the processes by which they might transform this knowledge into capabilities to meet needs and opportunities in their ecosystems.

Therefore, while an organisation must additionally understand how the corporate environment will develop and change to launch promising innovations at the right time, it must also know how suitable ideas emerge in reaction to possible developments and changes in the future. Technical implementation of new knowledge and innovations and an orientation towards the wishes of users are relevant for long-term market success. Studies generally show a positive connection between factual and perceived innovativeness and a variety of economically relevant performance indicators for competitiveness (Hubert et al., 2013; Rubera and Kirca, 2012), but it is unclear to what extent an individual participating in innovation influences the innovativeness of an organisation. Individuals, especially intrapreneurs, are an important source of new concepts and are a driving force for innovation performance and capability. In the context of HHII, they can act as facilitators of information exchange, using, for example, their experience, motivation, and knowledge with others in the corporation and the related ecosystem (Jansen et al., 2005; Martinkenaite and Breunig, 2016; Szulanski, 1996).

The construct of AC has primarily focused on the organisational level, although Cohen and Levinthal (1990) themselves said that AC begins with the individual, arguing that AC can be described as a function of individuals' cognitive abilities and the intensity of their efforts to process and organize information so as to learn, recall, and use it. In their view, individuals assess the value of new external knowledge, relate new knowledge to what they already know, and creatively use it

in new products, services, and organisational processes. The role of an organisation is to develop decision-making structures and networks of intra-firm relationships through which individual AC can be leveraged and deployed (Tortoriello, 2015). In researching the micro-foundations that explain various organisational-level variables, Felin and Foss (2006) suggest that observations at the individual level are the most appropriate type of data.

According to Zahra and George (2002), certain organisations excessively stress acquiring external knowledge but do not sufficiently focus on absorbing and transforming that knowledge. Creating and implementing an HHII program through new innovation management routines may lead to acceptance, surprises, and a willingness to change, but it also causes patterns of insecurity and doubt in the process and in the seriousness of the organisation's intention and ability to promote and truly use resulting ideas (Abu El-Ella et al., 2013; Bessant et al., 2009; Jones and Craven, 2001). External knowledge assimilated by the organisation still needs to pass internal assessments and overcome potential managerial resistance (Anderson and Bateman, 2000). Therefore, AC is critical in the implementation of new innovation management approaches, especially on the individual level.

Lane and Lubatkin (1989, p. 461) describe AC to be dependent on three key factors: 'One firm's ability to learn from another firm is argued to depend on the similarity of both firms' (1) knowledge bases, (2) organisational structures and compensation policies, and (3) dominant logics.' Consequently, individuals must translate external knowledge into their and the organisation's language and culture (Lane and Lubatkin, 1998) to facilitate the opportunity to learn and integrate new knowledge. This simultaneously reduces 'not invented here' syndrome and mobilises changes to current operating routines (Chesbrough, 2003). AC requires putting external ideas into a special format that can be reviewed, evaluated, and judged against internal ideas and information (Zahra and George, 2002) to assess their market potential (Ter Wal et al., 2011). To increase internal acceptance, individuals need to share external knowledge within the organisation (Jansen et al., 2005; Todorova and Durisin, 2007) and engage fellow individuals, creating enthusiasm about the underlying potential of such ideas (Ter Wal et al., 2011). By constructing an appealing story about the value and merit of external knowledge, individuals can convince others to develop an idea further (Maitlis and Lawrence, 2007). The story must also address the organisation's internal (dominant) logic regarding specialised ideas (Lane and Lubatkin, 1998; Ter Wal et al., 2011). The individual journey from idea to action is important in creating experience and fostering new developments in the corporation itself and in its environment.
Passionate individuals show commitment to external ideas and take risks to ensure the potential of external knowledge is realised (Howell and Higgins, 1990; Markham, 1998). Such efforts to use and support external ideas require discipline, motivation, ability, and high energy levels as well as high frustration and risk tolerance (Barron and Harrington, 1981; Cohen and Levinthal, 1990; Comacchio and Bonesso, 2012). According to Minbaeva et al. (2003), motivation is related to knowledge absorption and possibly enhances innovation performance. AC is thus critical for corporate innovative abilities and performance, which is why we have

chosen to focus on the role IAC plays in the acceleration of more radical HHII approaches.

2.3 Development of research questions

Based on recent research and observations, corporations enhance their engagement in participative, collaborative innovation with intrapreneurs, entrepreneurs, start-ups, and accelerators because of a necessity to increase flexibility and knowledge to build competitive advantages and increase radical innovation. It is no longer feasible to achieve a competitive advantage in dynamic and fast-moving industries and environments (McGrath, 2013) without focusing on the external creation of innovation through OI measures to improve processes, reduce uncertainty, access missing knowledge, and achieve lower costs (Enkel et al., 2009; Gassmann et al., 2010; Weiblen and Chesbrough, 2015; West et al., 2014) or to stimulate and enhance growth opportunities (Chesbrough and Crowther, 2006; Van de Vrande et al., 2009).

This increasing necessity to combine new external and internal knowledge in corporate innovation processes (Andersen and Drejer, 2008; Gassmann et al., 2010) credibly leads to an increasing corporate engagement in innovation activities through different channels and frameworks, such as start-up culture initiatives (Weiblen and Chesbrough, 2015). Developments in the management of innovation have introduced new opportunities to involve corporations and stakeholders in diverse innovation processes and thereby create sustainable competitive advantages. However, corporate strategies often lead to a heterogeneous selection between as well as within corporate engagement activities (Weiblen and Chesbrough, 2015). Against this background and existing research on the theoretical development of the following, this study focuses on understanding HHII concepts and highlights their importance for corporate innovation:

- Engagement models such as HII from different perspectives (Abu El-Ella et al., 2013; Bessant, 2003; 2013; Boer et al., 2000)
- Co-creative collaborative approaches to innovation, as in the coupled approach of inside-out and outside-in (Bessant and Moeslein, 2011; Harvey et al., 2015)
- Lead-user involvement (Von Hippel, 2005)
- Technological shifts and accelerations (Abu El-Ella et al., 2013)

Additionally, we explore management routines that encourage internal and external knowledge absorption and realise a commitment to radical innovation (Jones and Craven, 2001). Thus, we stress the importance of investigating the rapid development and increasing individualisation of corporate engagement and the high involvement of individuals in innovation activities using the lens of IAC.

First, we aim to identify mechanisms and corporate programs as engines of innovation management, enabling radical innovation and increasing individuals' capability to absorb new knowledge. Second, we aim to examine the different concepts and processes underlying high-involvement approaches and to determine to what extent such approaches are embraced in corporations. Third, we aim to

deepen the understanding of new HHII approaches and the role of IAC in allowing corporations to gain a sustainable competitive advantage, increase flexibility, explore and exploit new knowledge from different sources (inside-out, outside-in, or coupled), and extend participation. This study sheds light on new innovation management routines and how these are enabled and facilitated by increasing IAC.

3 Method and Research Design

To gather insights on the development of innovation management routines to handle new HHII approaches and the corresponding role of IAC, this exploratory study uses an inductive multiple-case design (Eisenhardt and Graebner, 2007; Yin, 2009). Each case consists of an interview with representatives of innovation programs and a review of information materials provided by the interviewees, as well as an analysis of publicly available information and prior research which characterises the case. To support this approach, we identified a modified and adapted version of Bullinger and Moeslein's (2010) ten key design elements for innovation contests to identify and evaluate characteristics, drivers, and barriers of these programs and tools. We have thus gathered rich information and insights to enhance the limited existing knowledge in this field. Additionally, we aim to identify new aspects of the role of IAC in emerging OI initiatives such as HHII, especially regarding difficulties in successful and sustainable implementation.

3.1 Sample

While we have limited our sample to a single country, the sample is heterogeneous and encompasses various industries, sectors, and company sizes and is thus somewhat generalisable. Additionally, Phelps et al. (2007) have suggested that the 'why' and 'when' of corporate knowledge integration is not dependent on the size or age of a corporation. Thus, we have maintained a homogeneous external context in which to observe different HHII concepts (Welter, 2011). We screened the corporate landscape for ways corporations engage in innovation activities and OI initiatives (outside-in, inside-out, or coupled) to realise their commitment to innovation and for ways they try to develop ongoing innovation opportunities to increase the degree and level of individuals' engagement (internal/external). HII concepts and approaches determine how a corporation and its individuals successfully learn from and engage with internal and external knowledge using, for example, hackathons, design-thinking challenges, innovation jams, incubators, the new generation of accelerators, classical suggestion boxes, and hybrid forms.

Overall, we identified 38 German programs and corporations for inclusion in this multiple-case analysis as a first step to achieving generalisable results (Eisenhardt, 1989). These corporations and/or separate entities were contacted and invited to join the study after several conversation rounds. Finally, nine German corporations and their innovation programs agreed to participate in the study, through which we assessed the degree and extent of such programs as well as

challenges and learnings around developments in OI and capabilities to innovate, focusing on IAC. All interview subjects were senior innovation managers and leaders of their HHII programs and therefore could provide us with first-hand information and rich examples. Table 1 presents a short overview of the nine cases, the interviewed experts, and their different models and approaches to innovation:

Table 1: *Overview of sample cases*

Case	Location	Interview period	Interviewed expert	Organisation (separate corporate entity vs. project based)	Involved participants (internal, external, open to all)
1. Finance (FIN-1)	Frankfurt (Main)	2016	Founder, program and innovation head	Separate corporate entity	Open to all
2. Transport (TRANS-2)	Berlin	2016	Head of strategy and innovation	Separate corporate entity	Open to all (focus on external)
3. Automobile (AUTO-3)	Munich	2016	Founder and unit leader	Project-based	Internal and external
4. Automobile (AUTO-4)	Stuttgart	2016	Innovation manager	Separate corporate entity	Open to all
5. IT (IT-5)	Frankfurt (Main)	2016/2017	Innovation manager	Project-based	Internal
6. Tech (TECH-6)	Stuttgart	2016/2017	CEO	Separate corporate entity	Internal
7. Tech (TECH-7)	Munich	2016	Strategy and innovation manager	Project-based	Open to all
8. Pharma (PHARMA-8)	Berlin	2016	Founder, intrapreneurship & innovation manager	Project-based	Open to all (focus on external)
9. Consulting (CONSULT-9)	Heidelberg	2016	Head of innovation & member of executive board	Separate corporate entity	Internal and external

3.2 Data acquisition and analysis

Data acquisition

In line with Irvine et al. (2013), we conducted nine exploratory and semi-structured face-to-face expert interviews according to the method used by Bernard (2012) between May 2016 and June 2017. Observations were included to better asses the corporate experiences, activities, and mechanisms as well as challenges and learnings to enable IAC and thus increase the capability to radically innovate. Interview durations ranged from 30 to 90 minutes. Each interview was tape-recorded, transcribed, and accompanied by information materials provided by the interviewees as well as publicly available information (McLellan et al., 2003). This information includes but is not limited to corporations' and programs' websites,

news articles, annual reports, media coverage, and additional information materials provided by the experts (e.g., program presentations).

This revealed different approaches/models structured by case, company, program, interviewee, and date, which allowed us to follow topical paths during the interviews. 'Open' and unguided descriptions were followed by structured questions to validate respondents' descriptions of their innovation activities and the corresponding approaches, to explore the role of IAC, and to gain further insights and characterise each case (see Appendix 2 for the interview guidelines). Additionally, this approach allows for observation and the addition of further explorative questions to encourage interviewees, which was particularly useful.

Data analysis

We structured the analysis in various stages to identify and cluster the gathered data and thereby compare and contrast it with that from existing research (Yin, 2009). The qualitative content analysis gathered and screened characteristics concerning the research questions and allowed us to interpret the answers of participants, revealing insights about HHII programs, the role of IAC, and respective activities and approaches (Miles and Huberman, 1994). To extract rigorous information from the answers and observations of the nine participants, we have summarised and interpreted the data using the text-reduction method of Bernard (2012). We have then identified emerging patterns and differences between the interviews and relied on prior literature, as discussed above, with the help of a cross-case analysis (Eisenhardt, 1989) to characterise and define main categories, subcategories, and element relationships of the dataset. To ensure the quality of this data analysis, two researchers separately extracted the data to visualise the different statements of each interviewee from the transcripts and the corresponding additional material. In addition to the two researchers, we enlisted a third independent researcher for more credibility of the interpretations (Gioia et al., 2010).

The researchers compiled a case description for each participant and interviewee using the identified elements and constructs of the transcript and the additional information. Following this, the researchers gathered statements explaining the underlying elements directly, developed categories, and grouped similar statements. The researchers then input specific data from each interview and from the case transcripts and completed the case descriptions to provide a better understanding of profound and pivotal ideas. The analysis was deepened in the next steps: To identify relevant statements, the researchers summarised the information, thereby creating an overview of the diversity of insights, descriptions, and correlations which arose (Bernard, 2012) by coding key phrases and patterns of meaning iteratively within several rounds (Spiggle, 1994). This helped the researchers identify patterns and differences between the cases, resulting in an advanced matrix structure.

The researchers then discussed their results. After defining the main characteristics of each program, the discussion was repeated with the input of the

third researcher to ensure the fit of identified insights regarding the cases, programs, and approaches. The main characteristics were then merged and interpreted with regard to the context of the problem description and evaluated using an adapted form of Bullinger and Moeslein's (2010) design elements for innovation contests, which illustrate the diverse HHII activities in practice (see Table 2). Table 3 summarises these identified design elements and attributes supporting the development and implementation of HHII from the perspective of IAC. During the analysis, the identified categories of the summary were revised, as the statements showed direct links which further illustrated characteristics, evolving activities, and drivers as well as challenges and requirements. Table 3 was completed with information from each interview and case for better comparability in general across cases. Finally, the researchers structured the cases and insights and explored these approaches to more radical innovation possibilities regarding the proximity of identified results (see Tables 2 and 3). In addition, the researchers identified design elements and attributes and modified and adapted Bullinger and Moeslein's (2010) ten key design elements (Table 4).

4   Results and Discussion

Through these interviews, we have gained an in-depth understanding of new HHII concepts as well as the role of IAC and perspectives on its use. Additionally, we have illuminated the challenges of new innovation management routines in these respective HHII programs, activities/tools of engagement, and environments, as well as learnings organisations have gained from meeting these challenges. For more radical innovation opportunities, the increase in employee involvement makes a difference in the development of HHII approaches. At the same time, a culture of innovation in terms of employee involvement and ownership is increasing through the implementation of such approaches and the willingness to invest in them. However, challenges appear with the development and implementation of diverse concepts of corporate innovation, and these challenges potentially affect the applicability and usability of different HHII methods, the role of IAC, and the ability to generate or renew knowledge.

With Table 2, we provide the characteristics of the different cases and individual approaches using an overview of the identified elements and attributes of corporate business models, infrastructures, and processes as well as corporate cultures. These elements and attributes vary in different contexts, and the identified parameters, opportunities, challenges, and learnings can help corporations better understand how to implement and develop appropriate management routines to handle hybrid and flexible HII approaches. The identified design elements and architectural guidelines of these HHII programs reinforce the importance of these findings. As identified in all cases, the parameters and contextual factors of the programs are flexible and need to be adapted to dynamic changes not only in the corporate environment but also within each case structure in relation to long-term perspectives and strategies.

Above all, the cases depend on the individual organisational culture and structure, which forces transformation and adaption. In some cases, the outsourcing of innovation activities (project-based, separate corporate entity as a program, or collaborative engagement with specialised service providers) is a more realistic approach to innovation. The corporate culture, especially, is a critical factor in the success of HHII programs, for example, with regard to expectations, experiences, and acceptance of new or different innovation approaches. Indeed, all the present cases identify corporate culture as crucial to the successful implementation and use of these approaches. The ability to continuously develop and to learn and generate knowledge increases IAC. In turn, this contributes to corporate and individual openness to more radical innovation, as innovation relies on knowledge (Tidd and Bessant, 2005) and related experience (Holsapple, 2003; Liebowitz, 1999). The high involvement of individuals and employees contributes to corporate innovation performance (Bessant, 2003), and individuals are therefore increasingly respected as being key to the success of HHII approaches.

Table 2: Characteristics of HHII concepts of corporate innovation

Cases	Model(s) of engagement (diversity of activities)	Description	Added value summary
1. Finance (FIN-1)	Hackathons, innovation labs, foresight workshops, digital factories	The program employs a diversity of formats and tools to enable the HHII of employees and the implementation of intrapreneurship as a leading corporate model for innovation. Users and developers of speed competitions gain commitment and a corresponding structure. Foresight scenarios and design thinking workshops increase open innovation. These programs aim to develop individual activities to increase internal commitment. Using the power of external platforms opens up existing API (application programming interface) services to external entrepreneurs, thereby allowing the sourcing of external creativity and evaluation.	• Implementation and integration of start-up spirit • No separation of business units in terms of innovation abilities and IAC • Melting boundaries and changes to the future of work • Growing influence on cultural change • Promotion of collaboration and partnerships • Reduced uncertainty of approaches through learning and doing
2. Transport (TRANS-2)	Innovation labs, accelerators, innovation pitches, mentoring	The program opens doors to external knowledge, sourcing partners, external innovation, entrepreneurs, and a start-up community to grow a start-up spirit and fuel internal HHII, community building and technology, product and service sourcing, enlargement of the resource base, and involvement through diverse forms of investment.	• Early trend scouting and preparation for future key challenges • Preparation for the unknown future • Restructuring of the corporation through implementation and awareness of HHII and IAC • Cultural change: agility and error tolerance
3. Automobile (AUTO-3)	Innovation hubs, innovation	Collaboration projects target a certain product or category, with prototyping in	• Expansion of start-up spirit and new innovation management routines

		later stages for a certain time. This increases and fosters employees' ability to innovate and to be involved in early-stage searching for and development of innovations, with the possibility for 'U-boat' projects. The door remains open for interaction and cooperation in exchanging knowledge.	• Silicon Valley style of working and thinking • Increased openness for radical new impulses and knowledge • Increasing individual capability • Commitment and culture change through entrepreneurs/intrapreneurs in executive positions
platforms, collaboration, innovation and R&D partnering			
4. Automobile (AUTO-4)	Innovation and collaboration platforms, innovation labs, open innovators, network camps, digital hubs	The program uses platform-centred alliances for an undefined time, involving stakeholders and encouraging networking for co-creation, evaluation, and partnering. Collaboration with key partners pushes and fosters internal and external business models, sharing of project costs, and cross-industry ecosystem building. There is cross-sharing and exchange of state-of-the-art knowledge on various levels.	• Early access to new knowledge and ideas • Increasingly open platform with high-level specialists of different industries and cultures, with technology leaders and hidden champions • Empowerment of new radical and disruptive innovations • Openness to all possibilities without restrictions, with flexibility and speed • Reduced risk and uncertainty
5. IT (IT-5)	Idea contests, workshops, 'innovation gaming', intrapreneurship	Innovation tool development and education in DT and foresight along with individual support and mentoring involves and enables employees. Contests and acceleration of ideas using forms of modern 'suggestions boxes' encourage an exchange of ideas and the identification of innovation potential across external players.	• Enabling of individual employees and teams • Flexibility and speed • Increase in AC and IAC • Continuous improvement of programs • Commitment • Promotion of human resources
6. Tech (TECH-6)	Innovation-enabling platforms, intrapreneurship, foresight and design thinking workshops, individual instruments to enable innovation	The program aims to develop intrapreneurship, enabling an internal start-up culture and AC and encouraging individual activities to grow internal commitment. This helps in the use of internal power and potential to innovate, using existing resources, continuous renewal of the knowledge base, and internal and external mentoring and collaboration possibilities.	• Increasing internal power to innovate and to encourage entrepreneurialism • New ways of thinking and acting • Creation of a culture of abilities and capacity for individual engagement with the whole corporation, enabling a culture and instruments for entrepreneurial employees and further promotion/fostering of talents and inventive genius • Communication and acceptance of new ways of thinking and acting throughout the whole corporation • Classical corporate structure and responsibilities and an HHII approach to enable radical innovation
7. Tech (TECH-7)	Innovation platforms, future and design thinking workshops, innovation collaboration, accelerators	The program opens doors to external knowledge, sourcing partners, external innovation, entrepreneurs, and the start-up community to grow a start-up spirit and fuel internal motivation to innovate. Community building and technology, product and service sourcing, enlargement of the resource base, and	• Truly individualised programs for individuals and groups • Toolboxes and approach models • Commitment and seriousness of continuous involvement • Substantial decrease in uncertainty • Disruptive business opportunities

		involvement through diverse forms of investments open the door for exchange and acceleration of new external 'resources'.	
8. Pharma (PHARMA-8)	Hackathons, accelerators, innovation labs, platforms and collaboration, mentoring workshops, innovation pitches	The program creates a window to innovation through start-up community creation and co-investing. Enablement of innovation in a coupled exchange process encourages flexible investment in an innovation community and fostering of interaction and exchange.	• Increasing use of acceleration programs for idea generation • Strategic implementation • Agility, flexibility, and speed for network building • Investment capital • Changing corporate structure and reduction of barriers for new innovation management routines
9. Consulting (CONSULT-9)	Innovation platforms and collaboration, networking, innovation academies, innovation labs, innovation hubs, innovation forums and events, mentoring	Diverse innovation approaches support and foster business modelling, foresight, design thinking, and emerging individualised instruments, using the power of networks for corporate reputation building and for supporting other corporations with these services. The program opens a window to networking and collaborative platforms and exchange. Joint development and implementation journeys create combined roles as organiser, service provider, consultant, and business owner. Mentoring and innovation team coaching create combined support processes, with cross-sharing.	• Experience as a business provider and as a consultant for a network of clients • Win-win and continuous learning process and development • Increasing need for a corporation • Enrolment and development of (radical) innovation activities • Meeting of special requirements with more speed and flexibility • A focus on finding solutions to implement radical innovation approaches and IAC

All engagement activities use a variety of approaches and tools, distinguishing themselves through flexibility and commitment. Differences are well displayed and observable through the architectural parameters of corporate anchoring and the involved participants (inside-out, outside-in, or coupled), all of whom accelerate and influence these new HHII approaches and possibilities to increase IAC.

The results indicate a heterogeneity between different cases and thus between the strength of HHII approaches (more–fewer and/or stronger–weaker), including IAC. This is shown through (1) corporate anchoring (centralised or decentralised), (2) a focus on participants involved (internal, external, or mixed), and (3) the resulting strength of the 'reach' and 'richness' of the HHII approaches and emerging tools. Because of the focus on only internal participants and entrepreneurs in the first step, cases IT-5 and TECH-6 still show less of a hybrid approach, though they intend to start including external participants and players in a separate entity of the corporation.

Corporations are trying to develop and implement an 'enabling culture' (FIN-1, IT-5, and TECH-6) and are more open to change. The primary goal is to identify the best individual engagement and support service to foster, for example, an internal start-up. In fact, the corporations we observed wanted to explore talents by accelerating employees' start-up ideas in response to the need to quickly build and

activate capabilities and processes in dynamically changing industry contexts, as TECH-6 highlighted. The interviewee in IT-5 stated, 'We are exploring talents and other markets and opportunities with the acceleration of employees' start-up ideas.' In all cases, the added values represent indicators of visions and strategic next steps for continuous development and implementation of HHII concepts.

The overall aim of these corporations is to identify and develop ideas for more radical innovation, implement approaches to increase innovation ability, and stimulate and enable individuals (internal and external) to participate across companies and industries. Sometimes these aims are introduced with special themes, using a framework with respective parameters and creative entrepreneurial spirit. The growing emphasis on hybrid approaches seems to depend on corporate willingness to radically rethink the ways innovation is fostered, with increased corporate reach and richness supported by emerging individualised tools. On one hand, the drivers of diversity in these approaches and tools are individual corporate strategies and structures, above all of which lies the corporate culture. On the other hand, organisational anchoring (centralised or decentralised) and the involved target groups and processes (inside-out, outside-in, or coupled) drive the variety and differentiation of HHII approaches.

The interviewees demonstrated a readiness to implement different and new HHII approaches from the inside out to build understanding, active involvement, and commitment to increase the innovation potential of their organisations. Typically, these programs work with individuals and start-ups evolving from within the corporation. The reference cases highlight the corporate ability to foster disruption and be open for the outside-in integration of knowledge, for example, through a start-up culture. Moreover, the interviewed experts pointed out the possibility (see also Table 2 and 3) of creating and enabling a culture of innovation, which correlates with the importance of the different models of engagement. Such a culture aims to directly integrate and present ideas and business cases to a wider public within the company (e.g., colleagues or departments) and its ecosystem, including stakeholders, consumers, and industry partners.

In addition, the interviewees emphasised varying degrees of acceleration, commitment and willingness to participate, and communication between innovation participants. They also identified varying developments in web-based technologies. For example, FIN-1 highlighted the educational possibilities created by having employees actively involved (viability) and communicating, as well as an increase in acceptability and commitment caused by employees spreading the word about their experiences. In opening the 'black box' step by step, corporations increase IAC and foster an entrepreneurial spirit, which strengthens the corporation from the inside and prepares it to do more than search for and explore new knowledge.

The acceleration of agile and accessible knowledge describes the movement of knowledge and actors across boundaries (Bessant and Trifilova, 2017, p. 1095). These flows, which are not new, call for the development of appropriate innovation management routines to handle changes to innovation approaches. Changes in access and usability have broken down established barriers, such as investment in

time, money, and human resources, as well as practicability and complexity, allowing corporate and stakeholder participation in and engagement with the emerging OI environment (Abu El-Ella et al., 2013; Bullinger et al., 2010). Without considering important contextual parameters, corporations could fail to realise the potential of new HHII approaches, thereby failing to implement, increase, and 'refresh' IAC.

In summary, the results show that the landscape of HHII is evolving and changing dynamically. Corporations are searching for and implementing suitable approaches to involve a wider range of players to boost knowledge creation both within organisations (AC) and among employees (IAC) as a prerequisite for learning and radical innovation. These approaches depend on different, sometimes very specific, parameters concerning corporations and individuals. HHII approaches also improve corporations' understanding of how to encourage individuals to generate innovation or participate in generating innovation (Criscuolo et al., 2014; Volberda et al., 2010). All cases have in common that they aim to invest in searching for, identifying, and using new knowledge and developing activities to promote an intrapreneurial spirit to innovate. Outside-the-box thinking can be encouraged step by step, as these cases show, by overcoming challenges in the development of a relevant knowledge base and by addressing problems with a high level of understanding and the ability to vary and recombine knowledge (Arnold and Thuriaux, 1998).

The observations of this study support Laursen and Salters' (2006) view that the openness of corporations is critical for new innovation opportunities but that the hype around OI and knowledge-management as a holy grail signifies the need for a profound understanding of innovation efforts, especially in the overall corporate and social context (Alexander et al., 2016). Requirements, emerging challenges, and benefits of HHII approaches are summarised as results in Table 3.

Table 3: *Identified benefits, requirements, and emerging challenges of HHII on corporate and individual levels*

	Benefits and possibilities	Requirements	Emerging challenges
Management routines	Improved interaction and communication	Management commitment	Increasing diversity of activities to innovate
	Building of recognition and acceptance	Supportive and innovative culture	Capacity (time, cost, people)
	Enabling of entrepreneurial spirit and behaviour	Clear responsibilities	Loss of focus without defined conditions
	Building of a culture of enablement	Openness (individual, corporation)	'Fail fast, fail early, fail often'
	Realisation of opportunities	Adoption of innovation management routines	Evaluation of compatibility with core business
		Encouragement of individuals and teams	Increasing complexity
Individual innovation capabilities	Acceleration of decision-making and problem-solving	Promotion of intrinsic and extrinsic motivation	Uncertainty and increase of prejudices
	Promotion and importance of the individual employee	Individual circumstances	Overacting
	Commitment-building	Scanning and evaluation of new knowledge and ideas	Limited capacity and capabilities
	Promotion of individual undiscovered skills		Information overload
	Thinking 'outside the box'		'Black box' thinking
	Improved interaction and communication		Gatekeeping and prior knowledge
Innovation infrastructure (internal)	Improvement of organisational and individual routines	Clear strategic framework	Rapidly changing environment, 'speed of change'
	Ability to create new knowledge in new structures	Individual and corporate ability	Network interactions that depend on organisational situations and contexts
		Quality of communication	Need for new innovation spaces
		Investment, e.g., in learning and capability building	

		Facilitation of infrastructure and human resources	
		Time and space, flexibility	
		Development of activities and toolkits	
		Organisational structure and working environment	
Innovation input and outcome (external)	Development of competitive advantages	An understanding of the importance of continuous innovation triggers	Increasing competition
	Risk reduction through awareness and trust building		Knowledge-rich and fluid external context
	Ability to address rapidly changing environments		White-label collaboration
	Increased exploration and exploitation capability		Search for new innovation triggers
	Flexible knowledge base for radical innovations		
	Increasing agility		

To capture and evaluate key elements and attributes of diverse innovation activities, we identified design elements and modified attributes of the HHII programs from the case studies, which led to an adaptation of Bullinger and Moeslein's (2010) ten key design elements, which originally targeted innovation contests, as a useful template to consider for evaluation. Table 4 summarizes the elements facilitating development, implementation, and convergence of innovation actions and presents architectural guidelines based on our adaptation of Bullinger and Moeslein's (2010) checklist to foster the identification and acceleration of HHII approaches using new perspectives on learning, innovation, and the increasing influence individual capabilities have in these processes. These design elements and attributes represent possible key building blocks for activities and strategic guidelines to create appropriate, individualised, and applicable innovation approaches for each case and possible HHII typologies of these cases.

All cases in this study have in common a need to identify new knowledge and activities to promote an entrepreneurial spirit, allowing participants to engage and innovate. The identified elements and attributes help corporations evaluate and support the acceleration and implementation of HHII and the development of related new innovation management routines which aim to support individual absorptive capabilities and corporate absorptive capacity. In addition, the challenges of dynamism and agility in this context can be overcome.

Table 4: *Identified design elements and attributes supporting the identification, development, and implementation of HHII from the IAC perspective for different cases, adapted from Bullinger and Moeslein (2010)*

Design elements		Attributes (values)
Environment of activity		Online
		Mixed
		Offline
Initiator of activity		Management
		Unit/department
		Employee
Participants	**Corporation**	Unit/department
		Employee
		Open to all
	Individual	Internal
		External
		Open to all
	Network partner	Internal
		External
		Open to all
Solution space of task (problem specification)		Low (open task)
		Defined, known
		High (specific task)
Degree of the required level of solutions		Idea
		Sketch
		Concept

	Prototype
	Solution
	Evolving/iterative
	Open/mixed
Target group	Specified
	Open
	Unspecified
Eligibility criterion of participation	Individual/single
	Both
	Team
Timeline of activity	Very short term
	Short term
	Long term
	Very long term/open
	Not specified
Organisational anchoring of activity	Separate corporate entity
	Project-based by department/business unit
	Participant/member
Space/location	Internal
	External
	Flexible
Training/support	Before
	During
	After
	All/continuous
Rewards/incentives	Monetary
	Non-monetary
	Mixed
Motivation of participants	Intrinsic
	Extrinsic
	Mandatory attendance
Community/program functionality (affiliation, communication possibility, tools, time, authorisation, individuals)	Given
	Not given
Evaluation of actions and individuals	Jury evaluation (special board)
	Peer review
	Self-assessment
	Mixed
Setting	Competitive
	Cooperative
Knowledge absorption	Exploration (radical/new)
	Exploitation (incremental)

5   Managerial Implications, Further Research, and Conclusions

One of the main obstacles in innovation management is the successful integration and implementation of new concepts to enable individuals and corporations to adopt, absorb, and use new instruments and tools to increase innovation ability and performance (Bessant, 2003; 2013). As this obstacle is directly connected to the corporate (innovation) culture, the process of overcoming such challenges is extremely demanding and difficult over very long implementation periods even after strong awareness and acceptance has been built up (Bessant et al., 2001). The theoretical contribution of this research is to fuel the need for an increased understanding of how innovation activities that increase the capability to absorb knowledge can be effectively adapted and implemented in practice and further developed in theory. Furthermore, this research tries to map experiences of HHII identified and analysed through the sample cases among individuals (internal, external) participating in or building on more radical innovation. It is also important to extend the exploration of the applicability and usefulness of a wider range of participation in innovation activities in terms of reach (e.g., quantity) and richness (e.g., quality).

Research and practice are thus confronted with challenging questions regarding these diverse perspectives and with the need to study the increasing potential for more radical innovation opportunities. Even though individuals have long contributed to innovation, for example, through the classic suggestion box, idea pitches, and intrapreneurship, there exists no generic solution for radical innovation and employee involvement in innovation because of the different situational contexts, individuals, and organisation structures of corporations seeking to innovate. This negates the possibility of a 'one size fits all' solution. As such, the increasing potential of hybrid models is an indicator of a change in corporate awareness and of a willingness and motivation to support openness to new internal and external knowledge sources and increase the capabilities of employees to engage in the development of radical innovation.

Corporations and involved stakeholders (e.g., employees) must be aware that the HHII evolution process is a journey of implementation and change which takes time and requires understanding and patience (Bessant, 2003). Simply adopting what others are doing is not possible, as highlighted and discussed in Table 3, regarding benefits and possibilities, requirements, and emerging challenges. Corporations need to accept that results take time following implementation and continuous improvement (Weiblen and Chesbrough, 2015). This reinforces the importance of adapting behavioural and managerial routines for successful implementation and use of HHII approaches and changes in knowledge absorption abilities (Bessant et al., 2001; Jones and Craven, 2001). Highly dynamic and volatile developments in the market require new kinds of innovation programs and diverse models of corporate and individual engagement with appropriate innovation activities. Individuals have emerged as an important driving force of development and radical innovation, and further research must thus be open to new approaches to innovation involving hybrid forms of engagement, which seem to

foster a 'trial and error' strategy of testing programs followed by adaptation based on reputation, feedback, acceptance, and usability.

This work could be developed further in several directions. This paper suggests the development and implementation of HHII activities to determine and increase IAC and innovative capabilities within a corporate context to foster more radical innovation investments. This approach requires further research on insights and characteristics of individual stakeholder behaviours, skills, and capabilities, all of which foster or prevent the implementation of new approaches to innovation. In addition, the different OI approaches must be taken into account. IAC seems increasingly important to strengthen the base for further development, as employees are a centrepiece of approaches to increase individual and corporate innovation capability. Resulting networks from HHII enable future developments in corporations and in individuals' capabilities. These could be studied in different situational contexts to structure the results and gather further insights.

We highly recommend including a stronger behavioural perspective on different levels of innovation and on the building of IAC, using IAC as a framework for learning. In addition, this research is based on corporations in Germany, so the research should be expanded to other countries in order to transfer the approaches across diverse contexts, keeping the IAC perspective (Alexander et al., 2016; Neyer et al., 2009). This could help researchers and corporations gain more insights to develop new approaches and tools in response to trends and needs in terms of development speed and information. Further research should explore IAC in specific contexts regarding where, when, and how corporations realise the importance of new internal/external knowledge for innovation. In addition, the evidence that these approaches increase opportunities for radical innovation should be further explored and promoted with more quantitative and qualitative research approaches over a longer period, in more industries, and in other countries and regions. More and extended research designs on drivers of AC and HHII approaches are also recommended, as is an investigation of the individual capabilities influencing these developments and results. A further examination of the roles of different drivers of more radical innovation is important.

The proposed frameworks can serve as a basis for future research on creating specific innovation spaces inside and outside corporations. These must be continuously examined and expanded in response to new information and characteristics, which might consequently result in new HHII approaches and powerful tools, with corresponding new innovation management routines for selecting and implementing new knowledge and employee engagement. In addition, building typologies of IAC behaviour might help to determine and cluster different corporations and their capabilities to absorb knowledge as well as to determine what helps create an appropriate context (centralised or decentralised) for further development and implementation of HHII concepts and routines. This may help to explain why firms are sometimes unable to leverage and exploit external knowledge, be it because of a lack of awareness of a need to change or a lack of capabilities (Bessant et al., 2009). New technologies and possibilities, such as the internet and other communication tools, are not enough to continuously

improve HHII approaches. Reaching out to more participants (inside or outside the corporation) is a prerequisite for the success of innovation through entrepreneurial activities or ideas for radical rather than incremental innovation.

Furthermore, an examination of the in-depth relevance and applicability of HHII approaches in a variety of empirical settings could generate further insights and structures for different typologies (corporations and individuals). Comparing these approaches to show and define the diversity of requirements, challenges, and benefits may reveal their relevance and applicability in a variety of empirical settings and allow researchers to assess and establish adequate required activities corporations and individuals should invest in to realise their potential and AC (Zahra and George, 2002). Bessant et al. (2009) have described archetypes in the development of AC which could be used as a basis for further research and development in this context: These are 'unaware/passive', 'reactive', 'strategic', and 'creative'. Further research and development of these archetypes as well as possible typologies of IAC and AC represent a great opportunity in a variety of (empirical) settings to develop guidelines for corporate decisions that support an environment of high-involvement innovation.

6 References

Abu El-Ella, N., Stoetzel, M., Bessant, J., & Pinkwart, A. (2013). Accelerating high involvement: the role of new technologies in enabling employee participation in innovation. *International Journal of Innovation Management*, *17*(6), 1340020. https://doi.org/10.1142/S1363919613400203

Alexander, A. T., Neyer, A.-K., & Huizingh, K. R. E. (2016). Introduction to the special issue: transferring knowledge for innovation. *R&D Management*, *46*(2), 305–311. https://doi.org/10.1111/radm.12195

Allen, R. C. (1983). Collective invention. *Journal of Economic Behaviour and Organization*, *4*(1), 1–24.

Andersen, P. H., & Drejer, I. (2008). Systemic innovation in a distributed network: The case of Danish wind turbines, 1972-2007. *Strategic Organization*, *6*(1), 13–46.

Anderson, L. M., & Bateman, T. S. (2000). Individual environmental initiative: Championing natural environmental issues in US business organizations. *Academy of Management Journal*, *43*(4), 548–570.

Argote, L., Ingram, P., Levine, J. M., & Moreland, R. L. (2000). Knowledge

transfer in organizations: Learning from the experience of others. *Organizational Behavior and Human Decision Processes*, *82*(1), 1–8.

Arnold, E., & Thuriaux, B. (1998). *Developing firms' technological capabilities*. Brighton.

Bader, K., & Enkel, E. (2014). Understanding a firm's choice for openness: Strategy as determinant. *International Journal of Technology Management*, *66*(2/3), 156–182.

Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology*, *32*(1), 439–476.

Bartl, M., Fuller, J., Muhlbacher, H., & Ernst, H. (2012). A manager's perspective on virtual customer integration for new product development. *Journal of Product Innovation Management*, *29*(6), 1031–1046.

Bernard, H. R. (2012). *Social research methods: Qualitative and quantitative approaches.* Los Angeles: Sage.

Bessant, J., & Caffyn, S. (1997). High-involvement innovation through continuous improvement. *International Journal of Technology Management*, *14*(1), 7–22.

Bessant, J. (2003). *High involvement innovation*. Chichester: Wiley and Sons.

Bessant, J. (2013). Learning and continuous improvement. In J. Tidd (Ed.), *From knowledge management to strategic competence (3rd ed.)* (Second, pp. 295–320). London: Imperial College Press.

Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behaviour. Technovation, 21(2), 67–77.

Bessant, J., & Moeslein, K. (2011). *Open Collective Innovation–The Power of the Few*. London: Advanced Institute of Management Research.

Bessant, J., Phelps, B., & Adams, R. (2005). *External knowledge: A review of the literature adressing the role of external knowledge and expertise at key stages of business growth and development.* UK: AIM Research.

Bessant, J., & Trifilova, A. (2017). Developing absorptive capacity for recombinant innovation. *Business Process Management Journal*, *23*(6), 1094–1107.

Bessant, J., Tsekouras, G., & Rush, H. (2009). Getting the tail to wag: Developing innovations capability in SMEs. In *Proceedings from 10th International CINe 6 – 8 September*. Brisbane.

Boer, H., Berger, A., Chapman, R., & Gertsen, F. (2000). *CI Changes: From suggestion box to organisational learning - Continuous improvement in Europe and Australia*. Aldershot: Ashgate.

Boer, H., & Gertsen, F. (2003). From continuous improvement to continuous innovation: A Retroperspective. *Int. J. Technology Management*, *26*(8).

Bullinger, A. C., & Moeselein, K. . (2010). Online innovation contests: Where are we? In *Proceedings from Fifteenth Americas Conference on Information Systems (AMCIS)*. Lima: AMCIS.

Bullinger, A. C., Neyer, A.-K., Rass, M., & Moeslein, K. M. (2010). Community-based innovation contests: Where competition meets cooperation. *Creativity & Innovation Management*, *19*(3), 290–303.

Camisón, C., & Forés, B. (2010). Knowledge absorptive capacity: New insights for its conceptualization and measurement. *Journal of Business Research*, *63*(7), 707–715.

Chauvel, D., & Borzillo, S. (2017). *The Innovative Company: An Ill-defined Object*, Volume 1, London: ISTE and Hoboken: Jon Wiley & Sons.

Chesbrough, H. (2006). *Open innovation : A new paradigm for understanding industrial innovation*. New York: Oxford University Press.

Chesbrough, H., & Crowther, A. K. (2006). Beyond high tech : early adopters of open innovation in other industries, 229–236.

Chesbrough, H. (2003). The logic of open innovation: managing intellectual property, *California Management Review*, 45(3), pp. 33-58.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128–152.

Comacchio, A., & Bonesso, S. (2012). *How do firms enact absorptive capacity? A routine based approach.* (ISSN: 2239-2734 No. Working paper 10/2012). Venezia.

Criscuolo, P., Salter, A., & Ter Wal, A. L. J. (2014). Going underground: Bootlegging and individual innovative performance. *Organization Science*, *25*(5), 1287–1305.

Daghfous, A. (2004a). Absorptive capacity and the implementation of knowledge-intensive best practices. *S.A.M. Advanced Management Journal*.

Daghfous, A. (2004b). Organizational learning, knowledge and technology transfer: A case study. *Learning Organization*, *11*(1), 67–83.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, *39*(6), 699–709.

Ebrahim, N. A., Ahmed, S., & Taha, Z. (2010). SMEs: Virtual research and development (R&D) teams and new product development: A literature review. *International Journal of the Physical Sciences*, *5*(7), 916–993.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academic Management Journal*, *50*(1), 25–32.

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: Exploring the phenomenon. *R&D Management*, *39*(4), 311–316.

Enkel, E., Heil, S., Hengstler, M., & H., W. (2017). Exploratory and exploitative innovation: To what extent do the dimensions of individual level absorptive capacity contribute? *Technovation*, *60–61*, 29–38.

Evans, P., & Wurster, T. (2000). *Blown to bits: How the new economics of information transforms strategy*. Cambridge, MA: Harvard Business School Press.

Felin, T., & Foss, N. J. (2006). Individuals and organizations: Thoughts on a micro-foundations project for strategic management and organizational analysis. In D. J. Ketchen & D. D. Bergh (Eds.), *Research Methodology in Strategy and Management Vol. 3* (pp. 253–288). Emerald Group Publishing Limited.

Fox, D. G., Ellison, R. L., & Keith, K. L. (1988). Human-resource management: An index and its relationship to readiness for change. *Public Personnel Management*, *17*(3), 297–302.

Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: A literature review. Journal of Product Innovation Management, 19(2), 110–132.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, *40*(3), 213–221.

Gifford, E. (2017). *Exploring knowledge intensity in entrepreneurship: A quantitative study of knowledge, innovation and performance in entrepreneurial firms*. Retrieved from http://hdl.handel.net/2077/51773

Gioia, D. A., Price, K. N., Hamilton, A. L., & Thomas, J. B. (2010). Forging an identity: An insider-outsider study of processes involved in the formation of organizational identity. *Academic Science Quarterly*, *55*(1), 1–46.

Habicht, H., Oliveira, P., & Scherbatuik, V. (2012). User innovators: when patients set out to help themselves and end up helping many. *Die Unternehmung – Swiss Journal of Management Research*, *66*(3), 277–294.

Harvey, J.-F., Cohendet, P., Simon, L., & Borzillo, S (2015). Knowing Communities in the Front End of Innovation. *Research-Technology Management*, *58*(1), 46-54.

Holsapple, C. W. (2003). *Handbook on knowledge management*. Springer.

Hossain, M., Islam, K. M. Z., Sayeed, M. A., & Kauranen, I. (2016). A comprehensive review of open innovation literature. *Journal of Science&Technology Policy Management*, *7*(1), 2–25.

Howell, J. M., & Higgins, C. A. (1990). Champions of technological innovation. *Administrative Science Quarterly*, *35*, 317–341.

Hubert, M., Florack, A., Enkel, E., Eberhardt, T., & Kenning, P. (2013). Effect of flagship-products on the perceived innovativeness of a firm. In *Proceedings from ISPIM Conference*. The International Society for Professional Innovation Management (ISPIM).

Huizingh, E. K. R. E. (2010). Open innovation : State of the art and future perspectives. *Technovation*.

Hussain, F., Lucas, C., & Ali, M. A. (2004). Managing knowledge effectively. *Journal of Knowledge Management Practice*, *5*(1), 1–12.

Irvine, A., Drew, P., & Sainsbury, R. (2013). "Am I not answering your questions properly?" Clarification, adequacy and responsiveness in semi-structured telephone and face-to-face interviews. *Qualitative Research*, *13*(1), 87–106.

Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2005). Managing potential and realised absorptive capacity: How do organisational antecedents matter? *Academy of Management Journal*, *48*(6), 999–1015.

Jones, O., & Craven, M. (2001). Beyond the routine: Innovation management and the teaching company scheme. *Technovation*, *21*(5), 267–279.

Jorna, R. (2006). *Sustainable Innovation: The Organizational, Human and Knowledge Dimension.* Greenleaf Publishing, Sheffield.

Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, *19*(5), 461–477.

Langfield-Smith, K. (2008). The relations between transactional characteristics, trust and risk in the start-up phase of a collaborative alliance. *Management Accounting Research*, *19*, 344–364.

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, *27*(2), 131–150.

Leonard, D., & Rayport, J. F. (1997). Spark innovation through empathic design. *Harvard Business Review*, *75*(6), 102–113.

Liebowitz, J. (1999). *The knowledge management handbook*. (J. Liebowitz, Ed.). Florida: CRC Press LLC.

Maitlis, S., & Lawrence, T. B. (2007). Triggers and enablers of sensegiving in organizations. *Academy of Management Journal*, *50*(1), 57–84.

Markham, S. K. (1998). A longitudinal examination of how champions influence others to support their projects. *Journal of Product Innovation Management*, *15*(6), 490–504.

Martinkenaite, I., & Breunig, K. J. (2016). The emergence of absorptive capacity through micro-macro level interactions. *Journal of Business Research*, *69*(2), 700–708.

McDermott, Christopher & O'Connor, Gina. (2002). Managing Radical Innovation: An Overview of Emergent Strategy Issues. *Journal of Product Innovation Management*. 19. 424-438.

McGrath, R. (2013). *The end of competitive advantage*. Boston, MA: Harvard Business Review Press.

McLellan, E., MacQueen, K. M., & Neidig, J. L. (2003). Beyond the qualitative interview: Data prepration and transcription. *Field Methods*, *15*(1), 63–84.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* (2nd ed.). Thousand Oaks: Sage Publications.

Minbaeva, D. B., Pedersen, T., Björkman, I., Fey, C. F., & Park, H. J. (2003). Subsidiary absorptive. *Journal of International Business Studies*, *34*(6), 586–599.

Neyer, A. K., Bullinger, A., & Moeslein, K. M. (2009). Integrating inside and outside innovators: A sociotechnical systems perspective. *R&D Management*, *39*(4), 410–419.

Nisbett, R., & Ross, L. (1991). *The person and the situation*. New York: McGraw Hill.

Noblet, J.-P., Simon, E., & Parent, R. (2011). Absorptive capacity: A proposed operationalization. *Knowledge Management Research & Practice*, *9*(4), 367–377.

Ocasio, W. (1997). Towards an attention-based view of the firm. *Management Journal*, *18*, 187–206.

Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, *50–51*(2010), 13–24.

Phelps, R., Adams, R., & Bessant, J. (2007). Models of organizational growth: A review with implications for knowledge and learning. *International Journal of Management Reviews*, *9*(1), 53–80.

Reagans, R., & Mcevily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly, 48*(2), 240–267.

Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses.* New York: Crown

Business.

Rosenkopf, L., & Nerkar, A. (2001). Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, *22*(4), 287–306.

Rothwell, R., & Dodgson, M. (1991). External linkages and innovation in small and medium-sized enterprises. *R&D Management*, *21*(2), 125–138.

Rubera, G., & Kirca, A. H. (2012). Firm innovativeness and its performance outcomes: A meta-analytic review and theoretical integration. *Journal of Marketing*, *7*, 130–147.

Schulze, A., & Hoegl, M. (2008). Organizational knowledge creation and the generation of new product ideas: A behavioral approach. *Research Policy*, *37*(10), 1742–1750.

Spiggle, S. (1994). Analysis and interpretation of qualitative data in consumer research. *Journal of Consumer Research*, *21*(3), 491–503.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, *17*(Winter Special Issue), 27–43.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533.

Ter Wal, A., Criscuolo, P., & Salter, A. (2011). Absorptive capacity at the individual level: An ambidexterity approach to external engagement. In *Paper presented at Druid 2011*.

Ter Wal, A., Criscuolo, P., & Salter, A. (2015). Making a marriage of materials: The role of gatekeepers and shepherds in the absorption of external knowledge and innovation performance. *Research Policy*, *46*, 1039–1054.

Tidd, J., & Bessant, J. (2005). *Managing innovation: Integrating technological, market and organizational change* (3rd ed.). Chichester: John Wiley and Sons.

Tidd, J., & Bessant, J. (2013). *Management innovation: Integrating technological, market and organizational change* (5th ed.). West Sussex: John Wiley & Sons.

Todorova, G., & Durisin, B. (2007). Absorptive capacity : Valuing a reconceptualization. *Academy of Management Review*, *32*(3), 774–786.

Tortoriello, M. (2015). The social underpinnings of absorptive capacity: The moderating effects of structural holes on innovation generation based on external knowledge, *36*, 586–597.

Van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, *29*, 423–437.

Volberda, H. W., Foss, N. J., & Lyles, M. A. (2010). Perspective: Absorbing the concept of absorptive capacity: How to realize its potential in the organization field. *Organization Science*, *21*(4), 931–951.

Von Hippel, E. (2005). *The democratization of innovation*. Cambridge: MIT Press.

Weiblen, T., & Chesbrough, H. W. (2015). Engaging with startups to enhance

corporate innovation. *California Management Review*, *57*(2), 66–90.

Welter, F. (2011). Contextualizing Entrepreneurship— Conceptual Challenges and Way Forward. *Entrepreneurship: Theory & Practice*, *35*(1), 165–184.

West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. (2014). Open innovation: The next decade. *Research Policy*, *43*, 805–811.

Yin, R. K. (2009). Case study research: Design and methods. In L. Bickman & D. J. Rog (Eds.), *Essential guide to qualitative methods in organizational research* (vol. 5). Thousands Oaks: Sage Publications.

Zahra, S. A., & George, G. (2002). Absorptive capacity : A review and extension. *Academy of Management Review*, *27*(2), 185–203.

Appendices

Appendix 1

Contextualisation of AC and IAC
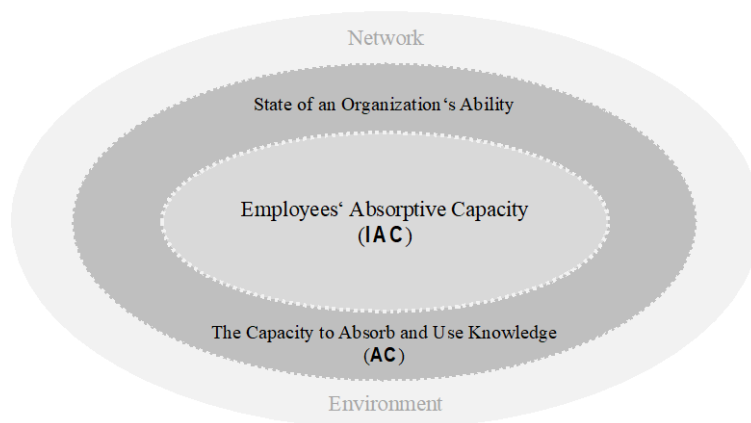
Appendix 2

Overview guidelines for semi-structured expert interviews

1. What OI programs are you involved in? What tools/mechanisms/formats (e.g., hackathons, design thinking, innovation garages/platforms, labs, incubators/accelerators) are used or have been developed to enable radical, incremental, disruptive innovation? How were these designed based on expectations and experiences/prior knowledge?

2. What other OI programs are you aware of? What do you expect from them? What experiences have you had since the development of the program and recently?

3. Do you combine different approaches to develop your model, for example, 'old' methods versus the 'new' world of influence and opportunity through digitalisation and new working environments?

4. Who is responsible for exploring new innovation spaces?

5. Which external and internal stakeholders are involved in which programs? Are there differences concerning group members and hierarchies (e.g., individuals, knowledge, promotion, training, ability)?

6. How do you find, form, involve, and work with individuals from inside and outside the corporation?

7. How do you prepare and implement such engagement?

8. How do you manage, facilitate, and promote these approaches and apply emerging tools (e.g., intrapreneurship, idea management, accelerators, 'innovation ecosystems')?

9. How do you increase engagement? What experiences and actions have played or will play an important role in involving employees?

10. What are your major goals?

11. What are your added values through these activities? What characteristics make your program(s) more valuable than others?

12. What major challenges, barriers, and drivers are you facing with engagement and hybrid high involvement?

13. How would you assess the present and future potential of these high-involvement innovation activities? How would you assess the roles of external and internal individuals?

14. What will your program look like in the future? How can these programs and the high involvement of individuals be developed further? What are your expectations and experiences/learnings?

Acknowledgements