Argument and innovation

Peters, Kristian

Argument and Innovation

Theoretical and Empirical Explorations in Knowledge Claim Evaluation

Kristian Peters

Publisher:	University of Groningen Groningen, The Netherlands
Printer:	Ipskamp Drukkers B.V. Enschede, The Netherlands
ISBN:	978-90-367-5313-5 (book) 978-90-367-5314-2 (e-book)

Argument and Innovation

Theoretical and Empirical Explorations in Knowledge Claim Evaluation

Proefschrift

ter verkrijging van het doctoraat in de
Economie en Bedrijfskunde
aan de Rijksuniversiteit Groningen
op gezag van de
Rector Magnificus, dr. E. Sterken,
in het openbaar te verdedigen op
donderdag 23 februari 2012
om 12.45 uur

door

Kristian Peters

geboren op 15 april 1983
te Leeuwarden

Promotores:	Prof. dr. R.J.J.M. Jorna Prof. dr. ir. R.J.F. van Haren
Copromotor:	Dr. L. Maruster
Beoordelingscommissie:	Prof. dr. ir. J.C. Wortmann Prof. dr. S.N. Gourlay Prof. dr. F.H. van Eemeren

Voor mijn ouders,

Eddi en Willy

Contents

Chapter 1

Introduction

In November 2005, a small and unknown Internet venture called YouTube.com announced that they received a US$3.5 million funding from a venture capitalist. Chad Hurley, one of three founders of YouTube, explained the investment in a press release:

> "*With more and more people carrying around devices that capture video – from digital cameras to cell phones – YouTube is set to become an essential destination for watching and sharing these experiences*" (YouTube, 2005).

The funding was a tremendous success for the founders of YouTube: they started the service to watch and share videos worldwide through the Internet only a few months earlier, in February 2005. Moreover, YouTube was still largely unknown to the public. YouTube used the investment to accelerate its growth, enhance product development and expand sales and marketing efforts.

One year after the initial US$3.5 million funding, YouTube was sold to Google for US$1.65 billion and the initial success became peanuts. Google did not waste money. In June 2008, Forbes magazine projected YouTube's revenue at US$200 million per year, noting progress in advertising sales. In May 2010, Google reported that YouTube was serving more than two billion videos a day, which is as "nearly double the prime-time audience of all three major US television networks combined" (Chapman, 2010). Every minute, 35 hours of video are being uploaded to YouTube (YouTube, 2010).

YouTube is a success story about innovation of epic proportions. Within two years, the value of YouTube increased from zero to US$ 1,65 billion. The service radically changed the rules where people choose what they want to watch, when they want to watch. YouTube changed the way the motion-picture industry promotes films;

changed the way journalists cover news; changed the way businesses profile themselves; changed the way random people become celebrities; and so on.

The story of YouTube serves as a very intriguing example of a highly successful innovation, yet it also provides an illustration what process we particularly examine in this thesis, namely, how innovating organizations evaluate knowledge. The quoted press release contains a statement of YouTube's beliefs and knowledge before YouTube's breakthrough in 2006. We refer to such an expression as a claim of knowledge or knowledge claim. The quote contains two knowledge claims. The first knowledge claim is "more and more people [are] carrying around devices that capture video-from digital cameras to cell phones" and the second knowledge claim is "YouTube is set to become an essential destination for watching and sharing these experiences". The two knowledge claims relate to each other: the second knowledge claim is an inference drawn based on the first knowledge claim. Obviously, the YouTube founders relied on additional knowledge claims. Nevertheless, we know now, six years later, that at least these two knowledge claims were true.

Yet, in 2005, when Hurley formulated the two knowledge claims, the outcome was far less certain. YouTube dealt with a situation that is inherently attached to innovation: organizations need to create knowledge and take decisions while being confronted with uncertainty (Schumpeter, 1934; Boisot and MacMillan, 2004). From a knowledge point of view, uncertainty translates to a lack of facts, experience and existing knowledge. Still, the founders of YouTube claimed to know the unknown in 2005, and they were right. How could they *know*?

Jawed Karim, another YouTube co-founder, explains in an ACM conference talk on YouTube's success that they could not initially support their ideas and beliefs (i.e., knowledge claims) with objective facts or existing knowledge. Instead, they found support for knowledge claims in a rather subjective way. For instance, they partially based their idea on the success of previous innovative initiatives on the Web (e.g., Livejournal.com in 1999, Hotornot.com in 2000, Wikipedia.net in 2001, Friendster.com in 2002 and Flickr.com in 2004), indicated by the number of page views and the size of the user community.

The subjective way of supporting YouTube's knowledge claims was problematic when YouTube tried to gain publicity and financial support in May 2005. They pitched a beta version of YouTube to magazines, journalists and venture capitalists, yet no one replied positively. Karim (2006): "It seemed that all experts rejected our idea". Yet, despite this setback, they continued developing the service and became very successful.

The story of YouTube highlights several properties of the process of, and the criteria by which organizations accept and reject knowledge, e.g., the nature of the evidence YouTube used to support their ideas, formulated as knowledge claims, and the role experts played in evaluating these ideas. We refer to this process as knowledge claim evaluation. Knowledge claim evaluation is the activity in which organizations evaluate the grounds (i.e., data, facts, evidence, considerations, and features) of a knowledge claim in order to accept or reject it. We concur with several scholars in the fields of innovation and knowledge management that understanding knowledge claim evaluation in organizations can lead to new insights about how innovations become a success or not (Boisot and MacMillan, 2004; Firestone and McElroy, 2003b; Giroux and Taylor, 2002; McElroy, 2003; Tripsas and Gavetti, 2000). However, as we illustrate next, the current understanding of knowledge claim evaluation is far from being straightforward yet.

Nonaka and Takeuchi (1995)[1] offer one of the few existing theories of knowledge claim evaluation in the literature. Their theory plays a prominent role in the fields of innovation and knowledge management. Nonaka and Takeuchi (1995) suggest that it is the best interest of innovating organizations that top management formulates justification criteria, such as a company vision, profit-levels, cost-levels, consumer-targets, product-ranges, etc. Subsequently, staff applies objectively verifiable evidence (i.e., facts) to justify innovative knowledge claims, e.g., the idea of an easy-to-use video sharing web service, in the light of management's justification criteria.

Going back to the YouTube example, it seems that the opposite of what Nonaka and Takeuchi (1995) prescribe worked out for YouTube. The founders did rely neither on objective verifiable evidence (i.e., facts) nor on top management, or other authorities, such as field experts and financial authorities. Obviously, the founders were able to continue organizing and promoting YouTube because no management controlled them. Yet, they also did not pull the plug after field experts and financial authorities of venture capitalists rejected their knowledge claims. The discrepancy between Nonaka and Takeuchi's (1995) theory and what worked out for YouTube suggest a lacking understanding of knowledge claim evaluation in innovations.

[1] The book title of Nonaka and Takeuchi (1995) is the '*The Knowledge-Creating Company*'

On the other hand, there are plenty of examples of innovating companies, which, like YouTube, did not rely on authorities, objective evidence, and prior experience to support new knowledge, yet failed. For instance, a large number of online companies founded during the "Internet bubble" (or "Dot-com bubble") in the mid-1990s, failed and went bankrupt when the bubble burst in 2000. The Internet bubble was notorious for enormous investments in companies that were based on unsupported profit prospects, subjective business plans and a blind faith in the future of the Internet (Boisot and MacMillan, 2004). For firms that invested in the Internet bubble, the application of Nonaka and Takeuchi's (1995) theory of knowledge claim evaluation could have prevented the failing innovations.

In this thesis we aim at improving the understanding of knowledge claim evaluation in innovation. Therefore, our main research question is:

Main research question:

What is the role of knowledge claim evaluation in innovation?

Existing theories do not provide a satisfying answer on the role of knowledge claim evaluation in innovation. The YouTube and Internet bubble examples in combination with Nonaka and Takeuchi's (1995) theory illustrate this. We will provide further evidence of the lacking understanding in the upcoming chapters by answering to three research questions. Research question one is composed by three sub questions (i.e., sub-RQs, see below). We introduce the other two research questions in sections 1.5 and 1.6 of this chapter. An overview of all research questions and chapters can be found in figure 1.2.

Research question 1:

Which approaches in knowledge management theory are available to explain the role of knowledge claim evaluation in innovation?

In this chapter, we will review existing theory to define innovation and knowledge, explain the role of knowledge in innovation (sub-RQ 1a), and we will introduce knowledge management as the discipline that is specialized in issues of knowledge and innovation (sub-RQs 1b). The answers to sub questions 1a and 1b describe in broad outline the background of the research. Subsequently, we will review to what extent and how knowledge management theory has addressed the role of knowledge claim evaluation in innovations (sub-RQ 1c). We elaborate the answer on research question one in Chapter 2, where we present three approaches of knowledge claim evaluation as found in knowledge management literature.

Sub-RQ 1a: What is the role of knowledge in innovation?

Sub-RQ 1b: What are the functions of knowledge management?

Sub-RQ 1c: To what extent does knowledge management theory explain how knowledge claims are evaluated in innovation?

The outline of this chapter looks as follows. In sections 1.1 and 1.2, we define innovation and we position knowledge at the basis of innovation: the knowledge-based view on innovation. Subsequently, we introduce epistemology in section 1.3, which is a branch of philosophy where the issue of knowledge claim evaluation has extensively been discussed, yet in other wordings. Innovation and epistemology come together in the field of knowledge management, introduced in section 1.4. Section 1.5 introduces our second research question in combination with informal argumentation theory, which we adopt to elaborate the existing theories on knowledge claim evaluation in knowledge management. Section 1.6 introduces the empirical research in which we have studied knowledge claim evaluation in innovation projects. Here, we also present the third and final research question, which guides the empirical parts of our research. We conclude this chapter in section 1.7 with an overview of the thesis chapters and research questions.

1.1 Innovation

Schumpeter (1934; 1983) was among the first who positioned innovation as the strategic stimulus to economic development. Schumpeter (1934) refers to innovation as

> *"[…] the carrying out of new combinations. This covers the following five cases: (1) The introduction of a new good […] (2) The introduction of a new method of production […] (3) the opening of a new market […] (4) the conquest of a new source of supply of raw materials or half-manufactured goods […] (5). The carrying out of the new organisation of any industry […]"* (p. 66).

Forty-seven years later, in the introduction to Schumpeter (1983), J.E. Elliot provides a more concise definition of Schumpeter's definition as

> *"[…] the commercial or industrial application of something new – a new product, process or method of production; a new market or source of supply; a new form of commercial, business or financial organization"* (p. xix).

Schumpeter (1934, 1983) highlights three essential aspects of innovation. First, he makes clear that innovation differs from invention: an innovation is the application of an invention. Secondly, by referring to the commercial or industrial application, he argues that the application of something new should be economically beneficial. Thirdly, he identifies that innovation can concern different types of output, e.g., a new product, a new market, a new financial organization etc.

Nowadays, the economic view in Schumpeter's (1934) pioneering work has been exchanged for a more differentiated view, which cannot solely be expressed in terms of profit or shareholder's value (Jorna, 2006). Innovation in the light of sustainability is exemplary for the differentiated view on innovation. An example of such an innovation is a newly developed car that will yield lower profit margins to the manufacturer, yet that can drive without any CO_2 emissions, and henceforth, has a smaller ecological footprint: an ecological gain.

Furthermore, contemporary innovation literature takes into account to whom, and to what extent, an innovation inflicts changes. For instance, the US army implemented the Global Position System (GPS) in 1967, which was an innovation back then. Nowadays, the US army does not consider GPS as an innovation anymore, whereas for modern Dutch farmers GPS is a genuine innovation. One of the topics of the innovation program in the agricultural domain in the Netherlands, which we study in Chapter 5, aimed to implement GPS on the tractor as a form of precision agriculture.

Jorna (2006) defines three types of innovative outputs: product innovation, process innovation and organizational innovation. Product innovation concerns innovation by means of new goods or services. YouTube is an example of a product innovation. Process innovation concerns innovation by means of changing the ways (or introducing new ways) of producing and developing products or services. For instance, the Internet provided a new way for banks to offer their services to customers: Online banking. Organizational innovation concerns innovation by means of changing the ways of organizing or managing a firm. In Chapter 6, for instance, we examine an organizational innovation that concerns a new method for calculating product sales prices in a large multinational company.

West and Farr's (1990) definition of innovation entails the updated view on innovation. We therefore adopt their definition in this thesis.

> *"Innovation is the intended or premeditated introduction or application – within a particular role, group or organization – of ideas, processes, products or procedures which are new to the relevant adoption-unity, with the aim of being clearly beneficial to the individual, the group, the organization or society as a whole"* (p. 9).

1.2 The knowledge-based view on innovation

Schumpeter (1983) contends that innovation faces "immense difficulties" (p. xxi). The difficulties have been summarized as three interrelated problem statements (Schumpeter, 1983):

1) Knowledge underlying innovation lies outside the known and thus is shrouded in uncertainty;
2) This uncertainty makes individuals reluctant to dive into the unknown;
3) Since innovation involves change and renewal, existing things have to be broken down or abandoned (i.e., creative destruction), therefore, non-innovators may obstruct the innovator.

(p. xxi)

The three problems highlight the close relationship between knowledge and innovation, which is known as the knowledge-based view on innovation (Chia and Holt, 2008; Leonard-Barton, 1995; McElroy, 2003; Nonaka and Takeuchi, 1995; Von Krogh et al., 2000). In this view: knowledge is the primary source of innovation, knowledge is involved in the innovation process, and knowledge is the outcome of the innovation process (Jorna, 2006). Correspondingly, Nonaka (1994) defines the innovation *process* as

> *"[…] a process in which the organization creates and defines problems and then actively develops new knowledge to solve them."* (p. 14)

However, the knowledge-based view on innovation is not straightforward, because knowledge is not a well-defined and well-understood concept (Boisot and MacMillan, 2004; Cook and Brown, 1999; Soo et al., 2004; Tsoukas and Vladimirou, 2001; Williams, 2008). Numerous definitions of knowledge exist in the literature. Moreover, the various definitions focus on different aspects or properties of knowledge. We identify five properties of knowledge: content, action, carrier, validity and expression. We elaborate on each property, and where necessary, we clarify the position(s) we adopt.

First, knowledge represents content. In line with this property, the Oxford English dictionary defines knowledge as "what is known in a particular domain or in total". We refer to this definition of knowledge, as *knowledge content* (Jorna, 2006). For instance, content of knowledge can refer to the working of computers, the preparation of soufflés or survival on a desert island.

The second property of knowledge relates to mental and physical skills made possible and fueled by knowledge. Definitions of *what one can do with knowledge* are ample in literature. The definitions we list below overlap. Most of them can be adopted simultaneously.

- Knowledge is essentially related to human action (Argyris and Schön, 1996; Choo, 2006; McElroy, 2008; Nonaka and Takeuchi, 1995);
- Knowledge provides a framework for evaluating and incorporating new experiences and information (Davenport and Prusak, 1998);
- Knowledge is the potentiality of defining a situation to permit (skillful) action (Nonaka and Von Krogh, 2009);
- Knowledge allows humans to define, prepare, shape, and learn to solve a task or problem (Schreiber et al., 2000; Von Krogh et al., 2000);
- Knowledge is the individual capability to draw distinctions, within a domain of action, based on an appreciation of context or theory, or both (Tsoukas and Vladimirou, 2001);
- Knowledge is the ability to use information (Turban and Aronson, 2001).

The third property of knowledge is w*ho and/or what can carry knowledge* and is subject of many debates in the knowledge management and organizational learning literature. It is the issue of whether knowledge can reside outside the individual human being or not or whether an organization can carry knowledge (i.e., organizational knowledge, e.g., (i.e., organizational knowledge, e.g., Tsoukas and Vladimirou, 2001). In this debate, we adopt the stance of Polanyi (1975) that knowledge is *personal* in essence. All knowledge contains a personal element (Daft, 2001; Jorna, 2006; Polanyi, 1967; Simon, 1991). Yet, what is stored in a mind of a person working in an organization (or in a discipline, or other context/domain) may relate to what is stored in other persons' minds working in the same organization. Simon (1991) argues:

> *"What an individual learns in an organization is very much dependent on what is already known to (or believed by) other members of the organization and what kinds of information are present in the organizational environment"* (p. 125)

Following Simon (1991), we regard organizational knowledge as (shared) knowledge that is stored and processed in the heads of individual members and that is used to execute mental and physical tasks in an organization. Artifacts that can carry and process information (e.g., computers, books, documents, pictures) can support organizational members and influence the (shared) knowledge they carry and process.

The evaluation of knowledge has not been addressed in the debate of w*ho and/or what can carry knowledge* in literature. We argue that our research contributes to this debate too, because we study the process of how organizations consciously and explicitly decide whether (personal) knowledge can be accepted, and subsequently, can be added to the "organizational" knowledge base.

The fourth property of knowledge mentioned in literature is *what counts as knowledge?* The issue of what is true or how can we assess the validity of knowledge is highly relevant to the subject of this thesis, i.e., the evaluation of knowledge. It has extensively been discussed in the field of epistemology (see section 1.3), whereas it little discussed in the fields of innovation and knowledge management (see section 1.4).

The fifth and last property of knowledge concerns the issue of *how knowledge can be expressed.* The issue is related to Polanyi's view that knowledge is in essence personal. We adopt Polanyi's (1967) distinction of two knowledge types: tacit knowledge and explicit knowledge. Tacit knowledge is context-specific, subjective knowledge that is hard to formalize and articulate (Nonaka and Takeuchi, 1995). Tacit knowledge constitutes the bulk of what someone knows, as Polanyi (1967) argues, "we can know more than we can tell" (p. 4). Polanyi illustrates tacit knowledge with the knowledge one needs to possess to ride a bike: you can only learn cycling by doing it. Explicit knowledge, on the other hand, is knowledge that can be formalized and articulated. Furthermore, Sveiby (1996) argues, "when tacit knowledge is made explicit through language, it can be focused for reflection" (p. 380). Explicit knowledge is a suitable knowledge type to evaluate knowledge within a group or organizational setting.

A *knowledge claim* is a particular form of explicit knowledge. Toulmin (Toulmin, 1958) defines a claim as an assertion put forward publicly for general acceptance: "a man who makes an assertion puts forward a claim – a claim on our attention and to our belief" (p.11). An essential requirement of a claim is that it can be evaluated. According to Toulmin (1958), we can "demand to have our attention drawn to the grounds (backing, data, facts, evidence, considerations, features) on which the merits of the assertion are to depend" (p.11). Although we adopt Toulmin's definition of claim, we realize that the term can have other meanings in common parlance. A claim can stand for e.g., a legal claim, an insurance claim, a patent claim, or a land claim. We use Toulmin's definition of claims in the context of innovation and knowledge management, and hence refer to those claims as knowledge claims.

1.3 Epistemology

Knowledge claim evaluation has been a core issue in epistemology for centuries. Epistemology comes from the Greek words *episteme*, meaning "knowledge" or "science", and *logos* meaning "knowledge", "information", "theory" or "account" (Johnson and Duberley, 2000; Morton, 2003). Combining the two translations results in "knowledge about knowledge" or "theory of knowledge". Epistemology deals with questions such as what can we know, with what means and defined by which criteria (Edwards, 1967). It aims to explain the nature and scope of knowledge and rational belief (Conee and Feldman, 2006). Epistemology usually starts from the notion of beliefs. Subsequently, it explains how people normally acquire and criticize believes, or how people could or should acquire and criticize beliefs (Morton, 2003). Eventually beliefs can be transformed in knowledge. Knowledge claim evaluation in epistemology is the activity dealing with this transformation.

Although traditional epistemology focuses on the individualistic side of knowledge, forms of social epistemology have emerged (Conee and Feldman, 2006). Insights from both traditional and social epistemology are used as an analytical foundation for what Von Krogh et al. (1994) call a corporate or organizational epistemology. Von Krogh et al. (1994) define organizational epistemology as "theory on how and why organizations know" (p. 53). In order to discuss existing theories in innovation and knowledge management literature, we will refer to the distinction between theories of truth and theories of evaluation. A theory of truth provides a regulative ideal for what should constitute the truth (McElroy, 2008). The main theories of truth are Correspondence theories, Coherence theories, Pragmatic theories and Consensus theories (Mingers, 2008).

The Correspondence and Coherence theories stem from the classical debate between empiricists (e.g., Aristotle, Hume, Mill, Moore, and Russell) and rationalists (e.g., Descartes, Leibniz and Spinoza). The Correspondence theory applies to the relationship (i.e., correspondence) between a knowledge claim and the states of affairs the knowledge claim concerns in reality. The Coherence theory argues that the extent to which a knowledge claim is consistent with other (existing) knowledge claims determines the truth-value of a claim (Kvanvig, 2007). The Pragmatic theory argues that the extent to which a knowledge claim is useful or practical determines the truth-value of a knowledge claim (Davenport and Prusak, 1998). The Consensus theory of truth holds that a process of enquiry that results in consensus of a group determines the truth-value of a knowledge claim (Mingers, 2008).

A theory of evaluation provides the activities and criteria for evaluating knowledge claims in the light of a specific theory of truth (McElroy, 2008). We regard Foundationalism (or Justificationism) and Criticalism (or Fallibilism) as the two most important theories of evaluation (Firestone and McElroy, 2003a; McElroy, 2003). In Classical Foundationalism, knowledge claims are justified in the light of self-evident basic knowledge claims. Self-evident basic knowledge claims are a bedrock set of propositions that do not require to be justified and are infallible (Conee and Feldman, 2006; Fumerton, 2005).

A theory of evaluation that provides an alternative to Foundationalism is Criticalism (e.g., Notturno, 2000; Popper, 1972). Criticalism argues that all knowledge is fallible and should be treated as such. Therefore, knowledge should be subjected to criticism and testing in order to eliminate the errors. Criticalists reject the ultimate or authoritative source of true knowledge, and the Foundanalist's claim that truth is above human authority. We elaborate and discuss the concepts of the theories of truth and evaluation in Chapter 2.

1.4 Knowledge management

Epistemology is the philosophical study of knowledge. Our interests lie in innovations in or by organizations. Therefore, we concentrate on a discipline that is related to epistemology, yet concerns the study of knowledge from a practical and organizational perspective: knowledge management. McElroy (2008) defines knowledge management (KM) as the

> *"management discipline that seeks to enhance the quality of knowledge processing in human social systems [such as organizations]"* (p. 43).

The growing relevance of knowledge management in science and practice can be observed in the accumulated research and publications on this topic during the last 15 years (Collinson and Wilson, 2006; Jorna, 2007; Nonaka et al., 2006). There are numerous theoretical perspectives on knowledge management (Dalkir, 2005). The various knowledge management perspectives address knowledge claim evaluation to a greater or lesser extent. In order to investigate how knowledge management theory explains knowledge claim evaluation, we first explain the various knowledge management perspectives with the help of the knowledge management cycle. The knowledge management cycle describes the knowledge processes that knowledge management seeks to enhance in organizations.

1.4.1 The knowledge management cycle

Based on a review of knowledge management literature, Dalkir (2005) proposes an "integrated knowledge management cycle", encompassing the stages of knowledge creation and acquisition, knowledge sharing and dissemination, and knowledge capture and application (see figure 1.1). In the transition from stage to stage Dalkir (2005) recognizes three additional knowledge processes: knowledge assessment, knowledge contextualization and knowledge update.

The first stage in the cycle is knowledge creation and acquisition. Knowledge creation refers to the creation of new knowledge where interpretation, learning, search, discovery, experimentation, and processes are in play (Dalkir, 2005). Knowledge acquisition refers to the retrieval of information and knowledge from the external environment. This stage is usually triggered by a problem or a new opportunity from the knowledge acquisition and application stage (see "update" in figure 1.1). The knowledge capture and application stage usually takes place in direct interaction with the business process (production, marketing, sales, etc.) and forms the channel through which problems and opportunities are fed (back) into the knowledge cycle (McElroy, 2003).

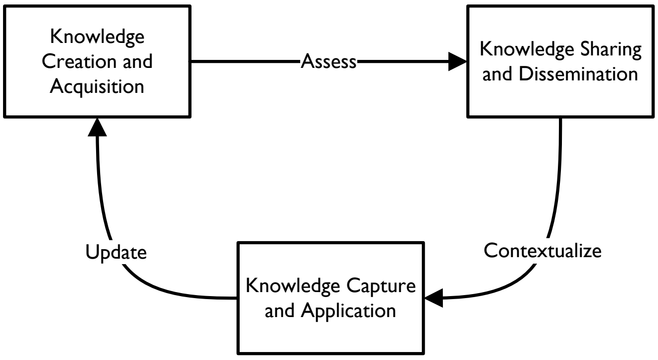


Figure 1.1. The integrated knowledge management cycle, based on Dalkir (2005)

After the knowledge creation and acquisition stage, Dalkir (2005) argues that

> *"an assessment takes place against selection criteria that will follow closely the organizational goal. Is this content valid? Is it new or better? That is, is it of sufficient value to the organization such that it should be added to the store of intellectual capital?"* (p. 43).

Hence, in Dalkir's (2005) integrated knowledge management cycle, the transition between the knowledge creation and acquisition stage and the knowledge sharing and dissemination stage ("asses") is where knowledge claim evaluation takes place.

In the knowledge sharing and dissemination stage, knowledge is integrated, distributed, shared, presented, and disseminated in the organization. These functions ensure that knowledge reaches those individuals who need it to perform their tasks. In addition, these functions ensure that knowledge is not lost. Knowledge should be "contextualized" after this stage (Dalkir, 2005), meaning that it should fit a specific organizational activity, task, or department.

The final stage of the integrated knowledge management cycle is knowledge capture and knowledge application, as staff understands knowledge and decides to make use of it in the business process. Knowledge capture refers to the identification and codification of existing internal knowledge within the organization. When the knowledge is out of date, incomplete, or insufficient in order to cope with new problems, the cycle can reiterate (i.e., the “update” transition in figure 1.1).

The various stages and transitions described in the integrated knowledge management cycle (figure 1.1) need a theoretical framework to operate within (Dalkir, 2005). As we indicated, numerous knowledge management perspectives exist. They provide different theories and models regarding each stage of the knowledge management cycle and are mostly rooted in various Epistemological streams. For instance, Nonaka and Takeuchi’s (1995) well-known SECI model is a model that explains how organizations create knowledge (see knowledge creation and acquisition stage in figure 1.1).

Multiple attempts have been made to categorize and classify the knowledge management perspectives (Dalkir, 2005; Earl, 2001; Kakabadse et al., 2003; McElroy, 2003; McElroy, 2008; Swan and Newell, 2000). We adopt McElroy’s (2003, 2008) distinction between *first-generation knowledge management* and *second-generation knowledge management*, because it takes into account whether a knowledge management theory addresses knowledge claim evaluation (or the “assess” stage in figure 1.1).

1.4.2 First and second-generation knowledge management

Before the mid-1990s, the primary concern of knowledge management was the economic utility of knowledge or “epistemology of possession” (Cook and Brown, 1999; Nonaka and Takeuchi, 1995). The motto of early knowledge management was to get knowledge to the right persons, in the right amount, in the proper format and at the right time (McElroy, 2003). McElroy (2003) connects this motto to first-generation knowledge management. First-generation knowledge management only includes the knowledge sharing, dissemination, capture, and application stages of the knowledge management cycle in figure 1.1 (McElroy, 2003).

First-generation knowledge management has practical rather than theoretical or epistemological origins (Von Krogh and Roos, 1995). Boisot and MacMillan (2004) underline this with the observation that “practitioners of knowledge management have not been much troubled by epistemological or foundational issues” (p. 22). Moreover, the strong development of information and communication technology (ICT) in the 1980s and 1990s has facilitated the emphasis on knowledge utilization in first-generation knowledge management. As of today, first-generation knowledge management still follows the paradigm of studying knowledge management in science and doing knowledge management in practice (Boisot and MacMillan, 2004; Firestone and McElroy, 2005; Jorna, 2006; McElroy, 2003).

With regard to knowledge claim evaluation, an essential observation is that valuable knowledge is assumed to exist in first-generation knowledge management; the processes of knowledge creation and acquisition are not included. Hence, knowledge claim evaluation has received no or only little attention in first-generation knowledge management. Knowledge was just there. Moreover, without any epistemological framework, knowledge was treated as information, i.e., interpreted data (Jorna, 2006).

Second-generation knowledge management represents theories that take an integrated approach to knowledge management: it addresses *all* stages of the integrated knowledge management cycle in figure 1.1 (Dalkir, 2005; McElroy, 2003). McElroy (2008) defines three criteria of Second-generation knowledge management. First, second-generation knowledge management makes a distinction between knowledge and information. Secondly, second-generation knowledge management includes a theory of knowledge processing in organizations. Thirdly, second-generation knowledge management provides a theory of knowledge claim evaluation.

McElroy (2008) refers to two second-generation knowledge management theories: the work of Nonaka and Takeuchi (1995) and his own work, i.e., McElroy (2003), and Firestone and McElroy (Firestone and McElroy, 2003b). To expand his selection, we reviewed the most important knowledge management theories in the literature based on McElroy's (2008) criteria. We based our pool of theories on articles and books that provided overviews of knowledge management perspectives and theories: Earl (2001), Kakabadse et al. (2003), McElroy (2003, 2008), Swan and Newell (2000), Hildreth and Kimble (2002) and Dalkir (2005). Subsequently, we selected the following theories for review: Boisot (1995; 1998), Leonard-Barton (1995), Davenport and Prusak (1998), and Choo (2006).

We found that the six contributions fulfill McElroy's (2008) first two criteria: (1) they make a distinction between information and knowledge, and (2) include an integrated theory of knowledge processing in organizations. With regard to the third criteria (3), most contributions acknowledge that organizations evaluate new knowledge before knowledge is disseminated and used. Yet, none of them provides a theory on how organizations evaluate knowledge claims or an explanation of the role of knowledge claim evaluation in innovations.

Based on the above, we conclude that the understanding of knowledge claim evaluation (in the light of innovation) is limited within knowledge management. Firstly, a considerable amount of studies, literature, and practical experiences in knowledge management only relate to first-generation knowledge management. First-generation knowledge management does not address knowledge claim evaluation. Secondly, most well-known knowledge management contributions (published after 1995) do acknowledge a process in organizations where knowledge is evaluated, but do not provide a theory on how organizations (should) do this.

Chapter 2 provides a review of second-generation knowledge management theories: Nonaka and Takeuchi (1995) and Firestone and McElroy (2003b), and McElroy (2003). In addition, we build out the literature review with other accounts found in innovation and knowledge management literature. These are accounts that do not belong to second-generation knowledge management, because they do not fulfill McElroy's (2008) second criterion: they do not take an integrated approach to knowledge management. Nevertheless, these theories fulfill the other two criteria, and hence, address knowledge claim evaluation in innovating organizations.

The results of the literature review in Chapter 2 are three approaches of knowledge claim evaluation: we discern the Managerial, the Open and the Entrepreneurial approaches. Starting from different theories of truth and evaluation (see section 1.3), each approach prescribes how an innovating organization should evaluate knowledge claims. However, the approaches are still highly abstract, and to some extent unrealistic and unpractical. They lack the level of detail needed to explain the role of knowledge claim evaluation in innovations. We therefore introduce a second pillar in our research in Chapter 3, namely informal argumentation theory, to overcome the lacking level of detail in the existing theories of knowledge claim evaluation. Before we introduce the role of informal argumentation theory in our research, we summarize the findings so far.

1.4.3 Innovation, knowledge and knowledge management: a summary

Following West and Farr (1990), we defined innovation as "the intended or premeditated introduction or application – within a particular role, group or organization – of ideas, processes, products or procedures which are new to the relevant adoption-unity, with the aim of being clearly beneficial to the individual, the group, the organization or society as a whole" (p. 9). Schumpeter (1983) recognized that innovation faced "immense difficulties" (p. xxi) that relate to the role of knowledge in innovations. In innovations, knowledge is shrouded in uncertainty, making individuals and organizations reluctant to dive into the unknown (Schumpeter, 1934, 1983). The success of innovations, however, depends on knowledge. The knowledge-based view on innovation represents a stream of theories that aims to understand this nexus.

Knowledge has been defined and conceptualized in many ways in literature. These definitions concentrate on the content of knowledge, the applications of knowledge, the carriers of knowledge, the types of knowledge and the validity of knowledge. With regard to the issue of who (or what) can possess knowledge, we adopt the stance of Polanyi (1967) that knowledge is personal in essence. Because we discuss issues of knowledge and knowledge claim evaluation in organizational settings, we define organizational knowledge as (shared) knowledge that is stored and processed in the heads of individual members and that is used to execute mental and physical tasks in an organization. Artifacts can support "organizational" members and influence the (shared) knowledge they carry and process. With regard to knowledge claim types, we defined the knowledge claim as an explicit form of knowledge, namely, as an assertion put forward publicly for general acceptance (Toulmin, 1958).

Two scientific fields concentrate on issues of knowledge: epistemology and knowledge management. The former field highlights the philosophical issues of dealing with the concept of knowledge; the latter field highlights the practical issues of processing and applying knowledge in organizations. The two fields interrelate in the sense that knowledge management borrows principles from epistemology, such as various theories of truth and evaluation, to build knowledge management theories.

McElroy (2008) defines knowledge management is defined as the "management discipline that seeks to enhance the quality of knowledge processing in human social systems [such as organizations]" (p. 43). The function of knowledge management is to understand, support and facilitate the processing of knowledge in organizations, that is, knowledge creation, knowledge evaluation, knowledge integration, and knowledge application. McElroy (2003) argues that a large number of knowledge management theories have only addressed a few of these knowledge processes. In this respect he regards first-generation knowledge management theories and second-generation knowledge management theories. Second-generation knowledge management theories are theories that explicitly make a distinction between information and knowledge, that address all knowledge processes and that provide a theory on knowledge evaluation. Most existing knowledge management theories are, however, first-generation knowledge management theories. In order to answer our first research question, we will review the approaches of knowledge claim evaluation belonging to second-generation knowledge management in Chapter 2. Simultaneously, we introduce informal argumentation theory in Chapter 3 to overcome the lacking level of detail in the existing theories of knowledge claim evaluation.

1.5 Informal argumentation theory

In the light of informal argumentation theory, we regard knowledge claim evaluation as an argumentative discourse (Schreyögg and Geiger, 2007) or argumentative discussion (Van Eemeren et al., 2002). Van Eemeren et al. (2002) define an argumentative discussion as a means "to deal with a difference of opinion in a rational way" and "in which argumentation is used to try to determine to what extent a given standpoint is defensible" (p. 24). The relation between argumentation and knowledge claim evaluation is described by Habermas (1984):

> *"arguments are the means by which intersubjective recognition of a proponent's hypothetically raised validity claim can be brought about and opinion thereby transformed into knowledge"* (p. 25)

Furthermore, we follow Schreyögg and Geiger (2007), who propose argumentative examination as a reorientation of dealing with the concept of knowledge within Management Studies. Earlier applications of argumentative examination in (Knowledge) Management can be found in Fletcher and Huff (1990a; 1990b), and Von Krogh and Roos (1995). Informal argumentation theory has not been applied in the context of innovations yet. In order to investigate the role of informal argumentation theory in describing knowledge claim evaluation we formulate our second research question, which we will answer in Chapter 3.

Research question 2:

What is the role of informal argumentation theory in describing knowledge claim evaluation in innovation?

The research question is decomposed in two sub research questions. Sub question 2a concentrates on the definitions and characteristics of informal argumentation theory. Based on the answer on sub question 2a, we propose aspects of informal argumentation theory with which we will enrich knowledge claim evaluation theory. We firstly expect that informal argumentation theory will provide a better understanding of the role of knowledge claim evaluation in innovations. Simultaneously, we expect that informal argumentation theory makes it possible to describe and explain knowledge claim evaluation in innovations in a way that is more concrete, realistic and practical. Hence, overall, we expect that by including informal argumentation theory we can properly answer our main research question. We explore the expectations in our empirical research, which we describe in next the next section.

> **Sub-RQ 2a**: What is informal argumentation and what are its characteristics?
>
> **Sub-RQ 2b**: What aspects of informal argumentation theory can be used in describing knowledge claim evaluation in innovation, and how?

1.6 The empirical research

We conduct an exploratory empirical research to investigate the role of knowledge claim evaluation in innovations. We take the two theoretical pillars – the three approaches from knowledge management literature and the insights from informal argumentation theory – as starting points. In addition, we concentrate on innovation projects in organizations and in innovation programs. The third research question guides the exploratory empirical research. Chapter 4 describes how the studies and relate and introduces the methodology of our empirical research, i.e., what methodological actions we undertook in order to answer our research question.

> **Research question 3:**
>
> Which practices of evaluating knowledge claims can be found in existing innovation projects?

Chapter 5 presents a study of sixteen innovation projects in the Kennis op de Akker (KodA; *our translation*: Knowledge at the Field) innovation program (The Netherlands). KodA was a semi-public initiative consisting out of various firms and stakeholders in the domain of arable farming. The firms and stakeholders participating in KodA varied from SME's to large cooperation firms. In this study, we explored the frontiers of existing knowledge claim evaluation theory in practice: we used the concepts from the three existing approaches identified in knowledge management literature (Chapter 2).

In the other two empirical studies, we incorporated the insights from informal argumentation theory to gain more in-depth knowledge about knowledge claim evaluation (Chapter 3).

Chapter 6 presents the study at Siemens Building Technology (BT) headquarters in Switzerland. Siemens BT is a large multinational in building technology. We focused on the "Pricing Project". The Pricing Project implemented a new company-wide method of setting sales prices of Siemens BT's products. We applied informal argumentation theory to a reconstruction of the Pricing Project based on the interviews with project members and the key informant.

Chapter 7 presents the study we conducted in the context of the "Customer Portal Project" at GEON in Groningen (The Netherlands). GEON is a small-sized organization (SME) in the domain of geo-information management. The aim of the Customer Portal Project was to design and to implement a customer portal by which GEON's services could be offered through the Internet. Like the Siemens BT study (Chapter 6), we investigated knowledge claim evaluation using the insights from informal argumentation theory. In the GEON study, however, we analyzed real-time argumentative discussions through observing project meetings.

Research question 3 is decomposed in two sub research questions. We will provide an answer on Sub-RQ 3a in all three empirical studies, whereas we will provide an answer on Sub-RQ 3b in the Siemens BT and GEON studies.

> **Sub-RQ 3a**: To what extent does knowledge claim evaluation in innovation projects concord with the explanations found in knowledge management theory?
>
> **Sub-RQ 3b**: To what extent does knowledge claim evaluation in innovation projects concord with the aspects from informal argumentation theory?

1.7 Reader's guide

This thesis is organized in eight chapters (see figure 1.2). Chapters 1, 2 and 3 form the theoretical backbone of the thesis. Chapter 2 presents the results of our literature review: the three distinctive approaches of knowledge claim evaluation. Chapters 1 and 2 are based on an edited and extended version of a journal article published in the *Journal of Knowledge Management* (Peters et al., 2010). Chapter 3 augments the three existing theory on knowledge claim evaluation with aspects from informal argumentation theory. Chapter 4 presents the methodology of the empirical research. Subsequently, we report the methodological details and the findings of the three empirical studies in Chapter 5 (the KodA study), Chapter 6 (the Siemens BT study) and Chapter 7 (the GEON study). These three chapters constitute the empirical side of this thesis. Chapter 5 examines knowledge claim evaluation in sixteen innovation projects using the existing theory as discussed in Chapter 2. Chapters 6 and 7 examine knowledge claim evaluation in more detail in two innovation projects, using the argumentation framework discussed in Chapter 3 (see figure 1.2). Parts of Chapters 3, 4 and 6 are based on an edited and extended version of a journal article published in *Management Learning* (Peters et al., 2011). We draw our conclusions and provide an overall discussion of the findings in the final chapter of this thesis, Chapter 8.

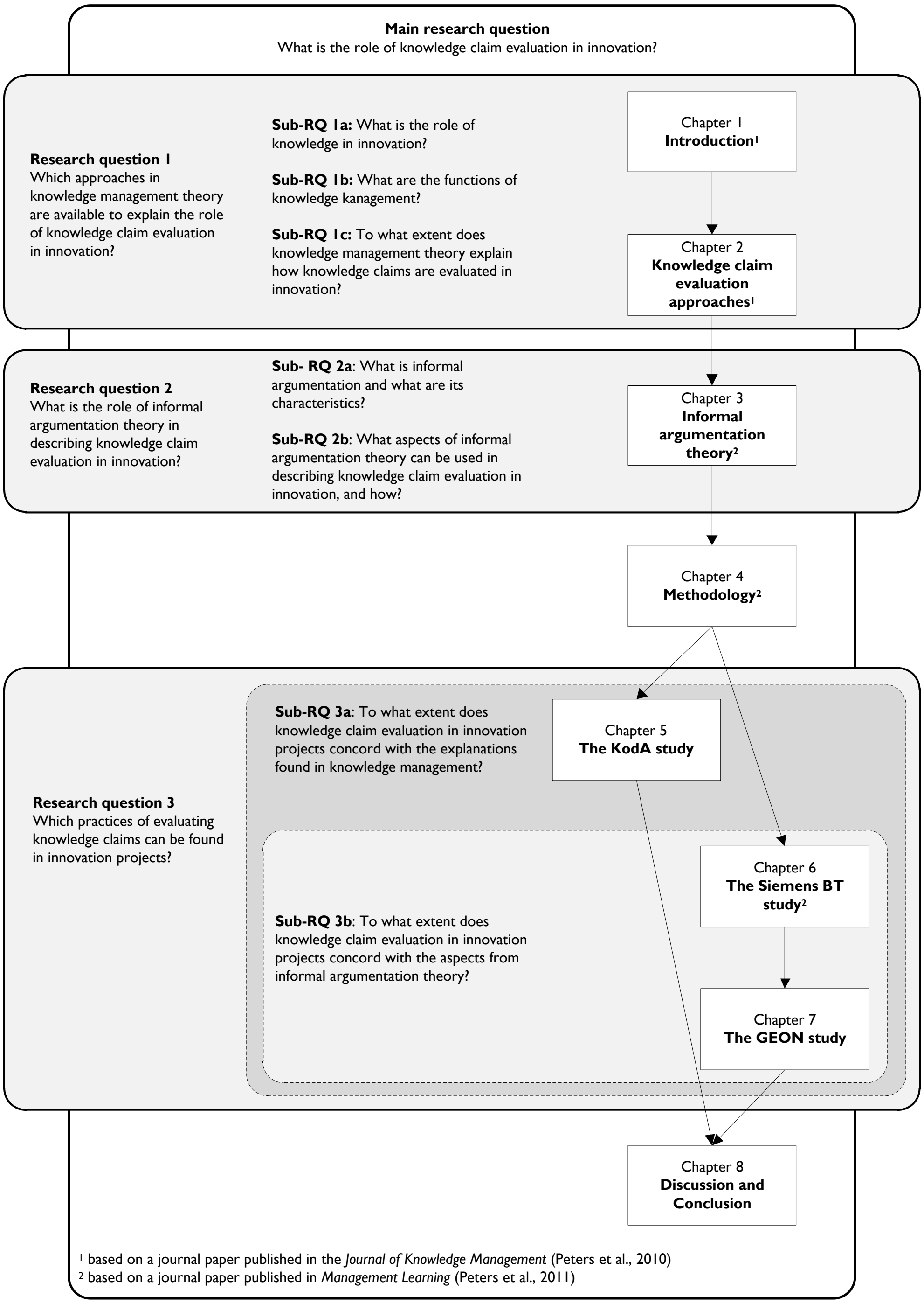


Figure 1.2. Outline of the thesis and research questions

Chapter 2

Knowledge claim evaluation approaches

This chapter is edited and extended version of a journal article published in the Journal of Knowledge Management (Peters et al., 2010).

Fans of football will remember the 2010 World Cup football in South Africa as the tournament of the vuvuzela, the Jabulani ball, and the predictions of Paul the octopus – the latter to the dismay of the Dutch: Paul also predicted the correct outcome of the final between Spain and The Netherlands. England supporters will particularly remember the disallowed goal in the match between Germany and England in the round of 16 of the World Cup. With England trailing 2-1 in the first half, a shot by England player Frank Lampard hit the crossbar and bounced down behind the goal line, but the referee did not award a goal. Millions of television viewers saw the ball had crossed the goal line by at least half a meter. Germany retained the 2-1 lead and ultimately won the match by 4-1 in the second half. In the Netherlands, the disallowed goal controversy was referred to as "Het Blattertje", which translates to "pulling a Blatter". Blatter refers to Mr. Sepp Blatter, who is the president of the international football association (FIFA). We explain why.

A device that determines when the ball has crossed the goal line is not used in football, even though the required technology has already proven its worth; it is used in other sports such as tennis, cricket, hockey and snooker. A few months before the 2010 World Cup kicked-off, the FIFA brought goal-line technology under discussion. Alterations to the laws and rules of football are discussed and decided upon in a closed meeting with eight FIFA representatives known as the IFAB (the International Football Association Board). Four board members represent the Welsh, Irish, Scottish and English football associations. The other four members represent the other 204 member associations in the world. The IFAB discussed and decided upon goal-line technology in March 2010: "Concerning goal-line technology, the Board concluded that goal-line technology would not be pursued" (FIFA.com, 2010b). Subsequently, in May 2010, FIFA announced to continue the Additional Assistant Referee Experiment, i.e. increasing the number of assistant referees on the pitch (FIFA.com, 2010a).

After the match between England and Germany in June 2010, Blatter needed to defend the standpoint not to implement goal-line technology. He shared IFAB's arguments with the press: goal-line technology would affect the "universality" and the "human" element of the game; it would remove the enjoyment of debating mistakes. The "universality" of the game refers to FIFA's policy that the rules of football should be the same everywhere it is played; from the different leagues in each country, to pub teams having a Sunday morning match in an amateur league. Therefore, the FIFA decided to continue the Additional Assistant Referee Experiment.

Many football players, coaches, commentators and spectators disagree with FIFA's standpoint. Moreover, they argue that FIFA's way of evaluating issues such as goal-line technology inhibits innovation in football. The critique condenses to the closed character of IFAB meetings, the aristocratic attitude of FIFA president Blatter, and the lack of stakeholder involvement. Many regarded the Germany vs. England goal controversy as a direct result of the "aristocratic" approach of the FIFA and its leader, hence, "Het Blattertje" [2,3].

In this chapter we will answer the first research question that we formulated in Chapter 1: *Which approaches in knowledge management theory are available to explain the role of knowledge claim evaluation in innovation?* "Het Blattertje" introduces a central topic of debate in the answer to this question, namely, the role of authority in knowledge claim evaluation. Authority is the legitimate power which one person or a group holds over another. The primary authority in organizations is (top)

---

[2] Although "Het Blattertje" originally referred to the incident of the 2010 World Cup, "Het Blattertje" is nowadays used in football commentaries for other refereeing mistakes that technology could have prevented.

[3] FIFA president Sepp Blatter announced in early 2011 that the FIFA is willing to give the green light to goal line technology at the FIFA world cup of 2014 in Brasil (CNN.com, 2011; Volkskrant, 2011).

management. We notice that the issue of authority divides knowledge management scholars in two groups. The first group asserts:

a) that a prominent role of top management increases the risk of creating or retaining false and infallible knowledge claims in organizations because knowledge claims go untested by others;
b) that false or infallible knowledge claims inhibit innovation;
c) therefore, a prominent role of top management in knowledge claim evaluation increases the risk of inhibiting innovation;

The claims (a), (b) and (c) belong to a theory of knowledge claim evaluation, which we will refer to as the *Open approach* of knowledge claim evaluation in this chapter. The accusations against the FIFA as found in the example of “Het Blattertje” are illustrative for what the Open approach claims in relation to innovation: when authorities in an organization, such as the IFAB, monopolize knowledge claim evaluation, they may hamper innovation. In addition to claims (a), (b) and (c), the Open approach prescribes how an organization should evaluate knowledge claims without relying on authorities. The Open approach prescribes an open and rigorous evaluation process based on the (scientific) principle of falsification. Falsification is knowledge claim evaluation through error elimination and testing with only rational arguments and objective evidence (McElroy, 2008).

The second group of knowledge management scholars, however, stresses the role of top management in knowledge claim evaluation. We refer to their theory as the *Managerial approach* of knowledge claim evaluation. The Managerial approach fundamentally differs from the Open approach in that it regards

a) top management are the most competent group in organizations to assess whether innovative ideas cohere with the core values and intentions of an organization;
b) top management is responsible for establishing new values and intentions and changing old ones in order to stay successful as a business;
c) therefore, top management is a valid and important source in knowledge claim evaluation to innovate successfully;

The example of “Het Blattertje” illustrates the Managerial approach. According to FIFA president Blatter, the FIFA regards the “human” element as a core value in football: it makes football the most popular sport in the world. Following the

Managerial approach, innovative ideas in football should be evaluated in the light of protecting or improving the "human" element of the game. The IFAB executed this task, and denied goal-line technology because of this core value. Moreover, the IFAB decided to add more assistant referees on the pitch, i.e., an increase of the "human" element in football.

We will elaborate the discussion about the role of authority in knowledge claim evaluation in this chapter. Yet, we also recognize a third group of scholars in knowledge management. They concentrate on a different topic of debate, namely the role of subjective evidence in knowledge claim evaluation. Scholars stressing the role of subjective evidence in knowledge claim evaluation argue

a) that current institutional practice is heavily skewed in favor of evaluating knowledge claims based on objectively verifiable facts and constraints;
b) that objectively verifiable facts and constraints are scarce or missing under conditions of novelty and uncertainty that come with innovation;
c) that organizations tend to reject innovative ideas when they evaluate knowledge claims based on objectively verifiable facts and constraints;
d) therefore, an approach of knowledge claim evaluation based on objectively verifiable facts and constraints will inhibit innovation;

The claims (a), (b), (c) and (d) belong to a theory of knowledge claim evaluation, which we will refer to as the *Entrepreneurial approach* of knowledge claim evaluation. The Entrepreneurial approach prescribes that organizations should rely on subjective sources of knowledge when it is confronted with high levels of uncertainty and novelty that come with (radical) innovation. This includes the usage of authority, e.g., an individual manager with an innovative idea based on gut feeling. The Entrepreneurial approach differs from the Open and Managerial approaches in that it allows *all* kinds of subjective sources of knowledge in knowledge claim evaluation; the approaches highlight the beliefs of entrepreneurial thinkers in an organization.

This chapter elaborates the three approaches of knowledge claims evaluation and highlights the similarities and differences. The Managerial approach, being the "oldest" of the three approaches in literature, is used by scholars who embrace the two other approaches as a benchmark. We therefore start the presentation of the three approaches with the Managerial approach in section 2.1. Subsequently, we discuss the Open approach and contrast it to the Managerial approach in section 2.2. We do the same for the Entrepreneurial approach in section 2.3. We conclude the chapter by proposing a framework that transcends the three individual approaches. In addition, we discuss to what extent the approaches do contribute to our central research objective, that is, whether we can use them to improve the understanding of the role of knowledge claim evaluation in innovations, and if so, how (see also research question Sub-RQ 1c, in Chapter 1).

2.1 The Managerial approach

2.1.1 Background

The Managerial approach of knowledge claim evaluation originates from Nonaka and Takeuchi's (1995) influential work in innovation and knowledge management: "The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation". The Managerial approach is complemented by follow-up publications of Nonaka, Takeuchi and colleagues, e.g., Nonaka and Tansley (1999), Von Krogh and Grand (2000), Von Krogh et al. (2000), Nonaka et al. (2000; 2006), and Nonaka and Toyama (2005).

Nonaka and Takeuchi (1995) build their contribution on a comparison between Western and Japanese business practices in relation to knowledge creation and innovation. They conducted "in-depth interviews" with approximately 130 managers in "successful" Japanese companies: Canon, Honda, Matsushita, NEC, Nissan, Kao, Sharp, Mazda, Fuji, Xerox, Shin Caterpillar, Mitsubishi, Fujitsu. Also three US companies have been used as case studies: 3M, GE and the US Marines. However, Nonaka and Takeuchi (1995) do not provide any further methodological information, neither about the overall research design nor of the design of each individual case study. The studies have resulted in the identification of knowledge-related factors that have contributed to the innovation successes of Japanese businesses in the late 80s and early 90s. The findings have been translated to a general theory on knowledge creation.

The best-known model from Nonaka and Takeuchi (1995) is the SECI model of knowledge creation. Based on Polanyi's distinction of tacit knowledge and explicit knowledge, the SECI model describes four modes of *knowledge conversion*: Socialization (tacit knowledge to tacit knowledge), Externalization (tacit knowledge to explicit knowledge), Combination (explicit knowledge to explicit knowledge) and Internalization (explicit knowledge to tacit knowledge). The SECI model does not address knowledge claim evaluation. Nonaka and Takeuchi (1995) address knowledge claim evaluation in their "five-phase model of the organizational knowledge creation process" (p. 84). Figure 2.1 depicts the five-phase model. Nonaka and Takeuchi (1995) relate the four types of knowledge conversion of the SECI model and the distinction of tacit knowledge and explicit knowledge to the five phases. The five-phase model can be regarded as an instantiation of the integrated knowledge management cycle we presented in Chapter 1. Nonaka and Takeuchi's (1995) theory is a second-generation knowledge management, because they address all stages of the integrated knowledge management cycle.

What we call knowledge claim evaluation can be found in the "Justifying concepts" phase. The central aspect of this phase is justification, which is the backbone of the Managerial approach: "created concepts have to be justified […] in which the organization determines if the new concepts are truly worth for pursuit" (p. 84). We interpret a concept as a (network of) knowledge claim(s).

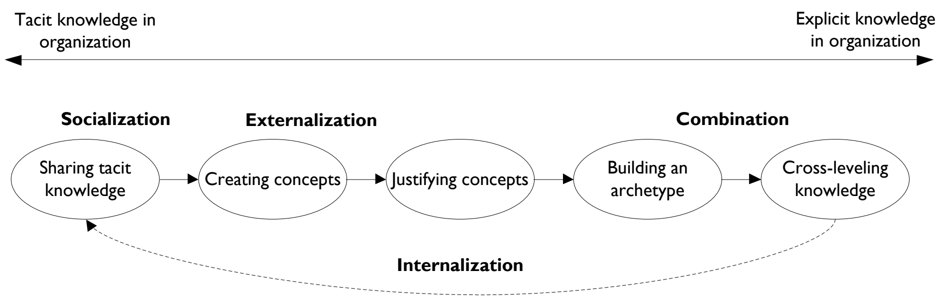


Figure 2.1. Nonaka and Takeuchi's (1995) five-phase model of the organizational knowledge creation process

2.1.2 The Managerial approach of knowledge claim evaluation: justification

Nonaka and Takeuchi (1995) refer to the oldest definition of knowledge coined by Plato (circa 400 BC) in explaining how organizations should evaluate knowledge: knowledge is *justified true belief*. Although this definition has been criticized by Gettier (1963), it is widely-used and accepted in the fields of epistemology and knowledge management. From Plato's definition, three conditions of knowledge can be extracted.

A person X has knowledge of Y if and only if (adapted from Steup, 2006):

- Y is true (the truth condition);
- X believes that Y is true (the belief condition);
- it is justified that X's knowledge of Y is true (the justification condition);

Nonaka and Takeuchi (1995) argue that the traditional Western epistemology emphasizes the truth condition following the Correspondence theory of truth. Consequently, Western businesses emphasize the absolute, static and nonhuman nature of knowledge, typically expressed in propositions and formal logic. Japanese epistemology and Japanese businesses, however, adopt a Pragmatist theory of truth (Nonaka and Von Krogh, 2009). Nonaka et al. argue that knowledge claims (i.e., beliefs) become true if they are justifiable useful to the relevant adoption unit, and enable the organization to act. In contrast to Western epistemology, Nonaka and Von Krogh (2009) argue that knowledge claim evaluation is "fragile and fraught with uncertainty, conflicts of interest, and differences in mindset" (p. 640). Japanese epistemology accounts for the successful innovation practices of Japanese companies. Therefore, Nonaka et al. define knowledge claim evaluation as a dynamic human process of justifying personal knowledge claims toward the truth (Nonaka and Takeuchi, 1995; Nonaka and Von Krogh, 2009). The Managerial approach represents this view on knowledge claim evaluation.

How does the Managerial approach work in practice? In the first place, members of an organization should provide *external justification* for new knowledge claims by referring to reliable causes in reality (Tell, 2004). Von Krogh et al. (2000) argue that organizational members should find as objectively verifiable evidence as possible in favor of new knowledge claims (i.e., new concepts, ideas, models, strategies, etc.): "Members use market studies, benchmarking, customer focus groups, trend studies [...] to build arguments for or against the concept" (p. 7). Secondly, organizational members should provide *internal justification* for new knowledge claims by verifying that the knowledge claims are in conformity with corporate justification criteria (Nonaka and Takeuchi, 1995; Tell, 2004). Justification criteria concern, for example, cost levels, profit margins and the degree to which knowledge claims associated with an innovation can contribute to organizational growth. Furthermore, abstract and qualitative criteria can be included relating to e.g., adventure, romanticism, and aesthetics.

Justification criteria originate from organizational intentions[4]. Organizational intentions are expressed in terms of the corporate strategy, mission and vision. For instance, Dutch electronics corporation Philips intends to make simplicity the goal of their technology (e.g., their public slogan is "Sense and simplicity" Philips.com, 2011). Following the Managerial approach, Philips should derive justification criteria from this organizational intention. A fictive "simplicity" justification criterion could be the criterion that a certain class of devices should have three or less control buttons. Philips should justify competing new product concepts against "simplicity" criteria such as these using objective verifiable arguments and evidence.

A property of the Managerial approach that contrasts with one of the properties of the Open approach (see next section) is how organizational intentions should be established in innovative firms. Nonaka and Toyama (2005) follow Schumpeter (1934) in that "innovations are brought in by leaders displaying entrepreneurship" (p. 431). Consequently, Nonaka and Takeuchi (1995) argue:

> *"In a knowledge-creating company, it is primarily the role of top management to formulate the key justification criteria in the form of organizational intentions, which is expressed in terms of strategy or vision"* (p. 87).

Based on the organizational intentions, middle management establishes mid-range justification criteria that can be tested empirically within the company. Thus, top and middle management set the standards for justifying the value of the knowledge that is created.

Corporate management is the self-evident source of justification in the Managerial approach (e.g., comparable to how sense experience is a self-evident source of justification in Empiricism). Management establishes organizational intentions and justification criteria. Subsequently, all other knowledge claims depend on the justification of management through the organizational intentions and justification criteria. It is up to management to assess whether the organizational intentions and justification criteria are still "justified" in the light of the Pragmatic theory of truth. Nonaka and Takeuchi (1995) underline this by stating "The final justification of created concepts and their realized forms, i.e., products and/or services, occurs in the marketplace" (p. 94).

---

[4] In later work by Nonaka, Takeuchi, and colleagues, the concept of 'knowledge vision' is used instead of organizational intentions, see e.g. Nonaka and Toyama (2005), Nonaka et al. (2000, 2006)

The Managerial approach adopts a variant of the Foundationalist theory of evaluation, known as Modest Foundationalism (Conee and Feldman, 2006). In the standard version of Foundationalism, knowledge claims are justified in the light of self-evident basic knowledge claims that do not require to be justified and are infallible (see Chapter 1). In Modest Foundationalism, the self-evident basic knowledge claims are fallible (Conee and Feldman, 2006).

This concludes the presentation of the Managerial approach. In the Managerial approach, top management ensures the quality of knowledge in innovations by formulating organizational intentions and justification criteria. Next, we discuss the Open approach, which together with the Entrepreneurial approach (section 2.3), offers an alternative way to evaluate knowledge claims.

2.2 The Open approach

2.2.1 Background

The contributions by McElroy (2000; 2003; 2008), McElroy et al. (2007) and Firestone and McElroy (2003b; 2005) are the linchpin of the Open approach. The Open approach disagrees with the Managerial approach, especially with the role of management and other forms of authority. The same critique can be found in other work as well, e.g., Tripsas and Gavetti (2000), Giroux and Taylor (2002) and Gourlay (2006).

McElroy and Firestone argue that most mainstream organizations and their managers admit that certainty in knowledge does not exist. These organizations embrace a Criticalist theory of evaluation in epistemology. The same organizations reconsider the Criticalist position when their management determines the organizational intentions and justification criteria to evaluate knowledge claims. Like the Managerial approach, these organizations let their subordinates justify new knowledge claims based on management's justification criteria. The quality of management's organizational intentions and justification criteria largely determines the quality of newly justified knowledge claims, and, consequently, the innovation that depends on the new knowledge claims.

McElroy and Firestone question whether management can be considered as a reliable source of knowledge in innovations. They argue that the Managerial approach, and organizations that adopt that approach, conform to Floating Foundationalism as theory of evaluation. Firestone and McElroy (2003a) refer to the work of Notturno (2000) and define Floating Foundationalism as follows:

> *"Floating Foundationalism seeks to ground knowledge claims upon a subjective commitment to a belief, theory, paradigm, or type of group solidarity which, themselves, are not justified, but which are regarded by their subscribers as though they are."* (p. 5)

According to McElroy and Firestone, organizations that adopt the Managerial approach, and therefore adopt Floating Foundationalism, wrongly regard organizational intentions and justification criteria as justifiable true. In addition, McElroy and Firestone argue that organizations will less likely detect and omit falsehoods, because the Managerial approach does not offer evidence-based evaluation and control mechanisms. McElroy (2003) refers to the Enron scandal in 2001 to illustrate this.

> *"The initial record […] suggests that knowledge of Enron's dubious accounting practices was held close to the vest by its senior managers, and was therefore not open to scrutiny by such interested stakeholders as its board, employees, and stockholders. In other words, Enron was practicing knowledge produced [and evaluated] by a small band of leaders, whose claim had not been subjected to any criticism of stakeholders."* (p. 30)

In defense, advocates of the Managerial approach emphasize that the final justification occurs on the market place. According to McElroy and Firestone, this does not guarantee that management will change its intentions accordingly. Practical examples that provide support for the latter statement are ample in literature (e.g., Xerox, IBM, Polaroid, see Giroux and Taylor, 2002; Gourlay, 2006; Tripsas and Gavetti, 2000). Moreover, McElroy and Firestone regard the marketplace, i.e., the ultimate "authority" in the Managerial approach, as a "floating foundation" too (e.g., consider that Enron stock prices were rocketing sky high in mid-2000, before the scandal became public). In conclusion, McElroy and Firestone argue that the Managerial approach comes with a higher risk of adopting lower-quality knowledge or falsehoods because of the monopoly of management in knowledge claim evaluation. Lower-quality knowledge inhibits innovation.

Firestone and McElroy address knowledge claim evaluation in the context of their Second-generation knowledge management theory called “The New Knowledge Management” (TNKM). TNKM is primarily based on complexity theory, organizational learning theory and Popperian epistemology. An implementation of the theory in a practical setting has not been provided yet. McElroy (2003) relates knowledge claim evaluation to other TNKM processes in the Knowledge Life Cycle (see figure 2.2). The Knowledge Life Cycle is TNKM’s instantiation of the integrated knowledge management cycle we presented in Chapter 1. Knowledge claim evaluation can be found after the process of “Knowledge Claim Formulation”, which corresponds with the “Creating Concept” stage in Nonaka and Takeuchi’s (1995) five-phase model (see figure 2.1). McElroy (2003) uses the same name when referring to the evaluation of knowledge claims in organizations as we use in this thesis. In addition to Nonaka and Takeuchi (1995) five-phase model, the Knowledge Life Cycle in figure 2.2 depicts four knowledge claim types: “surviving” knowledge claims, “rejected” knowledge claims, “undecided” knowledge claims and “meta” knowledge claims.

2.2.2 The Open approach of knowledge claim evaluation: falsification

McElroy and Firestone adopt the Correspondence theory of truth and the Criticalist theory of evaluation (McElroy, 2008). Following Popper (1970; 1972), Firestone and McElroy argue that there are no self-evident basic knowledge claims. Consequently, there are no authoritative sources of knowledge; all knowledge is fallible. Knowledge claim evaluation is falsification and error elimination through ongoing criticism, subject to the entire organization and all its stakeholders (Firestone and McElroy, 2003b; McElroy, 2003). The Open approach represents this view on knowledge claim evaluation.

The Open approach consists of two steps. First, each knowledge claim in a set of competing knowledge claims (e.g., new ideas) must fulfill the background requirements for *fair comparison* between the competing knowledge claims. Firestone and McElroy (2003b) specify four fair comparison criteria. A set of competing knowledge claims should be 1) complete, 2) commensurable, 3) equally specified, and 4) in continuity with previous versions of knowledge claims.

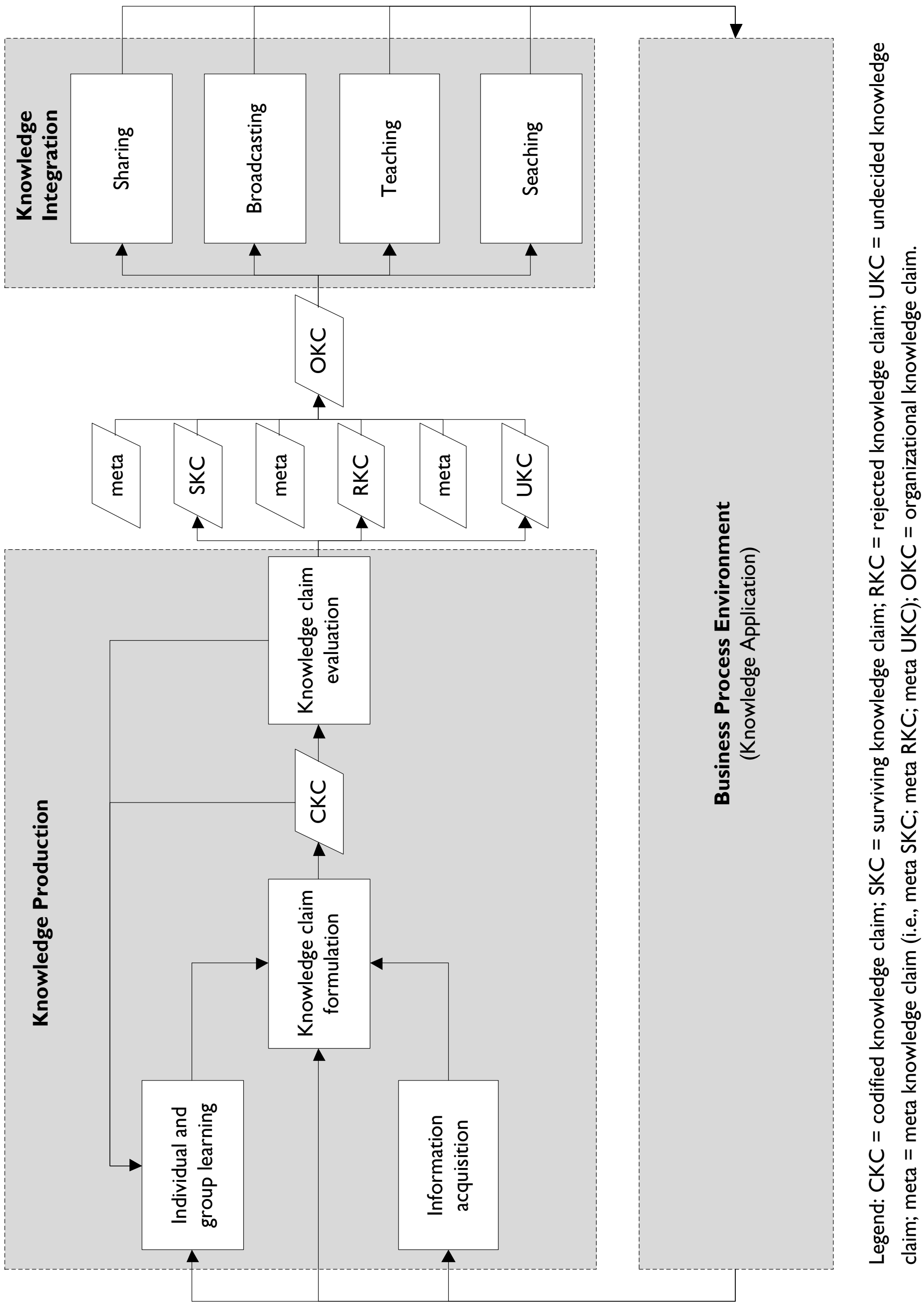


Figure 2.2. The Knowledge Life Cycle adapted from McElroy (2003)

Appendix A provides a description of each fair comparison criterion. If a knowledge claim does not fulfill one of the fair comparison criteria, then the evaluation of the knowledge claims is biased in some way. For instance, if knowledge claim A and B are competing, and knowledge claim A has been specified with empirical evidence, and knowledge claim B has not, people are probably biased towards knowledge claim A. Therefore, the organization should provide empirical specification of knowledge claim B too (i.e., the equally specified criterion).

As the second step, organizational members should evaluate each knowledge claim in the fair comparison set of competing knowledge claims based on a number of *epistemic evaluation criteria.* The criteria can be used to evaluate how each knowledge claim performs on various tests. Firestone and McElroy (2003b) discern logical consistency, empirical fit, projectibility, systematic fruitfulness, systematic coherence, simplicity and heuristic quality. Organizational members can use the Analytical Hierarchical Process methodology to compare competing knowledge claims in the light of these criteria. Appendix A provides a description of each epistemic criterion. A non-epistemic criterion highlighted by Firestone and McElroy (2003b) is the pragmatic priority evaluation criterion. Organizational members use the pragmatic priority evaluation criterion to compare competing knowledge claims based on the projected benefits, resulting from future actions, as specified by each knowledge claim. The epistemic evaluation criteria should be applied first in the evaluation of a set of competing knowledge claims.

Organizational members evaluate knowledge claims as surviving, rejected or undecided (see also figure 2.2). If members cannot be conclusive with respect to competing knowledge claims, the status of knowledge claims remains undecided. Subsequently, members must continue testing, analyzing, experimenting and collecting data. Finally, the Open approach prescribes organizations to keep records of the outcomes of knowledge claim evaluation: meta knowledge claims. Meta knowledge claims describe how each knowledge claim has scored on the relevant evaluation and comparison criteria. Organizational members may refer to existing meta knowledge claims when evaluating actual competing knowledge claims.

In conclusion, the Open approach differs from the Managerial approach in the exchange of a Foundationalist theory of evaluation for a Criticalist theory of evaluation. This results in an approach of knowledge claim evaluation that treats all knowledge claims as fallible, and in which authorities, such as management, cannot justify knowledge claims. Instead, the Open approach prescribes an organization to criticize knowledge claims by applying fair comparison criteria and epistemic evaluation criteria.

2.3 The Entrepreneurial approach

2.3.1 Background

Whereas the Open approach criticizes the subjectivity of the Managerial approach, and consequently, argues for a more critical, rigorous and objective approach of knowledge claim evaluation, the Entrepreneurial approach argues the opposite. We base the Entrepreneurial approach of knowledge claim evaluation on the work of Boisot and MacMillan (2004).

Boisot and MacMillan (2004) argue that current institutional practice is heavily skewed in favor of evaluating knowledge claims based on objectively verifiable facts and constraints. In explaining this, Boisot and MacMillan (2004) refer to Schumpeter's (1934) view on innovation "not as the fruit of rational planning, but rather the unleashing of 'gales of creative destruction' " (p. 517). Therefore, innovation offers benefits and growth, but it also produces losers. Since many agents in firms would avoid the risk of being losers, "they thus tend to favor reinforcing incumbency rather than encourage innovation" (p. 517). Hence, current institutional practice is skewed to the rigorous and objective evaluation of knowledge claims. Hence, institutional practice emphasizes objectively verifiable facts and constraints in knowledge claim evaluation:

> *"Much of modern management thinking has been inspired by the success of large established enterprises that operate on the basis of well-tested routines, well documented facts, and hence articulable probability distributions"* (p. 519).

Objectively verifiable facts and constraints have an important share in the Open and Managerial approaches of knowledge claim evaluation. The Managerial approach prescribes to evaluate knowledge claims in the light of organizational intentions by using objectively verifiable facts and constraints (i.e., external justification; see section 2.1.2). The Open approach specifies the Empirical Fit epistemic evaluation criterion, which measures to what extent knowledge claims are consistent with independently arrived at descriptions of the facts (see section 2.2.2).

According to Boisot and MacMillan (2004) “objective” criteria and procedures work fine as long as the organization is not confronted with high levels of novelty and uncertainty. However, “correspondence with the facts is typically not on offer in the early phases of a genuine innovation. The facts do not yet exist.” (p. 518) Consequently, organizations that rely on “objective” criteria and procedures in highly uncertain and novel circumstances tend to select non-innovative knowledge claims over innovative knowledge claims; the non-innovative knowledge claims can be supported with facts, the innovative knowledge claims not. Hence, Boisot and MacMillan (2004) criticize the “objective” criteria and procedures of the Open and Managerial approaches. These “objective” approaches inhibit innovation, and therefore, an alternative approach is needed.

2.3.2 The Entrepreneurial approach of knowledge claim evaluation: subjective true beliefs

We started this thesis in Chapter 1 with the story how YouTube became a major success. Boisot and MacMillan (2004) refer to another success story, the Sony Walkman.

> *“One day, before going on a trip to the United States, Masaru Ibuka (then Honorary Chairman of Sony) asked Norio Ohga (then Executive Deputy President) for a simple, playback-only stereo version of the ‘Pressman’, the small, monaural tape recorder that Sony had launched in 1977. He wanted to be able to take something light and portable with him on his travels. In 1979, Sony launched the ‘Soundabout’, a personal stereo that was later relabeled the ‘Walkman’. It was developed on the basis of nothing more than a strong personal hunch. Sony expected to sell 5,000 Walkmans a month. Within two months of the product launch it was selling ten times that amount and the ‘Walkman’ has since become a cultural icon”* (p. 506).

Like YouTube, Sony’s world famous Walkman was not supported by knowledge claims that have undergone a rigorous process of justification (i.e., the Managerial approach) or falsification (i.e., the Open approach). Sony acted upon the beliefs (i.e., a “hunch”) of an individual, in this case honorary chairperson Ibuka. Boisot and MacMillan’s (2004) point is that if Mr. Ibuka would had to justify his belief to outsiders in the standard objective way, then the Walkman was probably not invented at that time or by Sony.

Boisot and MacMillan (2004) characterize people such as Mr. Ibuka, irrespective of being a CEO or a non-CEO, as entrepreneurs. Entrepreneurs use their personal epistemology, one that is more connected to the Coherence theory of truth than to the Correspondence or Pragmatist theories of truth. According to Boisot and MacMillan (2004), the entrepreneurial mindset "[…] operates under conditions of novelty and uncertainty, where prior probability distributions, being non-existent offer little guidance, and in which coherence is the epistemological underpinning" (p. 519). The beliefs entrepreneurs hold as true and act upon are based on deep intuitions and extensive personal experience. The Coherentist theory of truth provides the jumping-off point for the Entrepreneurial approach.

Under conditions of novelty and uncertainty, the Entrepreneurial approach prescribes organizations to "focus on the coherence of a proposal [i.e., knowledge claim] and on the consistency of its underlying assumptions rather than on their likelihood" (p. 520). In addition, in a novel and uncertain situation, organizations should move away from the "analytically oriented business plan questions of 'how do you know that this will happen?' […] Instead, move toward a more action-oriented entrepreneurial question of 'what actions will you undertake to make this happen'" (p. 520). With the passage of time (and effort) uncertainty gets eliminated – factual evidence builds up and knowledge levels increase – and a more objective approach of knowledge claim evaluation should be adopted, e.g., the Open approach or Managerial approach. The supposition of the Entrepreneurial approach is that multiple and complementary epistemologies, i.e., theories of truth and evaluation, can co-exist in and across businesses.

2.4 Conclusion

The aim of this chapter was to review how knowledge management literature addresses our first research question: *Which approaches in knowledge management theory are available to explain the role of knowledge claim evaluation in innovation?* We identified three approaches of knowledge claim evaluation: the Managerial approach, the Open approach and the Entrepreneurial approach. Each approach prescribes how an innovating organization should evaluate knowledge claims. Table 2.1 provides an overview of the similarities and differences between the three approaches, considering seven properties.

Table 2.1. Overview of the three KCE approaches

	Entrepreneurial	**Managerial**	**Open**
Main works	Boisot and MacMillan (2004)	Nonaka and Takeuchi (1995) Von Krogh et al. (2000)	Firestone and McElroy (2003b) McElroy (2003, 2008)
Theory of truth	Coherence	Pragmatic	Correspondence
Theory of evaluation	*Not defined*	Foundationalist	Criticialist
Primary evidence types	Authority (entrepreneur)	Objective verifiable evidence Authority (top management)	Objective verifiable evidence
Evaluation criteria	Consistency (coherence) criteria	Justification criteria (derived from organizational intentions)	Epistemic evaluation criteria Pragmatic priority criterion
Fair comparison criteria	*Not defined*	*Not defined*	Continuity Commensurability Specification Completeness
Knowledge claim status	'True' 'False'	Justified Rejected	Surviving Rejected Undecided
Meta knowledge claims	*Not defined*	*Not defined*	All decisions should be documented; this includes the rationale, scores on criteria, etc.

The Open and Managerial approaches have in common that knowledge claims should be evaluated with objective verifiable evidence to guarantee the quality of knowledge in order to innovate successfully. The Open approach, however, does not allow the evaluation of knowledge claims in which subjective sources of knowledge, such as the knowledge claims of management or entrepreneurs are used. The Entrepreneurial and Managerial approaches are based on the notion that in order to innovate successfully an organization should rely on the innovative hunches of entrepreneurs (i.e., subjective true beliefs). According to the Managerial approach, organizations should rely on the entrepreneurial hunches of managers. However, according to the Entrepreneurial approach, anyone in the firm with an entrepreneurial hunches or an "entrepreneurial mindset" can formulate a valid knowledge claim. More importantly, the use of objective verifiable evidence under conditions of novelty and uncertainty is rejected in the Entrepreneurial approach.

However, *to what extent does knowledge management theory explain how knowledge claims are evaluated in innovations?* (i.e., sub-RQ 1c, see Chapter 1). One the one hand, the three approaches include aspects of knowledge claim evaluation to be considered in relation to innovations: the role of objective verifiable evidence, the role of authorities (e.g., managers, entrepreneurs) and the role of subjective evidence. Obviously, the three approaches need to be further elaborated and substantiated by critical examinations in empirical settings. On the other hand, the approaches are three highly abstract and empirically unexplored theories of knowledge claim evaluation. Moreover, we believe knowledge claim evaluation is much more detailed and multifaceted in real-life innovative settings than the three approaches describe, explain and prescribe.

The way existing knowledge management theories explain knowledge claim evaluation can be characterized as a "black box". This black box has as inputs knowledge claims, evidence of a certain type, and evaluation criteria of a certain type, and as output evaluated knowledge claims, e.g., justified, falsified, or believed as true knowledge claims. It is unclear exactly how evidence, criteria, knowledge claims – the internal workings of the black box – interact in an innovative setting and whether there are any other objects, factors or variables should be taken into account. We believe that this understanding is essential in order to substantiate the explanations of knowledge claim evaluation found in the three existing approaches. In addition, the limitations of the three approaches are not only of a theoretical nature. From a practical point of view, the approaches offer little understanding for practitioners, managers and others who are interested in improving knowledge claim evaluation in their organizations. How can they apply the various prescriptions of the three approaches?

We pursue the aim of opening the black box of knowledge claim evaluation both theoretically as well as empirically. Empirically, Chapters 5, 6 and 7 explore knowledge claim evaluation in three different practical contexts. Theoretically, the next chapter introduces informal argumentation theory. Informal argumentation theory is a practically oriented approach for analyzing argumentative discussions (Toulmin, 1958; Walton, 2009). From a practical point of view, informal argumentation theory explains how an argument works and how it can be examined. In addition, informal argumentation theory regards issues of validity as field-dependent. By adopting informal argumentation theory, we regard knowledge claim evaluation in innovation as an argumentative discussion (Schreyögg and Geiger, 2007). For the Open, Managerial and Entrepreneurial approaches, we will propose argumentation structures (consisting out of knowledge claim, data and warrant components) in which the main ingredients of the existing theory, i.e., types of evidence and types of evaluation criteria, are wrapped. Moreover, based on informal argumentation theory we take into account implicit elements of argumentative discussions, various ways of challenging knowledge claims, and a typology of knowledge claims to evaluate the appropriateness of the arguments used in innovations.

Chapter 3

Informal argumentation theory

This chapter is an edited and extended version of a journal article published in Management Learning (Peters et al., 2011).

This chapter concentrates on the workings of argumentative discussions. In argumentative discussions, arguments are used as a means to support or criticize claims in order to achieve a resolution of difference (Van Eemeren et al., 2002). The relation between argumentation and knowledge claim evaluation is described by Habermas (1984):

> *"arguments are the means by which intersubjective recognition of a proponent's hypothetically raised validity claim can be brought about and opinion thereby transformed into knowledge"* (p. 25).

The argumentative discussion is the object of analysis in informal argumentation theory or Informal Logic (Toulmin, 1958; Van Eemeren et al., 2002; Walton, 2009). Toulmin (1958) pioneered a path annex to the standard Logical treatment of argumentation (e.g., Barth and Krabbe, 1982; Wiche, 1993). An important difference between the standard Logical treatment of argumentation and informal argumentation is that the latter is field dependent (and even organizational-specific), as Toulmin (1958) argues:

> *"What has to be recognized first is that validity is an intra-field, not an inter-field notion. Arguments within any field can be judged by standards appropriate within that field, and some will fall short; but it must be expected that the standards will be field-dependent, and that the merits to be demanded of an argument in one field will be found to be absent from entirely meritorious arguments in another"* (p. 255).

After Toulmin (1958), we can find two major streams in Argumentation, the one continuing to elaborate his approach (Kock, 2006; Kock, 2007; Naess, 1966; Van Eemeren et al., 2002; Van Eemeren and Houtlosser, 2003; Walton, 2006; Walton et al., 2008; Walton, 2008), the other trying to combine informal argumentation theory within the Logical tradition (e.g., Barth and Krabbe, 1982; Wiche, 1993). We adopt Toulmin's (1958) stream, plus the related (contemporary) theories, because we believe that this stream has more to offer in the uncertain and novel circumstances that come with innovation than the Logical tradition. We therefore examine and explain knowledge claim evaluation in innovating organizations by using the concepts and structures based on Toulmin's (1958) theory. Earlier applications of argumentative examination based on Toulmin (1958) in a (Knowledge) Management context can be found in Fletcher and Huff (1990a; 1990b), and Von Krogh and Roos (1995). As far as we know, this chapter discusses the first application of informal argumentation in the context of innovation.

The second research question of this thesis, as stated in Chapter 1, is: *what is the role of informal argumentation theory in describing knowledge claim evaluation in innovation*? We decomposed this research question into two sub questions:

Sub-RQ 2a: What is informal argumentation and what are its characteristics?

Sub-RQ 2b: What aspects of informal argumentation theory can be used in describing knowledge claim evaluation in innovation, and how?

We provide answers to these two questions in the upcoming sections. In relation to the second research question, we summarize the answer by providing the most essential insights for describing knowledge claim evaluation in innovations below.

- The main ingredients of knowledge claim evaluation, i.e., knowledge claims, types of evidence and types of evaluation criteria are wrapped up in argumentation structures. The Open, Managerial and Entrepreneurial approaches each follow a specific argumentation structure;
- Especially the Open and Managerial approach emphasize the role of explicit and objective evidence in knowledge claim evaluation. informal argumentation theory acknowledges that knowledge claims can be accepted or rejected without an *explicit* reference to evidence and evaluation criteria;

- Knowledge claims can be challenged in several ways. The existing theory does not include this understanding. In addition, the outcome of knowledge claim evaluation is not necessarily a knowledge claim that is either true or false, yet a knowledge claim of which parts are true and other parts false;
- Informal argumentation theory recognizes six types of knowledge claims: designative, explanatory, definitive, evaluative, predictive and advocative. Each type of knowledge claim may follow different argumentation rules upon evaluation. The three approaches of knowledge claim evaluation, however, do not distinguish between the six types of knowledge claims in innovation. Consequently, they do not distinguish different argumentation rules for different knowledge claims. We will discuss the implications of this refinement.

The structure of this chapter is as follows. Section 3.1 introduces the basic aspects of informal argumentation theory: the Toulmin argumentation structure, the three methods of challenging an argument, and the four basic argumentation structures. Section 3.2 views Information Argumentation theory in the light of the existing theory of knowledge claim evaluation and innovation. We first connect the informal argumentation theory to the three approaches of knowledge claim evaluation, as discussed in Chapter 2. Subsequently, we address the implications for the theory of knowledge claim evaluation by acknowledging various types of knowledge claims in innovation. Section 3.3 ends the chapter with the conclusion.

3.1 An introduction to informal argumentation theory

3.1.1 The Toulmin framework

Toulmin (1958) describes an argument as a set of three *interrelated* knowledge claims. Each knowledge claim serves a different function in an argument. The three functions are claim, data and warrant. Consequently, Toulmin (1958) defines an argument as a movement (step) from accepted data through a warrant to a claim[5] (see figure 3.1). The claim is the knowledge claim put forward in public for general

[5] The original Toulmin (1958) framework contains three additional elements: the backing, the qualifier and the rebuttal. These elements are not necessary for our purposes in this thesis, yet can be useful in future more fine-grained research of knowledge claim evaluation.

acceptance (Toulmin, 1958). Figure 3.2 provides an example of the Toulmin framework based on the YouTube example we used in Chapter 1. The founders of YouTube made the claim in 2005 that "YouTube is set to become an essential destination for watching and sharing [videos]". The data functions as the foundation or evidence of the claim and can take the form of facts, historical or contemporary events, statistical output, opinions from an authority, and knowledge claims that have been established earlier (Brockriede and Ehninger, 1960). In the YouTube example in figure 3.2, the claim is supported by the data: "More and more people [are] carrying around devices that capture video – from digital cameras to cell phones". Note that the data itself is a *knowledge* claim too. Finally, the warrant justifies the inference from the data to the claim (Walton, 2009). The founders of YouTube did not mention any warrant that justified the movement from the data to the claim. The warrant is thus implicit, which is common in argumentation as we will deal with in section 3.2.1. We deduced the implicit warrant that the founders may have used based on additional information from the 2006 ACM conference talk we pointed at in Chapter 1 (Karim, 2006): "Generally, a technological trend creates the demand for a killer application"[6].

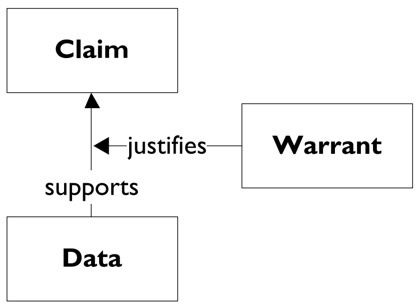


Figure 3.1. The Toulmin (1958) framework

---

[6] YouTube co-founder Karim explained the notion of *killer application* in relation to YouTube in his 2006 ACM conference talk (Karim, 2006): "A killer application is a computer program that is so useful or desirable that it proves the value of some underlying technology, such as a gaming console, operating system or piece of computer hardware." With regard to the YouTube example in figure 3.2, we deduce that the founders implicitly position YouTube as the killer application of digital video camera technology (i.e., the data component in figure 3.2). In addition, other secondary technologies such as broadband in the home, Macromedia Flash 7, and cheap dedicated hosting bandwidth contributed to the success of YouTube as killer application. The illustration in figure 3.2 only serves as a simple example and that it is bound to be incomplete.

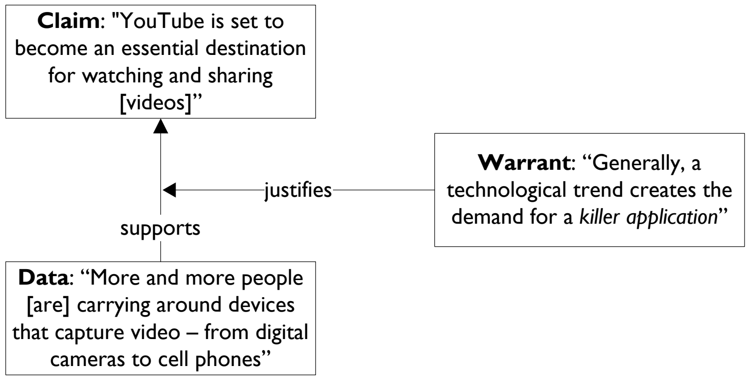


Figure 3.2. Practical illustration of the Toulmin (1958) framework based on the YouTube example from Chapter 1

3.1.2 Defending and challenging a claim

Toulmin (1958) argues that determining whether an argument is good or not, such as in figure 3.2, involves substantive judgments and not only formal (Verheij, 2005). Yet, he provided little insights into how an argument can be evaluated (Kock, 2006; Verheij, 2005). Contemporary informal argumentation theory provides deeper insights (Kock, 2007; Van Eemeren et al., 2002; Walton, 2006; Walton, 2007; Walton et al., 2008; Walton, 2009). The first insight is the *burden of proof* rule. The burden of proof rule in informal argumentation is that the *proponent*, i.e., the person who makes a claim, should come up with data to support the claim: Walton (2008) "he who asserts should prove" (p. 77). This rule, however, does not imply that the proponent needs to provide (all) supporting data when he makes the claim. The proponent can wait until an *opponent* challenges his claim; meanwhile the claim remains in the "accepted" mode. Therefore, data and warrants may remain implicit in an argument (Van Eemeren et al., 2002). An argument with one or more implicit elements is called an *enthymeme* (Walton, 2009). The YouTube example in figure 3.2 is an enthymeme, because it contains an implicit warrant. We discuss the enthymeme in more detail in section 3.2.1.

When an opponent challenges the claim – we explain below how an opponent can challenge a claim – the proponent needs to counter-react in an adequate way, otherwise the claim can fail. The proponent has two options. First, he can provide the data and warrants that support his claim. Secondly, the proponent can challenge the challenging claim(s) of the opponent. With the second option, the burden of proof shifts to the opponent. The situation where the roles of proponent and opponent, including the associated responsibilities and obligations, exchange is referred to as a *burden of proof shift* (Walton, 2006). Walton (2006; 2007) describes three methods of challenging a claim in an argumentative discussion. Each method concentrates on a different element of the Toulmin framework (see figure 3.3). The methods however provide no clear-cut answer on when and why a claim succeeds or fails (Walton, 2006). The outcome highly depends on what Toulmin (1958) refers to as the "substantive judgments" of the participants in an argumentative discussion.

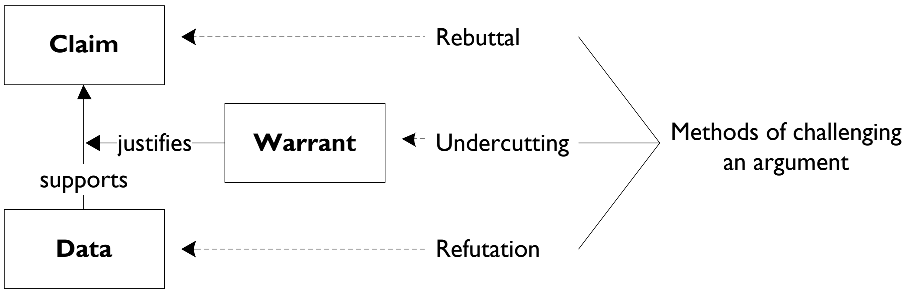


Figure 3.3. Three methods of challenging an argument based on Walton (2006, 2007)

The three methods of challenging a claim are:

1) The supporting data of a claim can be refuted, arguing that the data has not been adequately justified;
2) The argument can be undercut (or undermined) by asking one or more critical questions concerning the warrant, i.e., the inferential link between the data and the claim;
3) The claim can be rebutted by formulating a counter-claim, which is a claim in the opposite (or different) direction of the opposed claim;

The first method of challenging a claim is to *refute* the data of the claim, by arguing that the data has not been adequately justified (Walton, 2007). With respect to the YouTube example in figure 3.2, an opponent may argue (and substantiate) that "more and more people [are] carrying around devices that capture video – from digital cameras to cell phones" is false.

The second method is to challenge a claim by asking one or more questions concerning the warrant. Walton (2007) defines this method as *undercutting*. By undercutting, the claim is not falsified in the Logical "traditional" sense (see e.g., Barth and Krabbe, 1982); instead, it loses "strength" with respect to acceptation. The strength of the claim is undercut when the proponent cannot provide adequate answers to questions raised by opponent. An example of undercutting is that an opponent of the YouTube claim listed in figure 3.2 asks the proponent whether there are any factors that interfere with the killer application effect referred to in the warrant. If the proponent cannot answer this question, for instance, he indicates he does not know any interfering factors, than the claim loses strength.

The third method of attacking a claim is *rebuttal*. By rebuttal, one or more counter-claims are formulated, each with their own argument structure. Similar to undercutting, rebuttal affects the strength of the initial claim (Kock, 2007; Walton, 2007). With respect to the YouTube example in figure 3.2, an opponent could have made the opposing claim that "YouTube is *not* set to become an essential destination for watching and sharing videos, because […]" or the alternative claim that "The RealPlayer is set to become an essential destination for watching and sharing videos, because […]".

3.1.3 Comprehensive argumentation structures

In addition to the basic Toulmin argumentation structure (see figure 3.1), which Van Eemeren et al. (2002) refer to as single argumentation, informal argumentation theory discusses three other basic argumentation structures. These three structures can be used to describe more comprehensive argumentation structures in practice. The ways in which these three argument structures can be defended or challenged may differ from the Toulmin framework. Van Eemeren et al. (2002) define multiple argumentation, coordinative argumentation and subordinative argumentation (see figure 3.4).

In a *multiple argumentation* structure a claim is supported by multiple data components, each of which could standalone to defend the claim. Refuting one of the data components does usually not lead to the rejection of the claim; the other data components may successfully defend the claim. *Coordinative argumentation* is a variant of multiple argumentation. Coordinative argumentation differs from multiple argumentation in that all data components should be considered together to form a conclusive defense of the claim. If one of the data components is refuted, the claim usually fails. In *subordinative argumentation*, data that supports a claim is supported by other data through another warrant or argumentation structure. If one of the data components in the "chain" of data is refuted, the claim usually fails.

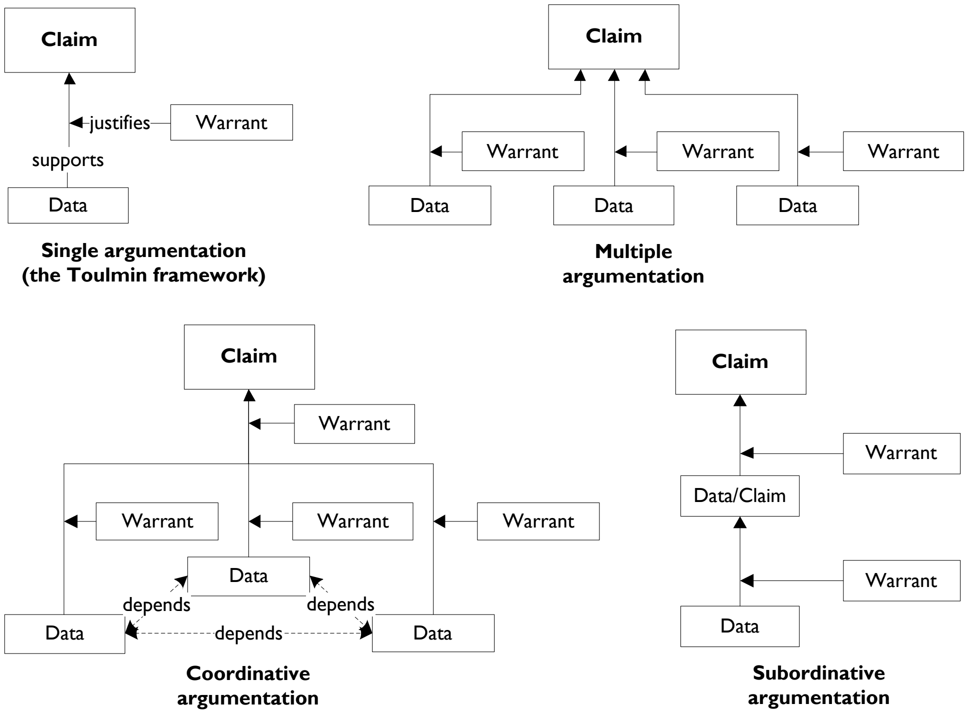


Figure 3.4. The four basic argumentation structures based on Van Eemeren et al. (2002)

3.2 Linking informal argumentation theory to knowledge claim evaluation theory

Informal argumentation theory provides a collection of concepts and structures to describe practical argumentation. Informal argumentation theory assumes that the basic aspects of argumentation can vary across fields and contexts. The warrant plays a crucial role in explaining differences across and within fields. Brockriede and Ehninger (1960) identify three types of warrants that can be used to justify the movement from data to a claim. We present their typology of warrants in section 3.2.1. In addition, we discuss how they can be identified when analyzing arguments in practice.

The idea of informal argumentation theory is that across and within fields and contexts, the types of warrants that people recognize as legitimate differ. Consequently, what may be a legitimate inference from data to a claim in one context may be an illegitimate inference in another. For instance, the YouTube example in figure 3.2 was a valid argument for the founders of YouTube in 2005, whereas other companies rejected the argument in 2005, because they did not regard the "killer application" warrant as legitimate. Moreover, the warrant types help us to connect the three approaches of knowledge claim evaluation to argumentation structures. Section 3.2.2 proposes an argumentation structure for each approach using the typology of warrants. As a result, we are able to a) describe existing theory of knowledge claim evaluation in terms of aspects from informal argumentation theory and b) analyze actual knowledge claim evaluation following informal argumentation theory.

In section 3.2.3, we enrich the theory of knowledge claim evaluation by introducing a typology of knowledge claims. The legitimacy of the various types of warrants may not only differ across and within fields but also with respect to the type of knowledge claim under discussion. Section 3.2.4 explains the implications of this insight for existing knowledge claim evaluation theory.

3.2.1 Typology of warrants

Brockriede and Ehninger (1960) identify three types of warrants that can be applied in an argument. Based on the Aristotelian concepts of logos, ethos and pathos, they distinguish the *substantive* warrant, the *authoritative* warrant and the *motivational* warrant. We explain and exemplify each type of warrant. Table 3.1 illustrates each type of warrant with fictive examples based on the YouTube claim in a single argumentation structure.

Brockriede and Ehninger (1960) define the substantive warrant is "an assumption concerning the relationship existing among phenomena in the external world" [7] (p. 48). It applies when the data of a claim is based on empirical-based evidence. The first row of table 3.1 illustrates an application of the substantive warrant. The

[7] In addition, Brockriede and Ehninger (1960) recognize six types of substantive warrants: cause, sign, generalization, parallel case, analogy, and classification. An overview of these types is provided in Appendix B.

authoritative warrant applies when an assumption concerning the quality of the source of the data (e.g., the source of data is an expert, the source of data is the CEO, the source of data is the majority of people, etc.) is used to support a claim. The second row of table 3.1 illustrates an application of the authoritative warrant. The motivational warrant differs from the other two types of warrants in that the data consists of one or more knowledge claims that may have been established in a previous argument. Hence, the motivational warrant relate to the subordinative argumentation structure (see figure 3.4). Brockriede and Ehninger (1960) argue that the motivational warrant applies when "inner-drives, values, desires, emotions, and aspirations, which impel the behavior of those agents to whom the argument is addressed" (p. 51) are used to connect the data to a claim. We argue that groups and organizations have inner-drives, values and aspiration, expressed in the form of organizational intentions and evaluation criteria. For instance, organizations apply the motivational warrant when they use organizational intentions and evaluation criteria to connect data to a claim. The last row of table 3.1 illustrates an application of the motivational warrant.

Table 3.1. Warrant types and examples

	Examples		
	Claim	**Data**	**Warrant**
Substantial warrant	"YouTube is set to become an essential destination for watching and sharing [videos]"	"More and more people [are] carrying around devices that capture video – from digital cameras to cell phones"	"Generally, a technological trend creates the demand for a *killer application*"
Authoritative warrant	*ibid*	Bill Gates stated that "YouTube is set to become an essential destination for watching and sharing videos"	"What Bill Gates says about YouTube is reliable"
Motivational warrant	*ibid*	"There is a demand for a service to watch and share videos worldwide through the Internet"	"The founders of YouTube have the aspiration to start a service to watch and share videos worldwide through the Internet"

Claims, warrants and data may however remain implicit in an argumentative discussion, i.e., in enthymemes. Most often, it is still possible to determine the type of implicit warrant and/or type of implicit data. We discuss how this can be done for two forms of enthymemes: a) an enthymeme in which the data is explicit, and the warrant is implicit and b) an enthymeme in which both the data as well as the warrant are implicit (see figure 3.5).

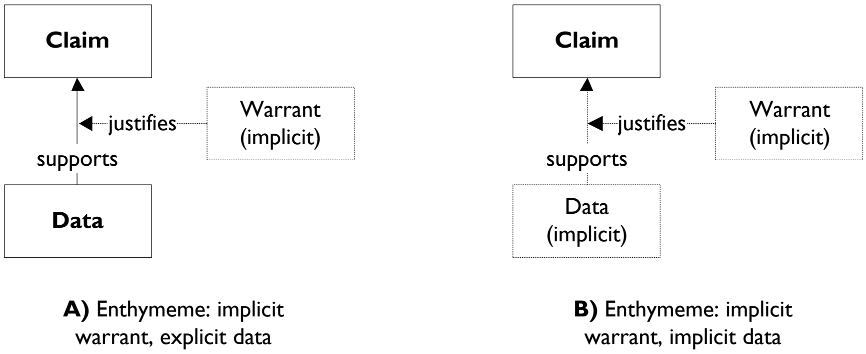


Figure 3.5. Two forms of enthymemes

3.2.1.1 Determining warrant types in enthymeme A: implicit warrant & explicit data

Warrants often remain implicit in practical argumentation (Van Eemeren et al, 2002). The type of an implicit warrant can be deduced by examining the explicit data of the argument. Because the three warrant types assume various classes of evidence in the data component of the Toulmin framework, we can define three *evidence types*: authority-based evidence, empirical-based evidence and existing knowledge claims (see table 3.2). It however depends on the exact formulation of the data component and the context of the argument what type of implicit warrant is used. The three types of evidence may help to determine of the type of implicit warrant.

Authority-based evidence is information that stems from a source with a certain quality. The quality of the source can be based on a) the legitimate power that a person or a group holds over another (i.e., formal authority), b) experience, knowledge and skill that that person or group has (i.e., expert authority) or c) the (large) number of persons that supports the evidence or idea (i.e., group or communitarian authority). Authority-based evidence may point at the application of an authoritative warrant. *Empirical-based evidence* is information gained by means of observation, experience, or experiment. We discern three types: a) primary data, which is information gained by systematic studies and/or other research activities conducted by stakeholders, b) secondary data, which is information gained by systematic studies and/or other research activities conducted by third parties, and c) personal data, which is information gained through personal observation, experience, or experiment. Empirical-based evidence may point at the application of a substantive warrant. *Existing knowledge claims* are claims that have survived in past argumentative discussions. We discern three types of existing knowledge claims: a) epistemic evidence, which is a form of existing knowledge that relates to one of the epistemic criteria as formulated by McElroy and Firestone (2003; see Chapter 2, and Appendix A), b) organizational intentions, which is a form of evidence that is given and fixed before the project started, or formulated and evaluated during the project, and that relates to an organizational intention (e.g., strategy) or project intention (e.g., project objective, project scope, project set-up), and c) general intentions, which is a form of evidence that concerns a general or commonly accepted kind of motivation, aspiration, or value. For instance, positive consequences are preferred over negative consequences; more profit is better than less profit, etc. Existing knowledge claims can be applied as a motivational warrant.

Table 3.2. Evidence types and associated warrants

	Description	Sub evidence types	Associated warrant type
Authority based evidence	evidence that stems from a source with a certain quality	formal authority expert authority communitarian authority	authoritative warrant
Empirical based evidence	evidence gained by means of observation, experience, or experiment	primary data secondary data personal data	substantive warrant
Existing knowledge claims	knowledge claims that have survived in past argumentative discussions	epistemic evidence organizational intentions general intentions	motivational warrant

3.2.1.2 Determining warrant types in enthymeme B: implicit warrant & implicit data

This section discusses the enthymeme in which both the data as well as the warrant are used implicitly (see figure 3.5). We regard five practical scenarios that are helpful in assessing the types of implicit warrant and data used in the enthymeme. First, a proponent may formulate a claim without any data and warrant, and without being challenged, because potential opponents tacitly consider the proponent as an authority. Consequently, the claim of the proponent comes with an *implicit authoritative warrant*. Secondly, an explicit data and warrant component can be missing because an *implicit motivational warrant* is applied. Implicit values and beliefs within a group or organization that each participant "knows by heart" support the claim. It is therefore unnecessary to provide data or to challenge the claim. Thirdly, explicit data can be missing in an argument due to a lack of knowledge and experience of the participants of the argumentative discussion. There is little or no data available, because nobody knows any. Here, claims may be linked to implicit best guesses, beliefs and instincts of the participants. The principle of (personal) coherence applies. Fourthly, the data and warrant lack because an *inartistic* argument is applied. In an inartistic argument data itself is conclusive and a warrant is not needed (Brockriede and Ehninger, 1960; Toulmin, 1958). Hence, the data is tantamount to the claim. Lastly and fifth, explicit data can be missing when a conversation or discussion is actually not an argumentative discussion. In an argumentative discussion, arguments are used as a means to support or criticize claims in order to achieve a resolution of difference. Instead, the aim of the discussion can be to generate ideas, like in a brainstorm session, or to share information, like in an informative dialogue (Van Eemeren et al., 2002; Walton, 2007). Consequently, this type of discussion should not be regarded as an act of knowledge claim evaluation.

In order to determine the type of implicit data and type of implicit warrant in each of the five scenarios, one requires detailed information about the context of the argumentative discussion. The information needs are:

1) the characteristics of the proponents and opponents (e.g., who can be considered as an authority?) and how the proponents and opponents perceive these characteristics;
2) the levels of expertise and knowledge of the proponents and opponents regarding the topic under discussion;

3) the objective of the discussion/conversation (e.g., brainstorm session or argumentative discussion).

3.2.2 Linking the typology of warrants to the three approaches of knowledge claim evaluation

In this section we propose an argumentation structure for each approach of knowledge claim evaluation, i.e., the Open, Managerial and Entrepreneurial approaches. We aim at keeping these argumentation structures as simple and generic as possible. Moreover, we stress that in practice, the proposed argumentation structures are part of more comprehensive argumentation structures. We will explore the argumentation structures in practical contexts in Chapters 6 and 7.

The basic argumentation structure of the Managerial approach follows a subordinative argumentation structure and incorporates all three warrant types (see figure 3.6). We annotated each element in figure 3.6 with the theoretical concepts of the Managerial approach as discussed in Chapter 2. In the lower-left part of figure 3.6, staff members collect and apply empirical-based evidence to support a claim concerning innovation. The substantive warrant applies in this part of the argument. Subsequently, the claim needs to be justified in the light of organizational intentions (and justification criteria). Organizational intentions function as a motivational warrant in justifying the claim. In the right-hand side of figure 3.6, management formulates organizational intentions. The Managerial approach assumes management (i.e., formal authority) as a reliable source in establishing proper organizational intentions. Hence, this part of the argument relies on the authoritative warrant; moreover, the right-hand side of the argument is normally not under discussion. Corporate management can only challenge organizational intentions.

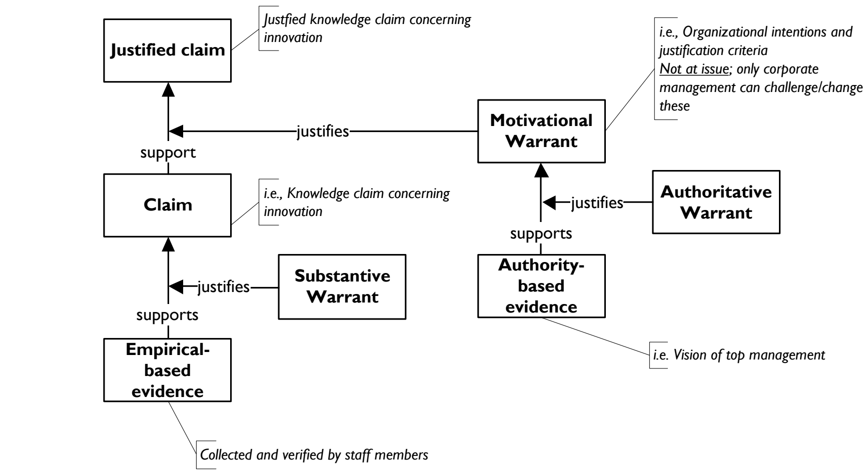


Figure 3.6. The Managerial approach argumentation structure (subordinative argumentation)

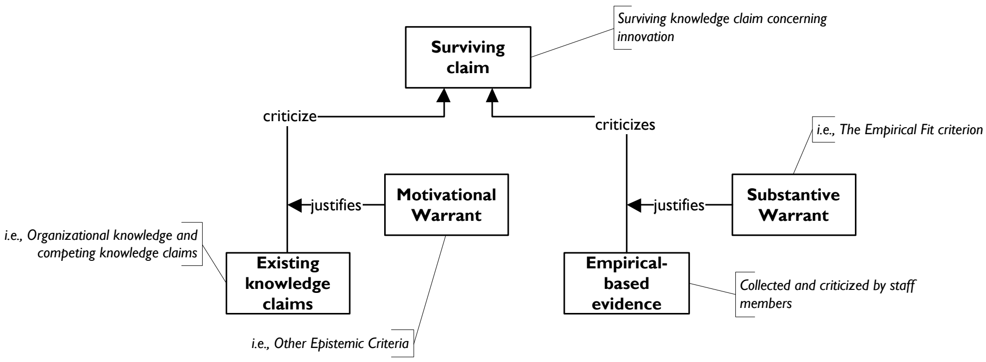


Figure 3.7. The Open approach argumentation structure (single or multiple argumentation)

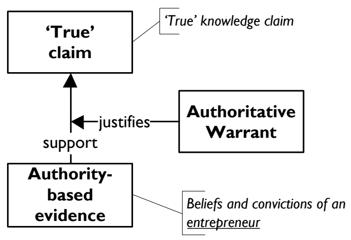


Figure 3.8. The Entrepreneurial approach argumentation structure (single argumentation)

The basic argumentation structure of the Open approach follows a single or coordinative argumentation structure. We emphasize the Criticalist position of the Open approach, as discussed in Chapter 2, by renaming the “support” label of the relations between data and claims into “criticize” (see figure 3.7). Note that the authoritative warrant is not used in the Open approach argumentation structure. The Open approach proposes a set of epistemic criteria. One of the criteria, i.e., the Empirical Fit criterion, specifically criticizes claims in the light of empirical-based evidence. Hence, the substantive warrant applies here. The other epistemic criteria criticize knowledge claims by comparing and weighting other epistemic properties of a claim. Existing knowledge claims (e.g., the Logical Consistency criterion) and competing claims are used here. The epistemic criteria function as motivational warrant in the Open approach argumentation structure.

The basic argumentation structure of the Entrepreneurial approach follows a single argumentation structure. The idea of the Entrepreneurial approach is that staff members with an entrepreneurial mindset can formulate claim concerning innovation, without justification through a substantive warrant or motivational warrant. The relation between data and claim fully relies on the entrepreneurial qualities of the source; hence, the authoritative warrant applies. Unlike the Managerial approach argumentation structure, the authoritative warrant is not based on the formal authority, but on expert authority (e.g., expertise in entrepreneurship).

3.2.3 Typology of knowledge claims

The three approaches of knowledge claim evaluation presented in Chapter 2 do not distinguish between types of knowledge claims during knowledge claim evaluation. Informal argumentation theory, however, recognizes different types of knowledge claims. In this section, we first present a typology of knowledge claims and, subsequently, we discuss how different types of knowledge claims require different types of warrants and data. This refinement enriches the three approaches from Chapter 2 and the understanding of knowledge claim evaluation in general.

Brockriede and Ehninger (1960) propose four types of knowledge claims used in argumentative discussions: designative, definitive, evaluative and advocative. Verschuren and Doorewaard (1999) propose a similar typology, yet distinguish two additional knowledge claim types: explanatory and predictive. Table 3.3 provides the definition and an example for each knowledge claim type. Brockriede and Ehninger

(1960) connect the six knowledge claim types to the three warrant types. They construct a framework of *legitimate arguments* based on the combination of warrant and knowledge claim types (see table 3.4). A legitimate argument is an argument in which a type of warrant legitimately justifies or criticizes a particular type of claim. Given the idea that argumentation is field-dependent, it is no surprise that Brockriede and Ehninger (1960) regard almost every claim-warrant type combination in table 3.4 as a legitimate argument. Substantive and authoritative warrants can legitimately be used in justifying or criticizing any of the six knowledge claim types. The motivational warrant, however, can only be used in justifying or criticizing explanatory, evaluative, predictive and advocative claims; it is an illegitimate warrant for justifying or criticizing designative and definitive claims (see table 3.4). For instance, inner-drives, values or aspirations, i.e., the motivational warrant, are irrelevant factors in justifying or criticizing a designative claim such as "Every minute, 35 hours of video are being uploaded to YouTube" (YouTube, 2010).

Table 3.3. Knowledge claim types and examples

	Definition	**Example**
Designative	answers the question whether something is	"Every minute, 35 hours of video are being uploaded to YouTube" (YouTube, 2010)
Explanatory	answers the question of why something	"Proliferation of digital cameras and camera cell phones, broadband in the home, Macromedia Flash 7, and cheap dedicated hosting bandwidth contributed to the success of YouTube in 2005" (YouTube, 2005)
Definitive	answers the question what something is	"YouTube is a video-sharing website which users can upload, share, and view videos" (Wikipedia, 2011)
Evaluative	answers of what worth something is	"YouTube offers an easy method for anyone with an Internet connection to post a video that a worldwide audience could watch within a few minutes" (Wikipedia, 2011)
Predictive	answers the question of what something will be	"YouTube is set to become an essential destination for watching and sharing [videos]" (YouTube, 2005)
Advocative	the question what course of action should be pursued	"YouTube should improve the way in which the community can add context information to existing movie entries" (the author)

In addition, Brockriede and Ehninger's (1960) make a distinction in the extent to which the substantive warrant is applicable in relation to each knowledge claim type. Brockriede and Ehninger (1960) report a number of methods (e.g., generalization, analogy, classification, cause and effect, symptom-analysis, case study) that can be used to justify or criticize designative, explanatory and evaluative claims based on empirical-based evidence. However, they argue that the set of methods that makes use of empirical-based evidence is more limited for justifying or criticizing definitive, predictive and advocative claims. Hence, the extent to which the substantive warrant is applicable varies per type of claim. We indicated this in table 3.4 by adding the label "limited" to the definitive, predictive and advocative claims.

Conversely, Brockriede and Ehninger (1960) do not differentiate between the extent to which the authoritative and motivational warrants are applicable in combination with different types of claim (except in relation to the designative and definitive claims, where the motivational warrant is inapplicable). The authoritative warrant justifies or criticizes a designative claim in the same way as it justifies and criticizes an advocative claim. An authority, for instance, may legitimately make the claim "Every minute, 35 hours of video are being uploaded to YouTube" (i.e., designative claim) in the same way as he may claim "YouTube should improve the way in which the community can add context information to existing movie entries" (i.e., advocative claim).

Table 3.4. Overview of Brockriede and Ehninger's (1960) legitimate arguments

	Claim type					
	Designative	**Explanatory**	**Definitive**	**Evaluative**	**Predictive**	**Advocative**
Substantive warrant	applicable	applicable	applicable (limited)	applicable	applicable (limited)	applicable (limited)
Authoritative warrant	applicable	applicable	applicable	applicable	applicable	applicable
Motivational warrant	inapplicable	applicable	inapplicable	applicable	applicable	applicable

Note:
We extended the original framework of Brockriede and Ehninger (1960) with the explanatory and predicitve claims from Verschuren and Doorewaard (1999).

3.2.4 Linking the typology of claims to the existing theory of knowledge claim evaluation

Brockriede and Ehninger's (1960) claim-warrant matrix in table 3.4 suggests that not every type of warrant is suitable or applicable to justify or criticize any type of claim. We mentioned earlier that this refinement enriches the three approaches from Chapter 2 and the understanding of knowledge claim evaluation in general. This section explains how.

Parts of the discussion in Chapter 2 concentrate on the availability of empirical-based evidence in innovation (i.e., "facts", "objective verifiable evidence", etc.). The Entrepreneurial approach calls in question the availability of empirical-based evidence in innovative contexts, and therefore, the applicability of the substantive warrant. As a result of lacking empirical evidence and the limited applicability of the substantive warrant, companies should rely on entrepreneurs and apply the authoritative warrant (see figure 3.8). The Managerial approach also assumes lacking empirical evidence and the limited applicability of the substantive warrant in innovative contexts, yet relies on the entrepreneurial characteristics of a firm's top management and forwards these as a legitimate authoritative warrant (see figure 3.6). The Open approach, however, bans the usage of the authoritative warrant. According to the claim-warrant matrix in table 3.4, banning the authoritative warrant is possible, yet the applicability of the other two warrants, i.e., the substantive and motivational warrant, is limited for some knowledge claims. It could, for example, take a lot of time and effort to collect and apply empirical-based evidence to support an advocative claim. So far, the claim-warrant matrix in table 3.4 supports the Managerial and Entrepreneurial approaches, and it underlines the possible problems with regard to the Open approach. Yet, the claim-warrant matrix in table 3.4 enriches the three approaches on a deeper level.

The first insight concentrates on prescriptive and advocative claims made in innovations. First of all, we assume that, in (highly) innovative contexts, predictive and advocative claims prevail, because innovation is about taking action based on future expectations. The claim-warrant matrix in table 3.4 shows that the applicability of the substantive warrant is limited for predictive and advocative claims. This means that even if empirical-based evidence is available in an innovative context, the options to support or criticize predictive and advocative claims through the substantive warrant are limited.

For instance, YouTube's claim from 2005 "YouTube is set to become an essential destination for watching and sharing [videos]" (YouTube, 2005) was supported by data about an empirically observed trend in digital camera technology usage, and hence, the substantive warrant was applied (see figure 3.2). Yet, there was *no* empirical-based evidence that YouTube was becoming an essential destination for watching and sharing videos. As we explained in Chapter 1, hardly anyone was convinced that YouTube would become successful based on the empirically observed trend in digital camera technology usage (YouTube, 2005). The perceived strength of YouTube's argument was low. It would have perhaps been more convincing if an authority, such as Bill Gates (Microsoft) or Steve Jobs (Apple), would have made (or supported) YouTube's claim by applying the authoritative warrant (see also table 3.1).

The claim-warrant matrix in table 3.4 shows that the substantive warrant has *limited* applicability to definitive, predictive and advocative claims. Because we assume that especially predictive and advocative claims prevail in innovative context, we find support in table 3.4 for the application of the authoritative and motivational warrants in innovation, as is prescribed in the Managerial and Entrepreneurial approaches. Moreover, the limited applicability of the substantive warrant in innovative contexts calls in doubt once again the practicability of the Open approach, which primarily relies on the substantive warrant.

The limited applicability of the substantive warrant in innovative contexts is however one side of the picture. Whereas predictive and advocative knowledge claims dominate in innovations, designative, explanatory and evaluative knowledge claims are used too. Moreover, these types of knowledge claims may play a crucial role in supporting or criticizing predictive and advocative knowledge claims. The claim-warrant matrix in table 3.4 shows that, designative, explanatory and evaluative claims can be fully supported through the substantive warrant. If this is the case, should innovating companies apply the substantive warrant even though they are working on something highly innovative?

Consider the designative claim "Every minute, 35 hours of video are being uploaded to YouTube" (see table 3.3). When somebody would be in the position to challenge this claim, i.e., by asking YouTube staff for data that supports the claim, what type of evidence, and hence, what type of warrant, would the opponent regard as acceptable or convincing? Table 3.4 shows that both the substantive warrant as well as the authoritative warrant can be applied to justify (or criticize) this claim. YouTube founder Karim may claim that "Every minute, 35 hours of video are being uploaded to YouTube" and provide no evidence, because he is the founder and owner of YouTube and he is capable of knowing this fact. However, we argue that, in this case, a critical opponent with some basic knowledge of the Internet and ICT would only accept the claim through a substantive warrant, i.e., Karim or other YouTube staffers should support the claim with data which contains empirical-based evidence. For instance, YouTube should provide user statistics captured and processed by web analytics.

What are the reasons for the opponent to demand the substantive warrant in this particular example? We argue that the opponent assumes that it is more appropriate to apply the substantive warrant in defending the designative claim than to apply the authoritative or motivational warrants. We contend that this correspondence-based way of reasoning is generally accepted in practice. Therefore, when relevant empirical-based evidence is available (or can be acquired), it is more appropriate to apply the substantive warrant in defending a claim than to apply the authoritative and motivational warrants. It obviously depends on how a given situation is assessed in relation to the availability of empirical-based evidence. That is, it depends to what extent a situation is uncertain and novel, i.e., innovative. We distinguish between two basic views.

These insights add a new dimension to the debate found in the three approaches of knowledge claim evaluation. The three approaches do not address different types of knowledge claims. Consequently, they do not distinguish between, e.g., the evaluation of a designative knowledge claim and the evaluation of an advocative knowledge claim. We however contend that this distinction can be essential in understanding the function of knowledge claim evaluation in innovation. We will include and explore the distinction between the six knowledge claim types and the relation with the three warrant types in the Siemens BT study in Chapter 6 and the GEON study in Chapter 7.

3.3 Conclusion

This concludes our discussion of informal argumentation theory. In this chapter we aimed at answering the question: *What is the role of informal argumentation theory in describing knowledge claim evaluation in innovation?* The answer consists out of several facets that augment the existing theory of knowledge claim evaluation and improve the understanding of its role in innovations. We summarize the lessons learnt as follows.

First, the types of evidence and evaluation criteria that organizations use to evaluate knowledge claims in innovations are wrapped up in (comprehensive) argumentation structures. We apply informal argumentation theory to decompose and describe these structures. Moreover, we proposed argumentation structures for each of the three approaches of knowledge claim evaluation, i.e., the Open, Managerial and Entrepreneurial approaches. These argumentation structures allow us to explain and examine knowledge claim evaluation as an argumentative discussion in the light of the existing theory from knowledge management (Chapter 2).

Secondly, knowledge claims are often accepted or rejected in innovations without an explicit reference to evidence or evaluation criteria. Informal argumentation theory offers guidelines to identify the types of evidence and evaluation criteria that are used implicitly. This finding indicates that the three approaches are far less clear and recognizable in innovation than is pretended in existing theories of knowledge claim evaluation from knowledge management.

Thirdly, knowledge claims can be attacked and defended in multiple ways in argumentative discussions taking place in innovation processes. The three approaches in Chapter 2 primarily rely on the principle of refutation. When a knowledge claim is refuted, it is argued that the knowledge claim has not been adequately justified in the light of evidence and certain evaluation criteria. Informal argumentation theory provides two additional methods to attack a knowledge claim, namely rebuttal and undercutting, where evidence and evaluation criteria are less relevant. Moreover, the outcome of knowledge claim evaluation is not necessarily a knowledge claim that is either true or false, yet a knowledge claim of which parts are true and other parts false.

Lastly, we discuss the fourth and final insight. Whereas the existing approaches do not distinguish between types of knowledge claims, informal argumentation does. Informal argumentation theory acknowledges that a predictive knowledge claim, such as “YouTube is set to become an essential destination for watching and sharing [videos]” may be evaluated in a different way than a designative knowledge claim, such as “Every minute, 35 hours of video are being uploaded to YouTube”. The main issue is to what extent these two knowledge claims can be supported through the substantive warrant (or alternatively, to what extent can empirical-based evidence support these knowledge claims). We argued that the substantive warrant has limited applicability for advocative, predictive and definitive knowledge claims. On the other hand, we argued that the substantive warrant should be applied in relation to designative, explanatory and evaluative knowledge claims, if empirical-based evidence is available. Therefore, informal argumentation provides a means to assess the appropriateness of using various argumentation structures in innovations.

With this summary, we conclude the theoretical foundation of this thesis. In the previous chapters we have positioned knowledge claim evaluation as an essential process within innovation in firms. Yet, the current understanding of knowledge claim evaluation and its function within innovation is limited. The three approaches we could identify in existing literature provide three different perspectives on how organizations should evaluate knowledge in innovative context. On the one hand, the conjectures made in each of the approaches deserve to be explored and elaborated. We aim to do this by means of three empirical studies that we report in Chapters 5, 6 and 7. On the other hand, the approaches found in literature are still highly abstract, and to some extent unrealistic and unpractical. They lack the detail needed to explain the role of knowledge claim evaluation in innovation. Therefore, we proposed to include informal argumentation theory. Informal argumentation provides practical and realistic insights on how people conduct argumentative discussions. In this chapter, we have combined these insights with the existing theories of knowledge claim evaluation, i.e., the three approaches. This chapter therefore serves as the basis for the argumentative analysis we executed in two of the three empirical studies of this thesis: the Siemens BT study in Chapter 6 and the GEON study in Chapter 7.

Chapter 4

Methodology

The central question of this thesis is *what is the role of knowledge claim evaluation in innovation*? This chapter describes what empirical actions we undertook in order to answer our research question. We first introduce the exploratory research as the type or research we perform (section 4.1). Subsequently, we present our research design in section 4.2 and discuss how the three empirical studies will contribute in answering our research questions. We then introduce our integrated qualitative and quantitative approach and sketch the methods we used. Section 4.2.2 discusses the various data collection methods we adopted in the empirical studies, and sections 4.2.3 and 4.2.4 discuss the analysis techniques we applied to draw conclusions. Some methodological details are study-specific and will be discussed the individual empirical studies, i.e., Chapters 5, 6 and 7.

4.1 Exploratory research

This research applies the empirical cycle as proposed by De Groot (1969). The empirical cycle aims to explain phenomena in an empirical domain and relies on empirically observed facts and theories to acquire this explanation. De Groot (1969) defines five phases in the empirical cycle (see figure 4.1):

1) ***Observation**: the researcher collects and groups empirically observed facts based on which he tentatively conceives hypotheses;*
2) ***Induction**: the researcher formulates hypotheses (the theory);*
3) ***Deduction**: the researcher derives specific consequences from the hypotheses, in the form of testable predictions (the theory);*
4) ***Testing**: the researcher subjects the predictions to new empirically observed facts;*

5) ***Evaluation**: the researcher evaluates whether the predictions come true in relation to the formulated hypotheses (the theory) and in relation to further research (i.e., starting a new empirical cycle).*
(p. 28)

This research, however, does not complete all phases of De Groot's (1969) empirical cycle. Instead we concentrate on the observation and induction phases (see figure 4.1). The type of research that fits this focus is the exploratory research. Vogt (1999) defines exploratory research as a type of "research [that] looks for patterns, ideas, or hypotheses, rather than research that tries to test or confirm hypotheses" (p. 105). Stebbins (2001) provides a more elaborate definition of exploratory research in the behavioral and social sciences:

> "*Social science exploration is a broad-ranging, purposive, systematic, prearranged undertaking designed to maximize the discovery of generalizations leading to description and understanding of an area of social or psychological life. Such exploration is, depending on the standpoint taken, a distinctive way of conducting science – a scientific process – a special methodological approach (as contrasted with confirmation) and a pervasive personal orientation of the explorer*" (p. 3)

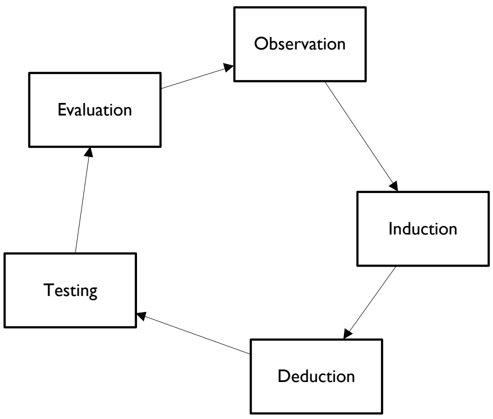


Figure 4.1. The Empirical Cycle based on De Groot (1969)

De Groot (1969) deems the exploratory research as the preferred type of research when three criteria are met. First, the research deals with a relatively broad area. Secondly, little usable theory exists that addresses this area. Thirdly, the researcher "is confronted with a quantity of observational data or variables whose relative relevance is little known" (p. 308). Based on the discussion in the previous chapters we conclude that this research meets these criteria.

The exploratory research is one of five types of research De Groot (1969) recognizes in the behavioral sciences, the other types being the hypothesis testing research (also known as confirmatory research), the instrumental-nomological research, the descriptive research, and the interpretative or theoretical study. De Groot (1969) contrasts the exploratory research to the descriptive research, i.e., the systematic description and classification of cases: "The objective [of exploratory research] is not so much fact finding, nor a survey of 'what is on hand', but rather the articulation of expected and newly discoverable relationships that are considered relevant to a given theoretical or practical purpose" (p. 307). Hence, the exploratory research aims at the creation and development of a theory or individual hypotheses (De Groot, 1969). Furthermore, Stebbins (2001) contrasts the research procedure of exploratory research to the procedure of hypothesis testing research, i.e. the testing of a single or few related hypotheses derived from theory against empirical data: "[…] exploration requires flexibility and open-mindedness, differing from confirmation [i.e. hypothesis testing] and its reliance on control of variables and prediction of outcomes using hypotheses" (pp. 9-10). The exploratory research can therefore be positioned in between the descriptive research and hypothesis testing research.

4.2 Research design

The aim of this thesis is to create and develop a tentative theory about the role of knowledge claim evaluation in innovation. The answers to our research questions will form this tentative theory and will be a ground for the formulation of hypotheses. The testing of these hypotheses should however occur in future research. De Groot (1969) discusses three research techniques in the light of exploratory research: the literature study, the empirical exploration and the exploration of sample material (see figure 4.2). We adopt the literature study and empirical exploration techniques. Chapter 1 already discussed the set-up of the literature study and Chapters 1, 2 and 3 presented the results of it. In this chapter we concentrate on the empirical exploration. The empirical exploration is the systematic activity of collecting factual observations in order to generate new ideas and to see whether certain existing ideas (i.e., expected and presumed relationships) yield any result (De

Groot, 1969). Whereas empirical exploration does not include the testing of a-priori precisely formulated hypotheses or theories, it may still take a-priori *ad-hoc* hypotheses, theories and assumptions as a starting point. We use existing theory – e.g., the three approaches of knowledge claim evaluation from Chapter 2 and informal argumentation theory from Chapter 3 – and reflect upon these theories based on the empirical findings.

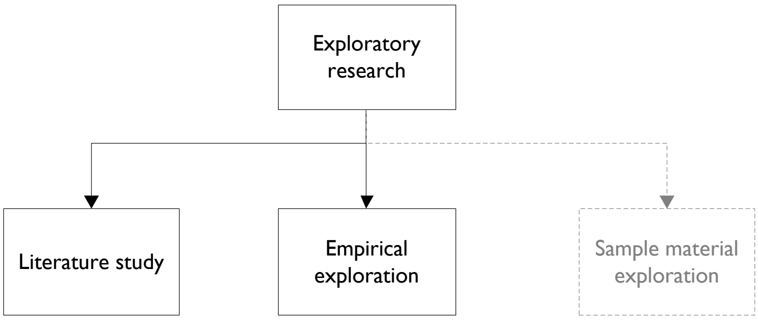


Figure 4.2. Techniques that can be used within the exploratory research adopted from De Groot (1969)

We conducted three empirical explorations, which we will refer to as empirical studies. An overview of the research design can be found in table 4.1. Within each study, we concentrate on innovation projects. We adopt the following definition of an innovation project based on the definition of innovation by West and Farr (1990).

> *An innovation project is a project situated in an institutional context with the objective to introduce or apply ideas, processes, products or procedures, which are new to a relevant adoption-unit, with the aim of being clearly beneficial to the individual, the group, the organization or society as a whole.*

The details of the project selection procedure and criteria can be found in the corresponding empirical study chapters, in Chapters 5, 6 and 7.

In the KodA study, we studied sixteen innovation projects in the Kennis op de Akker (KodA) innovation program (The Netherlands). We refer to these projects as KodA Projects. This study explored the frontiers of the existing knowledge claim evaluation theory (i.e., Chapter 2) on the level of the innovation project. In the Siemens BT study, we examined knowledge claim evaluation in the Pricing Project at Siemens

BT's headquarters in Switzerland. We conducted an in-depth study of knowledge claim evaluation on the level of knowledge claims and we used informal argumentation theory to analyze the data (i.e., Chapter 3). We applied informal argumentation theory to a reconstruction of the Pricing Project. The reconstruction was based on document studies and interviews with a key informant and project members. In the GEON study, we examined knowledge claim evaluation in the Customer Portal Project at GEON in Groningen (The Netherlands). Like the Siemens BT study, we investigated knowledge claim evaluation on the level of knowledge claims and we used informal argumentation theory to analyze the data. This time, however, we analyzed real-time argumentative discussions through observing project meetings.

Table 4.1. Research design overview

	KodA study Chapter 5	**Siemens BT study** Chapter 6	**GEON study** Chapter 7
Title	"Exploring the frontiers of existing knowledge claim evaluation theory in innovation projects"	"Analyzing reconstructions of an innovation project with informal argumentation theory"	"Analyzing argumentative discussions in an innovation project with informal argumentation theory"
Unit of analysis	Innovation project (sixteen projects)	Knowledge claims (in one innovation project)	Knowledge claims (in one innovation project)
Methods	Structured interview Document study	Semi-structured interview Key informant Document study	Non-participant observation Semi structured interview Key informant Document study
Sources of data	Project leaders Project documentation	Project members Project documentation	Project meetings Project members Project documentation

4.2.1 Integrating qualitative and quantitative research

We applied both qualitative and quantitative research strategies. The differences between qualitative and quantitative research are a debated topic in the behavioral and social sciences. Stebbins (2001) remarks that "it is difficult to know precisely when the qualitative-quantitative distinction took root […] or from where it came or who invented it" (p. 29). The distinction concerns the nature of research data and associated research methods researchers use (Miles and Huberman, 1994; Myers, 2009; Stebbins, 2001). Our approach integrates qualitative and quantitative research. Miles and Huberman (1994) advocate this approach by stating "the question […] is not whether the two sorts of data and associated methods can be linked during study design, but whether it should be done, how it will be done, and for what purposes" (p. 41). Our integrative method follows the four basic activities of qualitative research as formulated by Miles and Huberman (1994): data collection, data reduction, data interpretation[8], and conclusion drawing/verification. Miles and Huberman (1994) integrate quantitative research methods in the data reduction and data interpretation activities of the research. The four activities form an interactive cyclical process (see figure 4.3). In order to answer our research questions, we applied multiple cycles during the research process. Across the three empirical studies, and the activities depicted in figure 4.3, we adopted different methods and strategies; a schematic overview of the differences between the studies with respect to methods, interpretation strategies and objects of study can be found in figure 4.4. Before we introduce how we collected data (section 4.2.2), how we reduced data (section 4.2.3) and how we interpreted data (section 4.2.4), we address several considerations about validity, reliability and generalizability in our research.

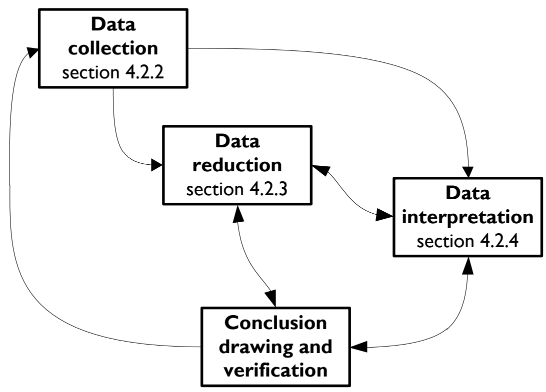


Figure 4.3. Qualitative analysis activities based on Miles and Huberman (1994, p. 12)

[8] Miles and Huberman (1994: p. 12) use the concept of "data displays" instead of "data interpretation". We however regard "data displays" as a specific data interpretation strategy. Langley (1999) offers a systematic overview of data interpretation strategies.

In an integrated qualitative and quantitative research, triangulation and ensuring trustworthiness are two important methods to ensure and increase both validity as well as reliability (Shank, 2006). Triangulation is the process of supporting findings through different data sources, methods, theories, researchers (Miles and Huberman, 1994; Shank, 2006). In our empirical studies we applied triangulation by data source and by method. Trustworthiness is a property assessed by peers. Keys in achieving trustworthiness are rigor and transparency (Lincoln and Guba, 1985). To ensure transparency we provide 1) detailed overviews of our data collection methods for each empirical study, 2) full disclosure of all our data after the data reduction activity (i.e., we provide the data we collected in the Siemens BT and GEON studies in the appendix of this thesis), and 3) detailed applications of how the data led to our conclusions for each empirical study. We do not aim to generalize our findings regarding knowledge claim evaluation to a target beyond the three empirical studies. Generalization should be the aim of future research on knowledge claim evaluation, i.e., in hypothesis testing research. The conclusions of this thesis in Chapter 8 can be used for that purpose.

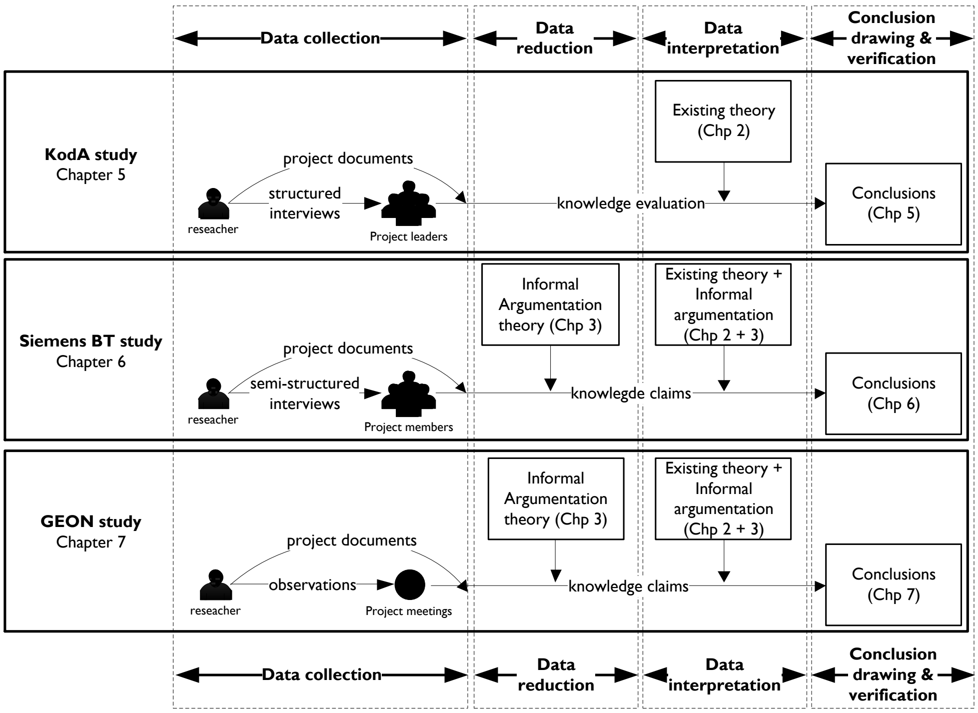


Figure 4.4. Overview of three empirical studies and data collection and analysis activities

4.2.2 Data collection

Data collection is the activity of gathering data for analysis in order to answer our research questions. We adopted the following data collection methods: open and semi-structured interviews, observations, document studies, and key informants. The selection of the specific data collection methods was based on the research design and the abovementioned considerations about validity and reliability. In this section we highlight the methods we adopted; Chapters 5, 6 and 7 present all study-specific details concerning the methods of data collection.

4.2.2.1 Interviews

According to Emans (2004) the interview aims "to collect objective information from statements made by one or several interviewed individuals in order to answer one or several pre-formulated questions" (p. 14). Across and within the three empirical studies we adopted multiple interviewing techniques. Our information needs again played a central role in choosing the right interview technique (Emans, 2004). We explain the techniques we used per study.

In the KodA study, we aimed at exploring the role of knowledge claim evaluation in innovation projects in the light of the three existing approaches of knowledge claim evaluation. We interviewed KodA project leaders using *structured* interviews with field coding and closed questions. The questions were printed in an interview guide (i.e., questionnaire used in the interviews). The structured interview assumes an ordered set of pre-formulated interview questions (Emans, 2004). In the interviews, we asked, for instance, "Did your project rely on the opinion of managers to evaluate a new idea?" and "Did your project prefer useful knowledge or did your project prefer true knowledge?" We asked the interviewee either to choose an answer from a set of predefined options (i.e., closed questions), or to respond in any manner, upon which we selected the best corresponding answer from a set of predefined options (i.e., field coding). Besides audio recordings as back-up, we noted the answers of interviews using a predefined scoring form. Chapter 5, about the KodA study, discusses the data collection details including the interview guide.

In the Siemens BT and GEON studies, we aimed at analyzing how the project members evaluated knowledge claims through the use of knowledge claims and argumentation in argumentative discussions. Hence, our information need was data about knowledge claims and arguments. This type of data is highly contextual and project-specific. We primarily used interviews to collect this data in the Siemens BT study, whereas we primarily used observations to collect data about knowledge claims and arguments in the GEON study. For the details of these observations we refer to section 4.2.2.3.

In order not to lose contextual and project-specific details, we interviewed Pricing Project members using the semi-structured interview technique with open questions. The semi-structured interview combines characteristics of the structured and unstructured interview (i.e., no ordered set of pre-formulated questions). We formulated a set of introductory questions based on the information obtained through a key informant (see below). In the interviews, we asked, for instance, "Could you explain why the project team decided to use pricing method X?" The interviewee could openly elaborate on his answer (i.e., open questions). Subsequently, based on the interviewee's answer, we asked further questions to identify all knowledge claims and arguments involved and to encourage the interviewee to provide the most adequate answer – Emans (2004) refers to this as *probing*. We, for instance, probed by asking interviewees "How did you assure that argument Y or knowledge claim Z underlying the decision to select pricing method X was valid?" All interviews have been recorded and transcribed. Chapter 6, about the Siemens BT study, presents the details of the data collection in Siemens BT study. In the GEON study (Chapter 7) we used the semi-structured interview with open questions to collect data about the context of the company and the Customer Portal project.

4.2.2.2 Key informant

We used key informants in the Siemens BT and GEON studies (Chapters 6 and 7). Payne and Payne (2004) define key informants as follows:

> "*Key informants are those whose social position in a research setting give them specialist knowledge about other people, processes or happenings that is more extensive, detailed or privileged than ordinary people, and who are therefore particularly valuable sources of information to a researcher, not least in the early stages of a project*" (p.13).

We interviewed the key informants on a frequent basis by using unstructured interviews and open questions. Through the key informant we were able to obtain an insider's view of the Pricing Project at Siemens BT and the Customer Portal Project at GEON. With regard to the Siemens BT study, the key informant was especially valuable in the early stages of the study; in the later stages of the Siemens BT study, we used the information provided by the key informant to set-up the semi-structured interviews with the other project members.

4.2.2.3 Observations

We conducted observations in the GEON study (Chapter 7). There are several types of observations: covert versus overt observation, nonparticipant versus participant observation, systematic versus unsystematic observation, and self-observation versus observing others (Flick, 2006). In the GEON study, we conducted an overt, non-participant, and systematic observation of others: we observed GEON staff during Customer Portal Project meetings. Similar to the Siemens BT study, we aimed at exploring knowledge claim evaluation and its function in the Customer Portal Project at GEON by means of analyzing how knowledge claims have been formulated through use of argumentation. However, instead of collecting *retrospective* argumentative data as in the Siemens BT study, we required *real-time* argumentative data this time, hence, our choice for observations. Our observation protocol was brief: we wrote down each and every articulated claim concerning the project, we noted how the claims related to each other, and who formulated the claim. The GEON study reported in Chapter 7 includes the details of the observations.

4.2.2.4 Document studies

Flick (2006) defines documents as "[…] communicative devices produced, used, and reused for specific practical purposes" (p. 252). Document studies fall under the realm of documentary methods, which, according to Payne and Payne (2004), "are the techniques used to categorize, investigate, interpret the limitations of physical sources, most commonly written documents, whether in the private or public domain (personal papers, commercial records, or state archives, communications or legislation)" (p. 60). There are two types of document studies, one that makes use of solicited documents and one that uses unsolicited documents. Solicited documents are first-person accounts of events and experiences asked for by the researcher, e.g., diaries, schedules, personal notes, mind maps, etc. Lincoln and Guba (1985) define unsolicited documents as "accounts created for the purpose of attesting to an event or providing an accounting" (p. 227). Examples are minute meetings, business plans, project proposals, invoices, etc.

We used unsolicited documents in all three empirical studies, especially official project documentation. We did not use solicited documents. The investigation of project documentation had three purposes in our research. Firstly, we studied project documentation prior to the research in order to become familiar with the projects and the projects' contexts. Secondly, the analysis of existing project documentation formed the starting point for the preparation of the various interviews. Thirdly, we considered the project documentation as an authentic and credible source of data for triangulating the results of the interviews and observations, especially in the Siemens BT and GEON studies. Project documentation often functioned as a repository for accepted knowledge claims in these projects. We used it therefore both as a baseline for identifying accepted knowledge claims as well as a useful source for cross-checking the results of the argumentative analyses.

4.2.3 Data reduction

Miles and Huberman (1994) define data reduction as the activity of "selecting, simplifying, abstracting, and transforming the data that appear in written-up field notes or transcriptions" (p. 10). Coding and categorizing the data in written-up field notes or transcriptions are the two main data reduction strategies (Flick, 2006). This activity was not necessary anymore in the KodA study because we used a structured interview with mainly closed questions. Thus, we already realized the data reduction in the preparation of the interview guide.

In the Siemens BT and GEON studies, however, we needed to reduce and structure the collected raw and unstructured data into information that is relevant for analyzing the argumentative discussion. As first step, we reconstructed the project timeline and identified the key events where knowledge claim evaluation took place. Simultaneously, we identified the knowledge claims that had been accepted in the various project stages. The primary source for identifying accepted knowledge claims was official project documentation. We present the project timeline and the accepted advocative knowledge claims in a data display (see figure 4.5). We used three levels to label developments (in figure 4.5: transitions *a*, *b*, etc.) over time in the set of accepted knowledge claims:

1) **major change:** indicated a major modification of a previously accepted knowledge claim. It concerned a considerable change in plans or a considerable shift in ideas; it could concern a knowledge claim that is the opposite of the previous knowledge claim. The 'major change' level also applied when the advocative knowledge claim is the first recorded knowledge claim;
2) **minor change:** indicated a minor modification of a previously accepted knowledge claim. More details have been added with respect to the previous knowledge claim, but the core of the accepted knowledge claim remained the same. E.g., an "abstract" knowledge claim became more concrete/operational/specific;
3) **no change:** no modification has been made with respect to the previously accepted knowledge claim; it was required, however, that the unaltered knowledge claim was mentioned in the report, otherwise the 'no knowledge claim' level was applicable (see below).

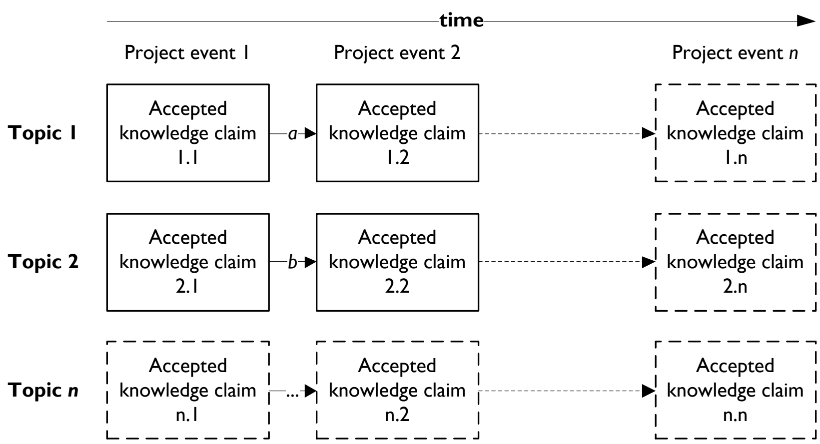


Figure 4.5. Data display for project timeline and accepted knowledge claims in the Siemens BT and GEON studies

As a second step, we used the definitions and concepts provided in Chapter 3 to isolate the elements of the Toulmin framework and comprehensive argumentation structures: claims, warrants and data. Subsequently, we assessed the attributes of each element, e.g., claim types, warrant types, data types, claim formulators, claim status, etc. As third step, we used the theory discussed in Chapter 3 to identify argumentation structures in the collected data, to assign functions and roles to knowledge claims, and to track the relations between the various elements and structures in the data. Chapters 6 and 7 provide detailed descriptions of the data reduction methods for the argumentative analysis.

4.2.4 Data interpretation

Data interpretation is the organizing, compressing and assembling of reduced data that permits conclusion drawing and action (Miles and Huberman, 1994). Several data interpretation strategies exist (Langley, 1999). Each data interpretation strategy has its own requirements (e.g., data need requirements, research design requirements, and anchor point requirements), advantages and disadvantages (i.e., trade-offs between accuracy, simplicity, and generality, see Langley, 1999), and types of outcomes and conclusions.

The interview guide that we used in the KodA study was designed in such a way that the answers could be analyzed quantitatively. In the Siemens BT and GEON studies, however, we adopted the *quantification* strategy and the *alternate templates* strategy to analyze the data. The quantification strategy is the systematical listing and coding of qualitative data according to predetermined characteristics (Langley, 1999). The goal is to reduce in-depth qualitative data to quantitative data. In the Siemens BT and GEON studies we counted the occurrences of the argumentation sturctures and attributes, as assigned in the data reduction stage. One of the disadvantages of the quantification strategy is that it leads to a lower reliability because of the abstraction from the original rich in-depth data. Therefore, Langley (1999) argues to use the quantification strategy in combination with the other data interpretation strategies that take the non-quantified data into account as well. In the light of the latter consideration, we combined the quantification strategy with the alternate template strategy. By applying the alternate template strategy, we analyzed and interpreted the findings (based on both the quantified data as well as the non-quantified data) based on different existing theories. These existing theories were the three approaches of knowledge claim evaluation from Chapter 2. The advantage of this combined strategy is that it combines both the richness of qualitative data and the theoretical parsimony of quantified and decomposed data.

4.3 Conclusion

This chapter presented the methodology we used in order to answer our research questions based on the empirical research. In our research, we adopt an exploratory research. Chapters 2 and 3 explore the literature; Chapter 5, 6 and 7 present three empirical explorations (i.e., empirical studies). In our empirical studies, we examined knowledge claim evaluation on different levels of analysis, that is, different units of analysis (i.e., the innovation project level and the knowledge claim level) and units of observation. Within this exploratory exploration we integrate qualitative and quantitative research. The data collection methods are qualitative: structured and semi-structured interview, key informants, observation, and document analysis. In the data reduction and data interpretation stages of the analysis we apply informal argumentation theory, and the quantification and alternative template interpretation strategies.

Chapter 5

The KodA study: Exploring the frontiers of existing knowledge claim evaluation theory in innovation projects

The empirical study we report in this chapter was situated in the Dutch arable farming sector[9,10]. Over the past decade, the sector had to face economic, societal and climatological challenges (Faber, 2006; Faber et al., 2010; Jorna, 2006). Social and economic challenges follow from the breakdown of the Common Agricultural Policy (CAP) of the European Union (EU). Subsidies in all sectors of the agricultural sector, e.g. sugar, starch potatoes, and mushrooms, have been stopped or will be stopped to stimulate fair trade on a worldwide scale. Furthermore, the Kyoto Protocol (1997) has led to stricter regulation to protect the environment, e.g. new regulations concerning fertilization and crop treatments. Climatological challenges, e.g. changing patterns of precipitation, more extreme weather, and an increase of average

[9] This study was commissioned by TransForum. TransForum (2005-2010) was an innovation program aimed at stimulating sustainable development of the Dutch agricultural sector.
[10] In 2009, there were 23.830 holdings in the Netherlands with arable farming yielding an annual production value of 2.207 million Euros (LTO Nederland, 2009).

temperature, already influence farming in the Netherlands causing an increasing fluctuation of the sector's turnover (Faber, 2006). The Intergovernmental Panel on Climate Change (IPCC) reports that the global surface temperature is likely to rise a further 1.1 to 6.4 °C up to the year 2100 leading to changes in the amount and pattern of precipitation, in the frequency and intensity of extreme weather events, and consequently, to changes in agricultural yields (IPCC, 2007).

A national initiative to deal with the abovementioned challenges was the "Kennis op de Akker" innovation program (KodA; *our translation* Knowledge at the Field). KodA was initiated by the Dutch Ministry of Agriculture, Nature and Food Quality[11] and commercial parties from the arable farming sector in 2005. ZLTO-LTO Projects (the Dutch Federation of Agriculture and Horticulture for the Southern region[12]) and the Univeristy of Wageningen (WUR) directed the KodA program. The aim of the KodA program was twofold. Firstly, KodA aimed at stimulating knowledge transfer in the Dutch agricultural sector by strengthening the link between researchers (e.g., universities, knowledge institutes) and entrepreneurs (e.g., farmers, suppliers, buyers/processors). Secondly, KodA aimed at opening up and operationalizing existing scientific knowledge for practical usage. Given these two aims, the KodA program was a suitable context for investigating knowledge claim evaluation.

Between 2006 and 2010, several hundreds of arable farmers, their suppliers and processors participated in the KodA program. In total seventy-six KodA projects have been executed. KodA program members and program management have collaboratively defined a number of program objectives referred to as the "KodA program agenda" (see Geerligs and Wolfert, 2007). These objectives were especially focused on the practical usability of the project outcomes. Besides contributing to the program objective, KodA projects aimed at achieving project-specific objectives as formulated in project proposals. Each of the seventy-six KodA projects dealt with one of the five themes formulated by the program management (Wolfert et al., 2009):

1. *Quality Improvement*: topics in this theme were, e.g., potato skim quality, grain quality, growing quality, electronic system improvements, new fertilizers, and new crop varieties;

---

[11] *in Dutch:* ministerie van Landbouw, Natuur en Voedselkwaliteit (LNV)
[12] *in Dutch*: Zuidelijke Land- en Tuinbouw Organisatie (ZLTO)

2. *Efficiency Improvement*: topics in this theme were, e.g., electronic registration, study groups on 'best practices', learning styles for innovation and knowledge transfer, and speeding up sugar yield;
3. *Sustainable Farm Management*: topics in this theme were, e.g., precision agriculture, soil and crop monitoring, and yield mapping;
4. *Knowledge Construction*: topics in this theme were, e.g., knowledge management, improving knowledge applicability, improving knowledge transfer (questions from the sector find the right person or institute for answers);
5. *Integration and Standardization*: topics in this theme were, e.g., electronic data interchange (EDI), electronic data standards, data management.

Together with the other two studies in Chapters 6 and 7, this chapter aims to answer our third research question as formulated in Chapter 1: *Which practices of evaluating knowledge claims can be found in existing innovation projects?* With regard to the KodA study we can re-formulate this question as follows:

Research question 3:

Which practice(s) of evaluating knowledge claims can be found in KodA projects?

We associate one sub question with this study, namely Sub question 3a) *To what extent does knowledge claim evaluation in KodA projects concord with the explanations found in knowledge management theory*? We refer to figure 1.2 in Chapter 1 for an overview of all research questions in this thesis.

5.1 Methods

This section describes the methodological details of the KodA study (see figure 5.1). In the upcoming sections, we elaborate our data collection method, by discussing the measurement instruments, the interviewee selection process and our procedure.

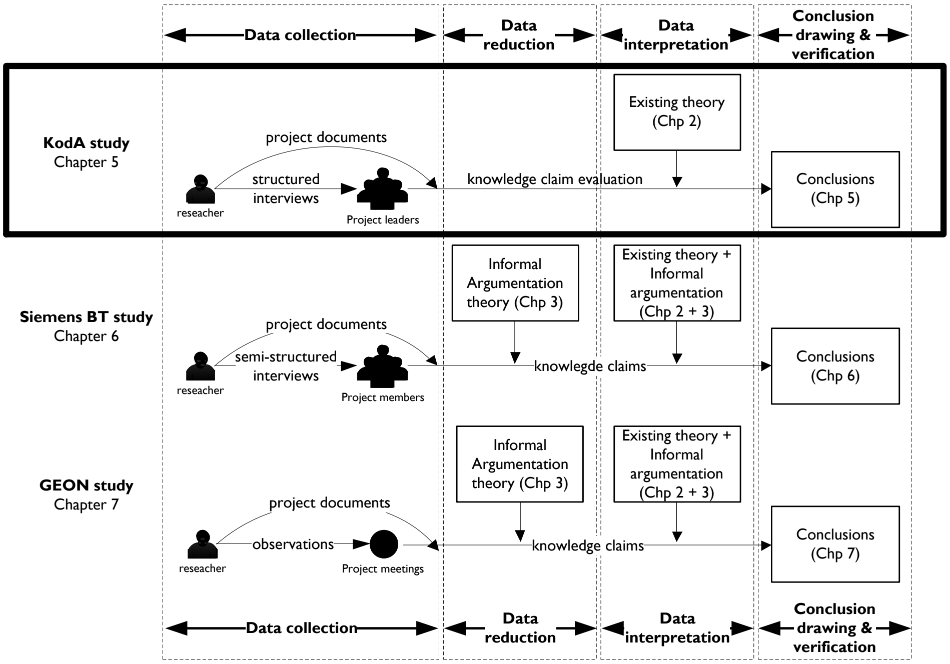


Figure 5.1. Overview of three empirical studies including data collection and analysis activities

5.1.1 Measurement instruments

5.1.1.1 Interview guide

The interview guide included an 1) introduction of the interview, 2) the questionnaire including definitions of concepts, explanations of questions, examples, probes and answers form, and 3) a conclusion. The entire interview guide can be found in Appendix D (in Dutch). The questionnaire was developed on the basis of the literature review in Chapters 1 and 2 and consisted of two parts. The first part included questions about general properties of the KodA projects. The second part of the questionnaire consists of questions about knowledge claim evaluation. Additionally, we used information from KodA project documentation and information obtained from KodA program management to improve the interview guide. A senior-member of the KodA program management reviewed the interview guide for structure and understandability. We conducted three pilot interviews to fine-tune the interview guide.

Table 5.1 lists the statements used in the interview guide concerning KodA project performance. Using these statements we could determine to what extent project leaders found their project innovative. By asking project leaders we obtained an *insider's* perspective on KodA project innovativeness. We explained innovativeness to project leaders using the definition of West and Farr (1990; see Chapter 1). Section 5.2.4 introduces the questionnaire that we had completed by domain experts and used to obtain an *outsider's* perspective on the innovativeness of KodA projects. We also included the six program objectives listed in the KodA innovation agenda. The identifiers of the interview questions correspond with the identifiers in the interview guide in Appendix D.

Table 5.1. Statements about KodA project performance: an insider's perspective on innovativeness

Statements	Interview question(s)	Answer format
The official project objective has been achieved	2d	all questions 5-points Likert scale 1 = Fully disagree 5 = Fully agree
The project could be tagged as innovative after project completion	4b	
The project can be tagged as successful	2f	
Participants and partners can use project results in practice	2g	
The objectives as listed in the KodA innovation agenda have been achieved[a] (6 objectives (items): perspectives, agreements, routines, insights, designs, competencies)	3b, 3c, 3d, 3e, 3f, 3g	

Notes:
[a] *Based on KodA innovation program documentation*

In Chapter 2 we proposed three approaches of knowledge claim evaluation. The three approaches can be distinguished based on epistemological positions, types of evidence and types of evaluation criteria. Table 5.2 lists the statements we presented to interviewees about the epistemological position taken in the KodA projects. We based the three statements on the three trade-offs that Morton (2003) describes in order to distinguish between various theories of truth (e.g., the Theories of

Correspondence, Coherentism, Pragmatism, and Consensus) and theories of evaluation (e.g., the Theories of Foundationalism and Criticalism).

Table 5.2. Statements about epistemological positions

Statements	Interview question	Answer format
The project took for granted that in order to avoid errors, the project might overlook or ignore opportunities	7a	all questions 5-points Likert scale 1 = Fully disagree 5 = Fully agree
Knowledge development on the long term was more important than knowledge development on the short term	7b	
The (universal) truth was more important than the usefulness of knowledge	7c	

Notes:
The statements are derived from Morton (2003: p. 76)

The backbone of this study was formed by analyzing the type of evidence and evaluation criteria in KodA projects. Based on Chapter 2, we identified five types of evidence and evaluation criteria, which we will refer to as *dimensions*: 1) empirical evidence, 2) authority, 3) intuition, 4) organizational intentions and 5) existing knowledge. In this study, the empirical evidence dimension concerned primary data, secondary data and personal data (see table 5.3). Primary data was empirical evidence collected by project members in the context of the KodA project. Secondary data was empirical evidence used in the project, yet collected by third parties. Personal data was empirical evidence collected or provided by individual project members (e.g., personal experiences and observations). The authority dimension concerned opinions and knowledge of experts, key figures in the field, (research) institutes and majority opinion. The intuition dimension was explained to interviewees as gut feeling, hunches, deep personal beliefs, and "fingerspitzengefühl" used to evaluate knowledge in KodA projects. The organizational intentions dimension was operationalized on two levels. On the program level, we asked questions about the KodA program agenda, and on the project level we asked questions about the project proposal. Finally, we operationalized the existing knowledge dimension as knowledge obtained and results gained in previous innovation projects.

Table 5.3. Overview of the operationalization and explanation of evidence type / evaluation criterion dimensions

No.	Dimension	Operationalization/explanation
1	Empirical evidence	Primary data, secondary data and personal data
2	Authority	Experts, key figures in the field, (research) institutes and majority opinion
3	Intuition	Intuition, gut feeling, hunches, and "fingerspitzengefuhl"
4	Organizational intentions	The KodA program innovation agenda (i.e., program level) and the official project proposal of the KodA project discussed in the interview (i.e., project level)
5	Existing knowledge	Knowledge obtained in previous projects (previous projects should relate to the KodA project discussed in the interview)

For each of the five dimensions we formulated three categories of questions (see table 5.4) concerning 1) the role of dimensions in KodA projects, 2) the critical attitude towards dimensions in KodA projects and 3) the extent of justificationism with regard to dimensions in KodA projects. The first category concerned the role of each dimension in KodA projects. Within this category, we formulated four sub questions (i.e., questions 1a through 1d, see table 5.4). The four sub questions differ from each other in terms of (un)ambiguity: the extent to which a question unambiguously relates to knowledge claim evaluation. Question 1a asked for the *importance* of a particular dimension in supporting knowledge in the KodA project. It is the most ambiguous question of the four because "importance" may mean a lot to an interviewee, and therefore the interviewee's answer may not be fully related to knowledge claim evaluation in the KodA project. Question 1b asked for the extent to which the KodA project members *discussed* knowledge when new evidence (i.e., one of the five dimensions) became available or was modified. This question is less ambiguous than question 1a because we explicitly referred to the evaluation of knowledge in these questions. Question 1c asked to what extent was knowledge *modified* or *rejected* when one of the dimensions required a modification or rejection of knowledge. Question 1d is the least ambiguous question of the four, asking for the *decisiveness* of a dimension in accepting or rejecting knowledge in the KodA project.

In general, we asked one interview question per dimension (see table 5.4). However, for the empirical evidence and organizational intentions dimensions we asked multiple interview questions. For empirical evidence, we distinguished between primary data, secondary data and personal data (i.e., interview questions 8a, 8b and 8c). For organizational intentions, we distinguished between organizational intentions (i.e., the KodA program agenda: interview questions 12a through 12f) and project intentions (i.e., the project proposal: interview questions 14a through 14e). We did not include questions concerning the organizational intentions dimension and the existing knowledge dimension in relation to question 1b (see also table 5.4). The reason for this omission was because these two types of evidence were already available at the start of the KodA projects and could not be changed in the course of KodA projects.

The second group of questions in table 5.4 concerned the critical attitude towards the dimensions. For the empirical evidence dimension we asked how often the KodA project had verified secondary data and personal data (i.e., interview questions 8h and 8j). We left out the interview question for primary data, because we assumed that the project members have collected primary data themselves and that verification was part of this activity. With regard to the organizational intentions dimension, we measured the critical attitude for organizational intentions and project intentions separately (i.e., interview questions 12d and 14c).

The third group of questions concerned the extent of justificationism with regard to the dimensions. We assessed whether members in the KodA project looked for evidence that justified certain knowledge, even though conflicting evidence existed (or could be found) that would falsify the same knowledge. This question was irrelevant for the organizational intentions and existing knowledge dimensions, because we assumed these two dimensions were already available at project start (see also table 5.3). All questions have been measured with a 5-point Likert scale, which was associated with a statement (i.e., scale: 1 = Fully disagree, 5 = Fully agree). Interview questions 8h, 8j, and 11a were however measured by using a 5-points frequency scale (i.e., scale: 1 = Never, 5 = Always).

Table 5.4. Questions about the five evidence type and evaluation criterion dimensions

		Evidence types and evaluation criteria dimensions				
		1 Empirical evidence	2 Authority	3 Intuition	4 Organi-zational Intentions	5 Existing knowledge
Questions						
1. Role. What is the role of a dimension in knowledge claim evaluation?	***1a. Importance*** To what extent played a dimension an important role in supporting intermediate results and conclusions?	8a, 8b, 8c[a]	9a	11a[d]	12a, 12b, 12c, 14a[b]	13a
	1b. Discussion To what extent was knowledge subjected to discussion if a dimension changed or became available?	8l	9j	11e	*No questions*	*No questions*
	1c. Change To what extent was knowledge modified or rejected if a dimension required a modification or rejection of knowledge?	8m	9k	11f	12f, 14e[b]	13e
	1d. Decisiveness To what extent was a dimension decisive in accepting knowledge?	8o	9l	11i	12e, 14d[b, e]	13d[e]
2. Critical attitude To what extent was a critical attitude shown towards a dimension?		8h, 8j[c,d]	9i	11d	12d, 14c[b]	13c
3. Justificationism To what extent did the project try to justify knowledge by searching for supporting evidence in the form of a dimension?		8n	9n	11h	*No questions*	*No questions*

Notes:

[a] 8a = role of primary empirical data, 8b = role of secondary empirical data, 8c = role of personal empirical data

[b] Questions 12a through 12f relate to the KodA innovation agenda and questions 14a through 14e relate to the project proposal

[c] 8h = attitude towards secondary empirical data, 8j = attitude towards personal empirical data

[d] 5-points scale variant: 1 = Never, 5 = Always

[e] We use the inverse scores

5.1.1.2 The innovativeness questionnaire (outsider's perspective)

We created a questionnaire to acquire an external perspective on the innovativeness of KodA projects. The questionnaire can be found in Appendix E. It included seven items that were measured with a 5-points Likert scale. The survey items were based on Freeman and Perez (1988), Garcia and Calantone (2002), Jorna (2006), and Geels and Schot (2007): Innovativeness is determined by the extent to which knowledge was available at the macro level, the extent to which knowledge was certain at the macro level, the extent to which knowledge was available at the micro level, the extent to which knowledge was available at the macro level, and the extent to which the project led to a socio-technological breakthrough at the micro level (see table 5.5). "Macro" referred to the level of the world, global industry or global market. "Micro" referred to the level of the firm and/or the customer. On the micro level we included an additional distinction, namely between the firms that executed the KodA projects and customers/users that would use the results of the KodA projects. We expected that differences existed between these two groups on the micro level and that these differences should be taken into account when measuring project innovativeness.

Table 5.5. Items for the innovativeness questionnaire: outsider's perspective on innovativeness

No.	Innovativeness items	Likert scale (low to high)	Score
1	Knowledge availability at the macro level	1 – 2 – 3 – 4 – 5	For each project p the innovativeness score IS_p
2	Knowledge availability at the level of the executing firm (micro level)	1 – 2 – 3 – 4 – 5	
3	Knowledge availability at the level of the customer/user (micro level)	1 – 2 – 3 – 4 – 5	$IS_p = 6 - \frac{\sum_{i=1}^{7} \frac{\sum_{e=1}^{n} item_{i,e}}{n}}{7}$
4	Knowledge certainty at the macro level	1 – 2 – 3 – 4 – 5	
5	Knowledge certainty at the level of the executing firm (micro level)	1 – 2 – 3 – 4 – 5	Where: p is the project number
6	Knowledge certainty at the level of the customer/user (micro level)	1 – 2 – 3 – 4 – 5	i is the item number; e is the expert number; n is the number of experts
7	Socio-technological breakthrough at the micro level	1 – 2 – 3 – 4 – 5	surveyed

5.1.2 Respondent selection

A KodA project usually consisted out of multiple project members with different tasks and responsibilities. The person that was responsible for a KodA project was the project leader. He had a high-level overview of the project and he knew the details about every task in the project. The project leader was therefore the most suitable project member of KodA projects to interview. In total eighteen project leaders have led seventy-six KodA projects in the period 2006-2010. We removed one project leader from the pool who was unable to participate in the research because of other obligations. A second project leader was removed from the pool due to possible conflicting stakes with respect to this study. This resulted in a final pool of sixteen KodA project leaders who were candidates to be interviewed. We sent out a request for the interview and a short introduction of the topic to the sixteen candidates. We received a positive response from all sixteen candidates.

When a project leader led more than one project we selected a KodA project based on the innovativeness. We used innovativeness as selection criterion because we wanted to investigate the role of knowledge claim evaluation in innovations, i.e., our main research question (see Chapter 1). We assessed the innovativeness for each project based on project documentation. In this assessment we focused on the formulation of the project objectives (e.g., was it formulated in a general way or was it formulated in a very specific way), the project description (i.e., newness of knowledge and current usage in the field) and the deliverables (i.e., exploratory results or exploitation results). At the start of the interview we asked whether the project leader agreed with the project we selected as being the most innovative one. In addition, we asked whether the project leader recalled the project sufficiently.

After we interviewed the sixteen project leaders, we measured innovativeness of KodA projects from an outsider's perspective by asking four experts to complete the innovativeness questionnaire (see section 5.1.1.2). The respondents were experts in arable farming and had ties to the KodA program. We asked each expert to complete the survey for each of the sixteen KodA projects. A brief project description for each project (i.e., title, KodA theme, objectives and results) was attached to the questionnaire.

5.1.3 The interview procedure

We conducted the interviews between October 2009 and December 2009. At the start of the interview, we informed the interviewee about our intentions with the interview. We explained to the interviewees that we wanted to acquire an understanding of how knowledge was evaluated in KodA projects. Subsequently, we discussed our personal selection of a KodA project whenever the project leader led multiple projects (see previous section).

During the interview we provided instructions and explanations per questions or category of questions. Where necessary we provided a definition or examples in order to ensure that the respondent understood the question. In addition, some questions needed to be discussed in combination with the project's documentation (e.g., questions concerning the project objective) or the KodA program documentation (e.g., questions concerning the KodA program objectives). We brought all relevant documentation to the interview. We marked each answer on a results form. The average time spent with interviewees was between one and two hours. All interviews were digitally recorded as a backup.

5.1.4 Data analysis

We performed a descriptive analysis; we did not aim to generalize our findings to the entire KodA program (all 76 projects). Henceforth, whenever we refer to KodA projects, we refer to the sixteen KodA projects that we have investigated. The results of each dimension are discussed on the level of the sixteen KodA projects (see table 5.4). We present medians (abbreviated: Mdn) and interquartile ranges (abbreviated: IQR) because the answers on the interview questions were measured on an ordinal level (measured by using a 5-points Likert scale). Where possible, we calculated a single aggregate score for multiple interview questions that belonged to the same type of dimension. Aggregate scores were calculated when the questions showed positive correlation coefficients and Cronbach's alpha equal to or greater than 0,6. For aggregate scores we report means (abbreviated: M) and standard deviations (abbreviated: SD).

5.2 Results

This section discusses the results of our investigation of sixteen KodA projects. Section 5.2.1 introduces the sixteen KodA projects we studied. Section 5.2.2 discusses the performance of the KodA projects. Section 5.2.3 discusses the findings with regard to knowledge claim evaluation in KodA projects.

5.2.1 Overview of KodA projects and project leaders

The sixteen project leaders (all male) were participating in one of the five KodA themes (see introduction). We interviewed three project leaders that led projects in the Quality Improvement program theme (theme 1), four project leaders in the Efficiency Improvement program theme (theme 2), three project leaders in the Sustainable Farm Management program theme (theme 3), three project leaders in the Knowledge Construction theme (theme 4) and three project leaders in the Integration and Standardization program theme (theme 5). The project leaders were affiliated to different types of organizations: university (2 project leaders), research institute (2), commercial firm (2), cooperation firm (5), farm (2), public-private organization (2) and governmental institute (1).

5.2.2 Performance of KodA projects

Table 5.6 provides an overview of the results with regard to the performance of KodA projects. Figure 5.2 provides the corresponding boxplots. We calculated an aggregate score for the KodA program agenda based on six items that KodA participants formulated at the beginning of the KodA program. The six-items in this scale correlate positively and the scale's Cronbach's alpha is 0,88. The KodA program objectives achievement mean is 3,51 (SD = 0,77). These five results show that, on the whole, the sixteen KodA projects were perceived as (highly) innovative and performing (very) well. Project number "sixteen" is the only KodA project that was not perceived as innovative by its project leader (figure 5.2 depicts the outlier as a small circle). However, the questions that concentrate on the general performance of KodA projects (i.e., questions 2d and 4b) have smaller interquartile ranges than questions concentrating on the practical performance of KodA projects (questions 2f, 2g and the KodA program agenda questions 3b, 3c, 3d, 3e, 3f, 3g). It indicates that differences existed between KodA projects with respect to the *practical* outcomes of projects. Section 5.2.4 discusses project innovativeness from an external perspective based on the questionnaire completed by experts.

Table 5.6. Descriptives for performance of KodA projects

	Performance scores of KodA projects				
Item	Project objective achievement	Project successfulness	Project results practical usability	Project innovativeness	KodA program agenda
Interview-guide	2d: The official project objective has been achieved	2f: The project can be tagged as successful	2g: Participants and partners can use project results in practice	4b: The project could be tagged as innovative after project completion	3b, 3c, 3d, 3e, 3f, 3g: The objectives as listed in the KodA innovation agenda have been achieved
N	16	16	16	16	15
Median	4,0	4,5	4,0	4,0	-
IQ 25%	2,25	4,0	3,0	4,0	-
IQ 75%	5,0	5,0	5,0	5,0	-
Mean	-	-	-	-	3,51
Std. dev	-	-	-	-	0,77

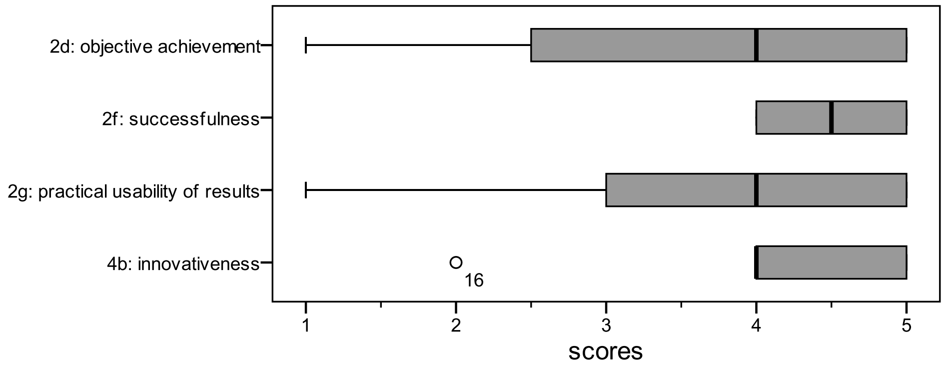


Figure 5.2. Boxplots of KodA project performance[13]

[13] Across this results section, there are minor differences between the quartile ranges listed in the tables and the quartile range displayed in the boxplots. The reason for this is because SPSS uses a different method to calculate interquartile scores for boxplots (i.e., the weighted average method versus Tukey's (1977) Hinch method)

5.2.3 Knowledge claim evaluation in KodA projects

This section presents the findings on how the sixteen KodA projects evaluated knowledge. Section 5.2.3.1 presents the results with regard to the epistemological positions taken in knowledge claim evaluation in KodA projects. Section 5.2.3.2 presents the results with regard to the role of the five dimensions in KodA projects. Section 5.2.3.3 provides the results on the level of individual KodA projects.

5.2.3.1 Epistemological positions in KodA projects

The interview guide included three questions about the type of epistemological position that KodA projects adopted (see figure 5.3). The details of the three interview questions specified per individual project can be found in Appendix C (see table c.0.2). The median for the ignorance avoidance versus error avoidance tradeoff is 3,5 (IQR 2,0–4,0). KodA projects thus took various positions with regard to this tradeoff and showed no unified preference towards one of the two theories of evaluation. The median for question 7b, the short-term versus long-term knowledge development trade-off, is 3,0 (IQR 2,25–3,75). Hence, on the whole, KodA projects did also not exhibit short-term or long-term knowledge development. The median for question 7c, the useful knowledge versus true knowledge tradeoff is 1, which indicates that KodA projects aimed to produce useful knowledge rather than true knowledge. Figure 5.3 depicts one outlier: project 1 is the only project that took a moderate position with regard to the useful knowledge versus true knowledge trade off.

Table 5.7. Descriptives for the epistemological positions in KodA projects

	Epistemological position in KodA projects		
Item	Ignorance-avoidance versus error-avoidance	Short-term versus long-term knowledge development	Useful knowledge versus true knowledge
Interview guide	7a: The project took for granted that in order to avoid errors, the project might overlook or ignore opportunities	7b: Knowledge development on the long term was more important than knowledge development on the short term	7c: The truth was more important than the usefulness of knowledge
N	16	16	16
Median	3,5	3,0	1,0
IQ 25%	2	2,25	1,0
IQ 75%	4	3,75	1,75

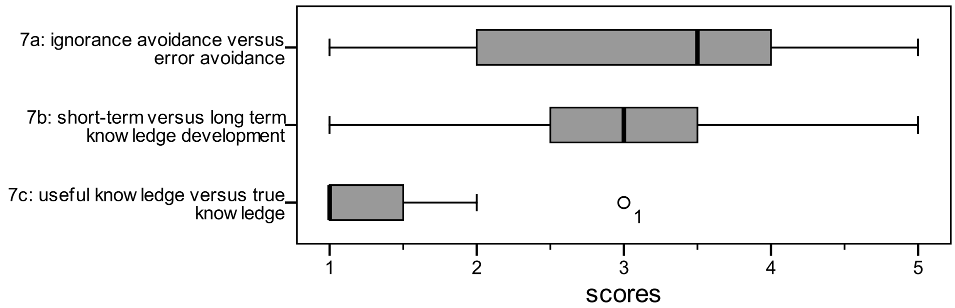


Figure 5.3. Boxplots for epistemological positions

5.2.3.2 The five dimensions in KodA projects

Table 5.8 lists the results with regard to the role of the five dimensions in KodA projects. Subsequently, table 5.9 shows the results with regard to the critical attitude of KodA projects toward the five dimensions and the extent of justificationism in KodA projects. The result details of each dimension per individual project can be found in Appendix C.

In the following paragraphs, we intend to compare the role of each dimension in the sixteen KodA projects. We used multiple interview questions to measure each dimension. Ideally, we would have calculated a single aggregate score for each dimension from the scores on the various interview questions. However, this was only possible for two out of the five dimensions, namely the authority and intuition dimensions (see table 5.8). We did not calculate single aggregate scores for the empirical evidence, organizational intentions and existing knowledge dimensions because inter-question correlations coefficients were negative and/or Cronbach's alphas were too low. The correlation coefficients for the relevant interview questions for each of the five dimensions can be found in Appendix C. With regard to the authority and intuition dimensions, we found positive correlation coefficients between the corresponding interview questions. For the authority dimension, Cronbach's alpha is 0,79 and for the intuition dimension, Cronbach's alpha is 0,90. Because we do not have single aggregate scores for all five dimensions, we will use the decisiveness question to compare the five dimensions (question 1d in table 5.8). The decisiveness question is the most valid (least ambiguous) question compared to the other three questions – questions 1a, 1b and 1c in table 5.8 – to measure the role of the each dimension in KodA projects. Consequently, table 5.8 lists both the single aggregate scores for the authority and intuition dimensions – i.e., for the combined score of questions 1a, 1b, 1c and 1d – as well as the decisiveness score – question 1d only.

The results in table 5.8 with respect to the decisiveness question (question 1d) indicate that empirical evidence was the most decisive type of evidence in KodA projects (Mdn = 3,0; IQR 3,0–4,0) and intuition and organizational intentions the least decisive type of evidence (Mdn = 1,5; IQR 1,0-2,0). The highest median score is only 3,0 and the lowest median score is 1,5: The differences between the highest and lowest medians are marginal. It thus seems that none of the five dimensions were decisive in knowledge claim evaluation in KodA projects. However, the large interquartile ranges, the outliers and the large distances between extreme values displayed in the boxplots in table 5.8 indicate that knowledge claim evaluation practices differed across KodA projects. Because of the differences between individual KodA projects, the current level of analysis provides an incomplete image of knowledge claim evaluation. We, therefore, elaborate in section 5.2.3.3 on individual KodA projects, based on the results of the decisiveness question (question 1d, see table 5.8).

When we regard all four questions about the role of each dimension in knowledge claim evaluation, i.e., questions 1a through 1d (see table 5.8), the role of each dimension becomes more apparent. Empirical evidence is the type of evidence in KodA projects a) that was most important, b) that led to most discussions, c) that led to most modifications of knowledge and d) was most decisive. However, we compare and interpret various types of results by stating the above: we calculated single aggregate scores for the authority and intuition dimensions, whereas we did not calculate aggregate scores for the other dimensions. Drawing conclusions based on different types of scores remains problematic. We can only compare based on the decisiveness question (see above).

Besides the role of each dimension, we investigated the critical attitude KodA projects kept towards each of the five dimensions (see question 2 in table 5.9). The results indicate that KodA projects generally kept a (highly) critical attitude towards authority, intuition and existing knowledge, and to a lesser extent towards empirical evidence and organizational intentions. Additionally, we investigated the issue of justificationism (see question 3 in table 5.9): the justification of knowledge by searching for supporting evidence, while neglecting any opposing evidence. The results show that KodA projects did not adopt justificationist practices; instead KodA projects were open for contradictory evidence that could eventually refute knowledge. Similar to the results regarding the role of the dimensions (table 5.8) some of the results in table 5.9 have large interquartile ranges and large distances between extreme values. The finding underlines that knowledge claim evaluation practices differed across KodA projects.

Table 5.8. Overview of results: Role of the five dimensions in KodA projects

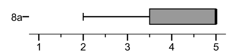
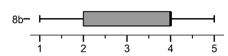
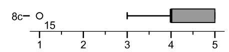
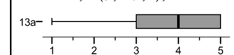
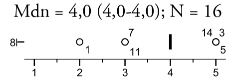
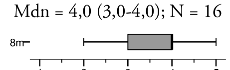
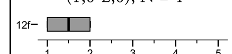
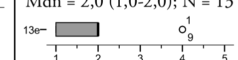
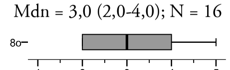
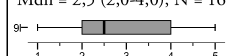
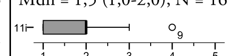
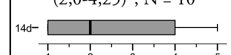
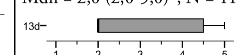
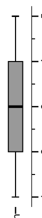
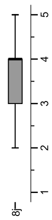
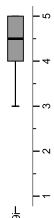
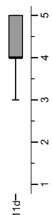
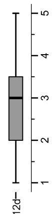
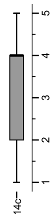
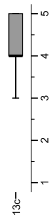
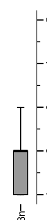
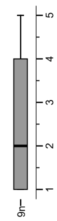
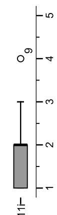
	Dimensions: evidence type and evaluation criterion				
	Empirical evidence	**Authority**	**Intuition**	**Organizational intentions**	**Existing knowledge**
1a. Importance To what extent palyed a dimension an important role in supporting intermediate results and conclusions	Primary data Mdn = 5,0 (3,25-5,0)*; N = 16  Secondary data Mdn = 4,0 (2,0-4,0); N = 16  Personal data Mdn = 4,0 (4,0-5,0); N = 16 			Aggregate score (interview questions: 12a, 12b, 12c, 14a) M = 2,66 (SD = 1,21); N = 16	Mdn 4,0 (3,0-5,0); N = 16 
1b. Discussion To what extent was knowledge subjected to discussions if a dimension changed or became available?	Mdn = 4,0 (4,0-4,0); N = 16 	Aggregate score 1a, 1b, 1c, 1d (interview questions: 9a, 9j, 9k, 9l) M = 3,33 (SD = 0,84); N = 16	Aggregate score 1a, 1b, 1c, 1d (interview questions: 11a, 11e, 11f, 11i) M = 2,53 (SD = 1,33); N = 16	No interview questions	No interview questions
1c. Change To what extent was knowledge modified or rejected if a dimension required a modification or rejection of knowledge	Mdn = 4,0 (3,0-4,0); N = 16 			KodA agenda Mdn = 1,5 (1,0-2,0); N = 4  Proj. proposal Mdn = 2,0 (2,0-5,0); N = 5 	Mdn = 2,0 (1,0-2,0); N = 13 
1d. Decisiveness To what extent was a dimension decisive in accepting knowledge?	Mdn = 3,0 (2,0-4,0); N = 16 	Mdn = 2,5 (2,0-4,0); N = 16 	Mdn = 1,5 (1,0-2,0); N = 16 	KodA agenda Mdn = 1,5 (1,0-2,0); N = 4  Proj. proposal Mdn = 2,0 (2,0-4,25)*; N = 10 	Mdn = 2,0 (2,0-5,0)*; N = 11 

Table 5.9. Overview of results: Critical attitude and justificationism with regard to the five dimensions

	Dimensions: evidence type and evaluation criterion				
	Empirical evidence	**Authority**	**Intuition**	**Organizational intentions**	**Existing knowledge**
2. Critical attitude To what extent was a critical attitude shown towards a dimension?	Secondary data Mdn = 3,0 (2,0-4,0) N = 11  Personal data Mdn = 4,0 (3,0-4,0); N = 15 	Mdn = 4,5 (4,0-5,0); N = 16 	Mdn = 4,0 (4,0-5,0); N = 12 	KodA innovation agenda Mdn = 2,0 (2,0-3,75)*; N = 8  Project proposal Mdn = 4,0 (2,0-4,0); N=12 	Mdn = 4,0 (4,0-5,0); N = 13 
3. Justificationism To what extent did the project try to justify knowledge by searching for supporting evidence in the form of a dimension	Mdn = 2,0 (1,0-2,0); N = 14 	Mdn = 2,0 (1,0-4,0); N = 16 	Mdn = 1,0 (1,0-2,0); N = 8 	*No interview questions*	*No interview questions*

5.2.3.3 The five dimensions per individual KodA project

Table 5.10 lists the scores on the decisiveness question per individual KodA project. We consider scores of 4 and 5 as an indication that a dimension was decisive in the KodA project, and scores of 1 and 2 as indecisive. This results in: five KodA projects without any decisive dimension; seven KodA projects where empirical evidence was decisive, five KodA projects where authorities were decisive, four KodA projects where organizational intentions (i.e., the project proposal) were decisive, and four KodA projects where existing knowledge was decisive. There is only one KodA project where intuition was decisive: KodA project nine. Project nine is also displayed as an outlier in the boxplot of question 1d, intuition dimension in table 5.8. It should be noted, however, that all dimensions were decisive (scores $\geq$ 4) in project nine (see table 5.10).

In order to identify knowledge claim evaluation practices we look for "patterns" in table 5.10. The idea underlying this strategy is that the three existing approaches of knowledge claim evaluation prescribe dimensions that are decisive and that are indecisive (i.e., dimensions that should not be used at all in knowledge claim evaluation). First, we review the combinations of decisive dimensions (i.e., scores $\geq$ 4). In table 5.12, we counted how often a particular decisive dimension was associated with an indecisive dimension. For instance, in project one, empirical evidence and organizational intentions were decisive, and authority and intuition were indecisive. The results in table 5.12 underline the special position of the empirical evidence dimension in KodA projects. First, there were no KodA projects where empirical evidence was indecisive while one of the four other dimensions was decisive. Secondly, in the seven KodA projects where empirical evidence was decisive, intuition was six times indecisive. A relation may exist between the decisiveness of empirical evidence and the indecisiveness of intuition.In table 5.12 we counted how often a particular decisive dimension was associated with an indecisive dimension. For instance, in project one, empirical evidence and organizational intentions were decisive, and authority and intuition were indecisive. The results in table 5.12 underline the special position of the empirical evidence dimension in KodA projects. First, there were no KodA projects where empirical evidence was indecisive while one of the four other dimensions was decisive. Secondly, in the seven KodA projects where empirical evidence was decisive, intuition was six times indecisive. A relation may exist between the decisiveness of empirical evidence and the indecisiveness of intuition.

Table 5.11 lists these decisive dimension patterns and the number of KodA projects for which the patterns applied. We found eight different decisive dimension patterns that were applied in eleven of the sixteen KodA projects (in table 5.12 we counted how often a particular decisive dimension was associated with an indecisive dimension. for instance, in project one, empirical evidence and organizational intentions were decisive, and authority and intuition were indecisive. the results in table 5.12 underline the special position of the empirical evidence dimension in koda projects. first, there were no koda projects where empirical evidence was indecisive while one of the four other dimensions was decisive. secondly, in the seven koda projects where empirical evidence was decisive, intuition was six times indecisive. a relation may exist between the decisiveness of empirical evidence and the indecisiveness of intuition.

table 5.11). Empirical evidence is part of five patterns, authority is part of four patterns, existing knowledge and organizational intentions are part of two patterns, and intuition is only listed in one pattern.

Table 5.10. Project comparison: the role of each dimension indicated by the decisiveness of dimensions

	Decisiveness of dimensions in knowledge claim evaluation				
Dimension	Empirical evidence	Authority	Intuition	Organizational intentions[a]	Existing knowledge
Interview guide	8o: Empirical data were always decisive in accepting knowledge	9l: The opinion and knowledge of experts was always decisive in accepting knowledge	11i: Intuition was always decisive in accepting knowledge	14d[b]: It was always possible to disregard the project proposal	13d[b]: It was always possible to disregard the results from previous project
Project 1	4	2	1	4	-
Project 2	2	3	1	2	2
Project 3	3	4	3	1	4
Project 4	2	2	3	-	-
Project 5	3	4	2	-	5
Project 6	3	1	2	4	2
Project 7	4	3	1	2	2
Project 8	3	2	1	5	2
Project 9	5	4	4	5	5
Project 10	4	4	1	-	5
Project 11	2	2	2	-	-
Project 12	2	2	2	1	2
Project 13	4	2	1	2	2
Project 14	4	5	2	-	2
Project 15	5	1	1	1	-
Project 16	2	3	1	-	-
N	16	16	16	12	13
Median	3,0	2,5	1,5	2,0	2,0
IQ 25%	2,0	2,0	1,0	2,0	1,0
IQ 75%	4,0	4,0	2,0	5,0	2,0

Notes

[a] *this column shows the scores for project proposal only (the N for KodA program agenda was too low, see table 5.8)*

[b] *we reversed the original scores of interview questions 13d and 14d to match them with the other dimensions*

In table 5.12 we counted how often a particular decisive dimension was associated with an indecisive dimension. For instance, in project one, empirical evidence and organizational intentions were decisive, and authority and intuition were indecisive. The results in table 5.12 underline the special position of the empirical evidence dimension in KodA projects. First, there were no KodA projects where empirical evidence was indecisive while one of the four other dimensions was decisive. Secondly, in the seven KodA projects where empirical evidence was decisive, intuition was six times indecisive. A relation may exist between the decisiveness of empirical evidence and the indecisiveness of intuition.

Table 5.11. Patterns of decisive dimensions and number of KodA projects

Decisive dimensions (i.e., scores $\geq$ 4)	Number of KodA projects
Empirical evidence only	3 (19%)
Empirical evidence and authority	1 (6%)
Empirical evidence and organizational intentions	1 (6%)
Empirical evidence, authority and existing knowledge	1 (6%)
Empirical evidence, authority, intuition, organizational intentions and existing knowledge	1 (6%)
Authority and existing knowledge	2 (13%)
Organizational intentions only	2 (13%)
No decisive dimension(s)	5 (31%)

Table 5.12. Number of occurrences of minor-major dimensions combinations in KodA projects

		Indecisive dimensions				
		Empirical evidence (5)	Authority (8)	Intuition (13)	Organizational intentions (5)	Existing knowledge (7)
Decisive dimensions	Empirical evidence (7)	x	3	6	3	3
	Authority (5)	-	x	3	1	1
	Intuition (1)	-	-	x	-	-
	Organizational intentions (4)	-	3	3	x	2
	Existing knowledge (4)	-	-	2	1	x

Note
The number between brackets next to each dimension is the number of KodA projects where a dimension had a score $\geq$ 4 (i.e., desicive dimension) and a score $\leq$ 2 (i.e., indecisive dimension)

5.2.4 The innovativeness of KodA projects (outsider's perspective)

We discussed the innovativeness and performance of KodA projects as perceived by project leaders in sections 5.2.1 and 5.2.2 (the outsider's perspective on innovativeness). Based on those results, we can conclude that 15 out of 16 KodA projects were innovative; a number of projects were even perceived as highly innovative.

Table 5.13. Results of the innovativeness expert survey (outsider's perspective on innovativeness)

	Expert 1		Expert 2		Expert 3		Expert 4	
	Innovativeness score	SD	Innovativeness score	SD	Innovativeness score	SD	Innovativeness score	SD
Project 1	2,43	0,18	3,00	0,15	2,86	0,12	3,57	0,10
Project 2	2,43	0,18	3,43	0,13	3,43	0,10	3,71	0,13
Project 3	3,00	0,11	3,43	0,18	3,29	0,13	3,86	0,12
Project 4	2,14	0,19	3,43	0,18	3,57	0,13	3,43	0,17
Project 5	2,14	0,09	2,71	0,06	3,43	0,10	2,43	0,10
Project 6	1,86	0,09	3,14	0,09	2,86	0,12	3,43	0,07
Project 7	2,14	0,14	2,43	0,10	2,71	0,10	3,86	0,09
Project 8	2,86	0,09	3,14	0,12	3,29	0,13	4,00	0,13
Project 9	1,86	0,19	3,00	0,13	3,00	0,08	3,43	0,10
Project 10	2,43	0,18	3,43	0,18	3,29	0,10	3,57	0,10
Project 11	2,57	0,17	3,00	0,08	3,00	0,08	3,86	0,05
Project 12	2,86	0,12	3,43	0,15	3,29	0,10	3,86	0,12
Project 13	3,14	0,05	3,29	0,10	2,71	0,06	2,00	0,08
Project 14	2,71	0,10	3,14	0,14	2,29	0,06	2,00	0,08
Project 15	2,57	0,07	3,29	0,10	2,57	0,07	2,00	0,08
Project 16	2,57	0,07	3,00	0,13	2,86	0,05	3,29	0,13
Mean	2,48		3,14		3,03		3,27	
SD	0,37		0,28		0,35		0,70	

After we interviewed project leaders, we asked four experts to assess the innovativeness of KodA projects by completing the innovativeness questionnaire (see

5.1.1.2). The results of this measurement are listed in table 5.13. The lowest possible score was 1, and the highest possible score was 5. The results in table 5.13 show that there were small differences with respect to innovativeness between KodA projects. In addition, the average innovativeness scores of the four experts ranges from 2,48 to 3,27, indicating that KodA projects were neither highly innovative nor highly non-innovative. The internal consistency (calculated as Cronbach's alphas) for the combined score of the four experts was however low. The four experts thus perceived the innovativeness of KodA projects differently. Consequently, we cannot distill a single aggregate innovativeness score per KodA project to explore whether different levels of innovativeness related to different practices of knowledge claim evaluation across KodA projects.

5.3 Discussion of results

We stated the following research question and sub research questions in the beginning of this chapter: (RQ 3) *Which practice(s) of evaluating knowledge claims can be found in KodA projects* and (Sub-RQ 3a) *To what extent does knowledge claim evaluation in KodA projects concord with the explanations found in knowledge management theory as we presented in Chapter 2?* In this discussion we will answer these questions based on the results of the study.

We first examined the epistemological positions taken in KodA projects – the theory of truth (e.g., the Theories of Correspondence, Coherentism, Pragmatism, and Consensus) and the theory of evaluation (e.g., the Theories of Foundationalism and Criticalism) – by asking three questions to project leaders. The first two questions concerned the error-avoidance versus ignorance-avoidance trade-off and the short-term knowledge development versus long-term knowledge development trade-off. Projects that exhibited error-avoidance and short-term knowledge development adopted Foundationalism as theory of evaluation, whereas projects that exhibited ignorance-avoidance and long-term knowledge development adopted Criticalism as theory of evaluation. KodA projects, however, did not exhibit clear patterns indicating one of the two theories of evaluation. The result of the third question was clear: it points to the adoption of a Pragmatist theory of truth in KodA projects rather than a Correspondence or Coherence theory of truth. In Chapter 2 we argued that the Pragmatist theory of truth can be found in the Managerial approach of knowledge claim evaluation. Although the latter finding is clear, we need to discuss the other results before we draw any conclusions.

The backbone of our analysis was made by inquiring around five dimensions. The dimensions consisted out of various evidence types and evaluation criteria used in knowledge claim evaluation. By comparing the role of each dimension in the KodA projects, we describe the practice of knowledge claim evaluation. Subsequently, we evaluate to what extent the dimensions converge with the three prescribed dimensions of existing approaches presented in Chapter 2 (see table 2.1). Based on the three existing approaches, we expect that one or more dimensions played a prominent role in KodA projects, whereas one or more of the other dimensions did not play a role of importance. The results, however, indicated that none of the five dimensions were decisive in knowledge claim evaluation (i.e., low to mediocre median scores: 1,5 $\leq$ median scores $\leq$ 3). We elaborate two explanations for this finding. We first discuss the impact of our a-priori assumptions. Secondly, we discuss the selection, operationalization and measurement of the dimensions in relation to the outcomes of the study.

The first explanation for the unexpected findings relates to our a-priori assumptions and expectations. In addition to the expectation that we would find one or more prominent dimensions, we first expected these results to be largely alike across the sixteen KodA projects. We therefore chose a high level of aggregation. However, the large interquartile ranges, the existence of outliers and the large distances between extreme values, as displayed in table 5.8, indicated that large differences between individual KodA projects existed. Thus, the analysis on this high aggregate level was not as insightful as we expected.

We lowered the level of aggregation in section 5.2.3.3, where we focused on individual KodA projects based on the results of the decisiveness question (question 1d, see table 5.8). We found that empirical evidence was the decisive type of evidence in knowledge claim evaluation in most KodA projects: it was decisive in 7 out of the 16 KodA projects (see table 5.10). Intuition was decisive in only one KodA project. The number of different decisive dimension patterns (in table 5.12 we counted how often a particular decisive dimension was associated with an indecisive dimension. for instance, in project one, empirical evidence and organizational intentions were decisive, and authority and intuition were indecisive. the results in table 5.12 underline the special position of the empirical evidence dimension in koda projects.

first, there were no koda projects where empirical evidence was indecisive while one of the four other dimensions was decisive. secondly, in the seven koda projects where empirical evidence was decisive, intuition was six times indecisive. a relation may exist between the decisiveness of empirical evidence and the indecisiveness of intuition.

table 5.11) and decisive and indecisive dimensions patterns (table 5.12) highlight the high variety of knowledge claim evaluation practices in KodA projects. Moreover, we only identified one dimension pattern associated with a KodA project that resembled the Entrepreneurial approach (i.e., project nine). This finding contrasts an expectations set in Chapter 2 that, in innovative projects, empirical evidence is lacking and cannot be used (Boisot and MacMillan, 2004).

The patterns that we associated with the other fifteen KodA projects show unclear images of knowledge claim evaluation. We found three projects with a dimensions pattern converging with the Open approach: in projects seven, thirteen, and fifteen empirical evidence was decisive, and (most of) the other dimensions were indecisive (see table 5.10). The epistemological position (i.e., Pragmatist theory of truth) did however not match with the Open approach. We did not find projects with an identical "Managerial" dimension pattern (i.e., empirical evidence, authority, organizational intentions and existing knowledge should be decisive dimensions). Authority was a decisive dimension in projects three, five, ten and fourteen (see table 5.10); however, one or more other dimensions that should be decisive were missing. It is obvious that the results are scattered and do not point out towards a clear conclusion. This analysis does not provide the required level of detail to study or understand knowledge claim evaluation. Therefore, in the two upcoming studies in Chapter 6 and 7 we lowered the level of aggregation in combination with applying informal argumentation theory.

The second explanation for the unexpected outcomes concerns the selection, operationalization and measurement of each dimension. The primary source and inspiration for the five dimensions were the three existing approaches of knowledge claim evaluation, as discussed in Chapter 2. We already indicated in Chapter 2 that these approaches are abstract and empirically unexplored. In this study, we did not aim at finding additional dimensions or exploring other manifestations of the dimensions. Furthermore, we operationalized each dimension in the interview guide by referring to practical concepts that were familiar to project leaders. This, however, led to questions that did not cover the full theoretical meaning of each dimension. For instance, we operationalized existing knowledge as knowledge obtained in previous and similar projects, even though the concept of existing knowledge theoretically entails (far) more than this. Experts (i.e., a form of authority) and project leaders could have relied on existing knowledge when they used personal experiences as evidence, etc. Nevertheless, our operationalization led to questions that were concrete and focused on the actual context of KodA projects, and were understandable to project leaders.

The abovementioned example also discloses an issue with regard to the operationalization of the empirical evidence, authority and intuition dimensions. The boundaries between these dimensions were not clear-cut. For instance, an expert could have used his intuition to evaluate knowledge. Yet there are more overlapping examples: "personal data" was part of the empirical evidence dimension (see table 5.4), but one could argue that it should be positioned under the authority or intuition dimension. We did not explore the "gray areas" in this study. Noteworthy was the low consistency of the questions that measured the empirical evidence dimension: we were unable to calculate an aggregate score for this dimension. It is an indication that our interview questions about empirical evidence dealt with different aspects of the role of empirical evidence in knowledge claim evaluation. Because we could not calculate an aggregate score, we had to use a limited set of questions in order to compare the five dimensions. Using a limited set of questions affects the reliability of the results. The abovementioned issues concerning the selection, operationalization and measurement of the five dimensions are another reason why we introduce informal argumentation theory in Chapter 3, and why we apply it in the two upcoming in-depth empirical studies described in Chapters 6 and 7.

To what extent does knowledge claim evaluation in KodA projects concord with the explanations found in knowledge management theory, as we presented in Chapter 2?

We concentrate on two findings. First, KodA projects evaluated knowledge in a variety of ways: The results indicate that empirical evidence played the most important role in KodA projects, whereas they indicate that organizational intentions and intuition did not play any role. Secondly, in sections 5.2.1 and 5.2.2, we reported that 15 out of 16 KodA projects were (highly) innovative. These two findings combined seem to contradict existing theory that we labeled as the Entrepreneurial approach of knowledge claim evaluation in Chapter 2. Boisot and

MacMillan (2004) argue that in highly innovative settings, empirical evidence is lacking and other types of evidence are used (or should be used), i.e., intuition. There was only one KodA project where intuition was a decisive dimension, i.e., project nine.

It is, however, questionable to what extent our measurement of innovativeness in the interview guide corresponded with the notion of innovativeness used in Boisot and MacMillan (2004). First, we explained innovativeness to project leaders during the interviews by referring to the West and Farr's (1990) definition of innovation (see Chapter 1, section 1.1). West and Farr (1990) provide a tolerant definition of innovation. The "application" of anything that is "new" to a certain "adoption-unit" is already considered as innovative. We requested the project leaders to interpret innovativeness in the light of this definition. Using this tolerant definition could have resulted in the high innovativeness scores. Secondly, KodA project leaders only assessed their own project, which we selected for the interview, whereas a comparison of their project with other KodA projects might have yielded a different assessment of innovativeness.

In order to acquire an outsider's perspective of innovativeness, tuned to the discussion of Boisot and MacMillan (2004), we created an additional questionnaire that we had completed by four experts. The results of this questionnaire indicated there were no KodA projects that were highly innovative or highly non-innovative. Based on this outsider's perspective of innovativeness, the finding that intuition was indecisive in almost all KodA projects does not contrast Boisot and MacMillan's (2004) theory. We were, however, unable to assess a reliable innovativeness score for each individual KodA project because the aggregate scores of the four experts were inconsistent. Consequently, we could not explore whether the differences between the KodA projects were related to the different degrees of innovativeness. Both the insider's perspective on project innovativeness as well as the outsider's perspective of project innovativeness show how subjective the concept of innovativeness can be in reality.

Finally, we reviewed the issues of critical attitude and justificationism in knowledge claim evaluation. The issue of critical attitude is one of the cornerstones of the Open approach of knowledge claim evaluation, as we discussed in Chapter 2. McElroy (2003) and Firestone and McElroy's (2003b) criticism on existing approaches of knowledge claim evaluation especially concentrates on authority, intuition and organizational intentions: organizations tend to be uncritical towards these sources of evidence. The KodA project leaders indicated in the interviews that this was not an issue in their projects. Another cornerstone of the Open approach is based on the notion that organizations tend to justify knowledge by searching for supporting evidence, while neglecting any opposing evidence (i.e., justificationism, see question 3 in table 5.9). The results show that KodA projects did not adopt justificationist practices; instead KodA project leaders indicated that they were open for contradictory evidence that could eventually lead to the falsification of knowledge. Thus, KodA projects adopted an Open approach with regard to critical attitude and justificationism.

5.4 Conclusion

The KodA program constituted a context of seventy-six innovation projects executed in the period 2006-2010. We interviewed KodA project leaders in order to collect information about knowledge claim evaluation in sixteen KodA projects. The main question that this study aimed to answer was which practices of evaluating knowledge claims can be found in KodA projects. The epistemological positions and various evidence types and evaluation criteria (the five dimensions) discussed in Chapter 2 form the linchpin in this study.

The sixteen KodA projects did not adopt a clear epistemological position with regard to the distinction between Foundationalism and Fallibilism theories of evaluation. The results did show that KodA projects adopted a Pragmatic theory of truth, as it can also be found in the Managerial approach. With regard to the five dimensions, i.e., the types of evidence and evaluation criteria used in KodA projects, the clear-cut distinctions we identified between the Open, Managerial and Entrepreneurial approaches in Chapter 2 could not be found in this study. We found a variation of configurations. Empirical evidence was the most decisive dimension in KodA projects, whereas intuition was the least decisive dimension. This finding contrasts Boisot and MacMillan (2004). They argue that in highly innovative settings empirical evidence is lacking and cannot be used. According to project leaders, KodA projects were innovative or highly innovative. Yet, we found that empirical evidence was a decisive source of evidence in the highest number of KodA projects, whereas intuition was only decisive in one project.

Because the abovementioned assessment of innovativeness concerned an insider's perspective on innovation, obtained by interviewing project leaders, we additionally measured the innovativeness of KodA projects from an outsider's perspective. Four domain experts completed a small questionnaire for each KodA project. This measurement showed that none of the KodA projects was highly innovative nor (highly) non-innovative. By combining this finding with Boisot and MacMillan's (2004) theory, it can be explained why intuition was not a decisive dimension in KodA projects. We were however unable to pinpoint the exact differences between the innovativeness of KodA projects because the innovativeness survey yielded inconsistent results. Consequently, we could not explore whether the ample variations with respect to the role of the five dimensions across KodA projects could be explained by differences in innovativeness. In addition, the results of the two innovativeness measurements (insider's and outsider's perspectives) show how subjective the concept of innovativeness can be in reality.

Lastly, the results with regard to the critical attitude and justificationism were clear. KodA projects were critical towards the various types of evidence and evaluation criteria, and justificationism was not an issue. The largest share of this study's findings underlines the conclusion of Chapter 2, where we expressed our concern that knowledge claim evaluation in practice is much more detailed and multifaceted than existing theories describe, explain and prescribe. We therefore augmented the theory of knowledge claim evaluation with informal argumentation theory in Chapter 3. We had to study knowledge claim evaluation on a lower aggregation level (i.e., on the level of knowledge claims in two innovation projects) in the two upcoming empirical studies in Chapters 6 and 7.

Chapter 6

The Siemens BT study: Analyzing reconstructions of an innovation project with informal argumentation theory

This chapter is an edited and extended version of a journal article published in Management Learning (Peters et al., 2011)

The empirical setting of this study was the headquarters of Siemens Building Technology (Siemens BT), a large building technology multinational. Siemens BT was developing a new product pricing method for its regional companies around the globe. The regional companies applied ad-hoc pricing methods. By developing an improved pricing system, a 2% increase in overall profits should be gained. Because Siemens BT did not have experience with the subject of pricing, nor experience with a project of such magnitude and scope, the project team collaborated with a team of specialized consultants. The project was steered by Siemens BT top management – hereafter referred to as the steer-co.

Siemens BT employed a workforce of approximately 38,000 employees in 51 countries in 2008. The company totaled sales of 6,000 million Euros and a group profit of over 460 million Euros in the 2007/2008 fiscal years. Siemens BT has several divisions, which produces products and provides associated services for building security, life safety and building automation. Innovation at Siemens BT is described in publicity material as 'the key to success'. Siemens BT invests substantial resources in research and development, maintaining two experimental and testing laboratories for building automation and fire safety at its headquarters.

The study focused on the Pricing Project within Siemens BT headquarters. The Siemens BT CEO initiated the Pricing Project. The aim of the project was "to substantially and sustainably increase Siemens BT's profit by development and implementation of practical pricing methods and tools in Siemens BT regional companies" (according to official project documentation). The project was organized according to a traditional project set-up covering a period of approximately nine months (February 2008 – November 2008). The phases included a start-up stage, diagnosis stage, design stage, testing stage and implementation stage. Our analysis focused on the start-up and diagnosis stages. Although knowledge claim evaluation could be found in all stages of the Pricing Project, the starting stages were most interesting because the project team was confronted with relatively high levels of uncertainty. We briefly discuss the activities of the two starting stages.

In the set-up stage, the project team formulated the project definition agreement (PDA). The PDA was an agreement between the project team and the steer-co. The PDA described the Pricing Project's objectives, scope, planning and budget. The set-up stage also included a selection of regional companies for the diagnosis, design and implementation stages, and the procurement of consultants to execute parts of the project. In the diagnosis stage, the Pricing Project team first selected fourteen problem areas (i.e., pricing levers, see Appendix F) related to pricing that were candidate for improvement. They used the pricing knowledge provided by hired consultants. Consequently, the consultants visited the selected regional companies and diagnosed the situation. The consultants presented the final selection of six pricing levers to the project team and the steer-co in a project meeting.

The core of the Pricing Project team consisted of two full time members and six part-time members with workloads varying from 10-50%. The steer-co consisted of the CEOs of Siemens BT and managers of all Siemens BT business divisions. The team was complemented with a team of six consultants during the execution stages of the Pricing Project (from the diagnosis stage onwards). On the level of the regional companies, two to four representatives were appointed to coordinate the project on the local level.

Together with the two other studies in Chapters 5 and 7, this chapter aims to answer our third research question as formulated in Chapter 1: *Which practices of evaluating knowledge claims can be found in existing innovation projects?* With regard to the Siemens BT study we can re-formulate this question as follows:

Research question 3:

Which practice of evaluating knowledge claims can be found in the Pricing Project at Siemens BT?

In comparison to the KodA study, in the previous chapter, this study augments the empirical exploration by applying informal argumentation theory to an in-depth reconstruction of the Pricing Project. We associate two sub research questions with this study: Sub question 3a) *To what extent does knowledge claim evaluation in the Pricing Project at Siemens BT concord with the explanations found in knowledge management theory (Chapter 2)?* And sub question 3b) *To what extent does knowledge claim evaluation in the Pricing Project at Siemens BT concord with the aspects from informal argumentation theory (Chapter 3)?* We refer to figure 2 in Chapter 1 for an overview of all research questions in this thesis.

6.1 Methods

This section describes the methodological details of the Siemens BT study (see figure 6.1). We first discuss the data collection methods and the data sources we used. Subsequently, we explain how we analyzed the data using existing knowledge claim evaluation and informal argumentation theory.

6.1.1 Data collection

The methods of collection our data in the Siemens BT study included using a key informant, conducting semi-structured interviews with project members and employing secondary data such as project documentation. Full access to project documentation was granted throughout the entire project period. Table 6.1 provides an overview of the data sources we used in this study.

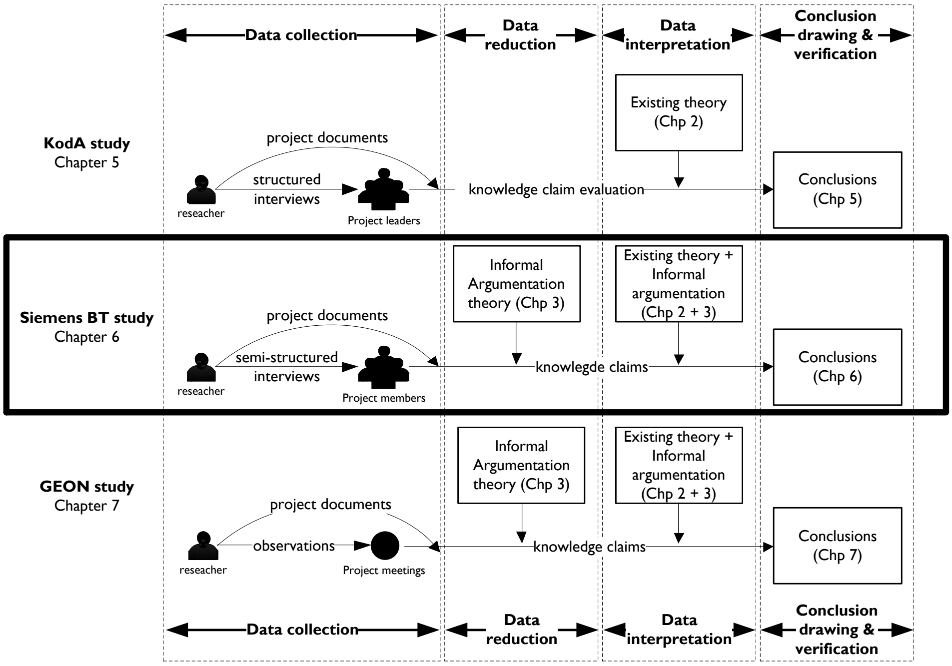


Figure 6.1. Overview of three empirical studies including data collection and analysis activities

We used a key informant to obtain an insider's view of the Pricing Project. We selected the key informant based on his full-time role in the Pricing project and his willingness to participate in the research. We had online meetings with the key informant every week in which he provided us the latest developments of the project. We discussed the decisions made, the problems encountered and the role various project stakeholders, such as project members, management, and consultants played. We visited Siemens BT headquarters in the last week of the diagnosis stage. We conducted interviewees with other project members and we spent four days at Siemens BT headquarters to become familiar with the company and the project. We attended the final project meeting of the diagnosis stage where the consultants presented results of their visits to the regional companies. We prepared the interviews by conducting a pre-analysis of existing project and consultant documentation. Interviewees were selected based on their participation in the Pricing Project and their willingness to participate in the research. We asked interviewees to report chronologically all relevant project activities. All interviews have been recorded and transcribed.

Table 6.1. Overview of data sources

Data sources	Details
Number of interviews	6
Average length of interviews	1,5 hours
Hours spent with key informant	15 hours
Attended project meetings (as non-participant observer)	4 hours
Site visits (as non-participant observer)	4 days
Project documentation	Full access
Consultant documentation	Full access
Company data	Full access

6.1.2 Data reduction

We structured and reduced the collected data in two stages. In the first stage, we identified the knowledge claims that had been accepted throughout the first two project stages (see figure 6.2). We concentrated on identifying the most essential knowledge claims for the Pricing Project, which were advocative knowledge claims. Project documentation offered the primary source for identifying accepted advocative knowledge claims. We grouped the accepted advocative claims according to topic and according to project event. The set of accepted advocative knowledge claims forms the input for the second stage of the analysis. In the second stage, we applied informal argumentation theory to analyze the transcripts based on the key informant and interviews. We refer to this stage as the *argumentative analysis*. The argumentative analysis consists out of four steps, which we elaborate below: 1) identification of accepted and rejected knowledge claims in transcripts, 2) identification of argumentation structures, 3) assigning properties to the components of the argumentation structures, and 4) identification of methods used to challenge knowledge claims. We iterated these steps during the argumentative analysis of the Pricing Project. In the result section, we will provide a detailed application of the argumentative analysis based on a sample from the Pricing Project data.

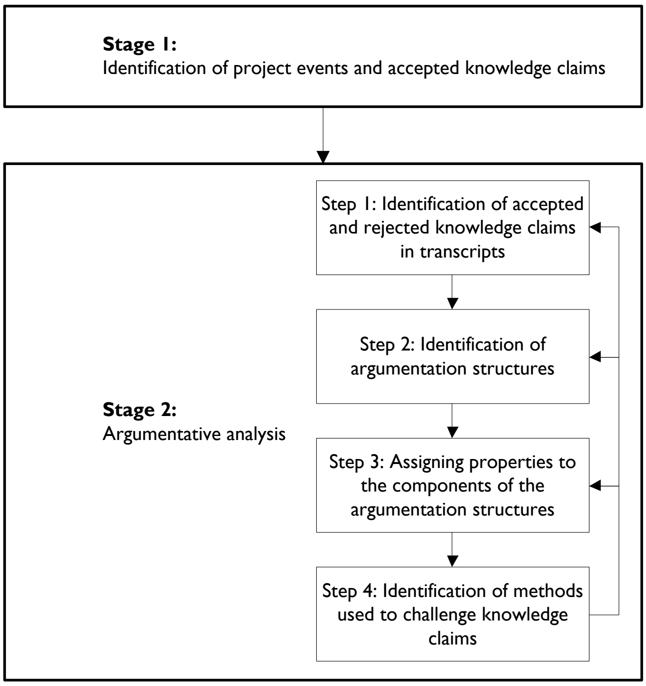


Figure 6.2. Data reduction analysis stages and steps in the Siemens BT study

Step 1 – Identification of the accepted and rejected knowledge claims in transcripts

In the first step of the argumentative analysis we scanned the interview transcripts for the accepted advocative knowledge claims that we identified in project documentation (stage 1). Near the location of the accepted advocative knowledge claim in the transcripts we identified the associated argumentation and the knowledge claims that have been rejected in favor of the accepted knowledge claim.

Step 2 – Identification of argumentation structures

In the second step of the argumentative analysis we analyzed the argumentation structure associated with each accepted and rejected knowledge claim identified in the previous step. Chapter 3 presents four argumentation structures: single argumentation, multiple argumentation, coordinative argumentation, subordinative argumentation (see section 3.1.3). We also explained in Chapter 3 that the more comprehensive argumentation structures can be decomposed into one or more chunks based on the Toulmin (1958) framework: knowledge claim, warrant and data.

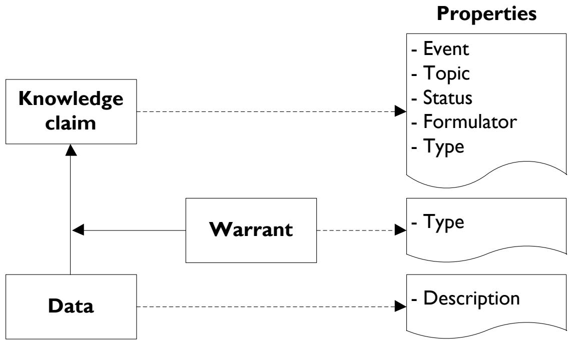


Figure 6.3. The Toulmin (1958) framework and properties assigned in the Siemens BT study

Step 3 – Assigning properties to the components of the argumentation structures

In the third step of the argumentative analysis, we assigned properties to each component in the argumentative structures we identified in the previous step (see figure 6.3). With regard to the knowledge claim component, we analyzed five properties according to predefined or project-specific values as listed in table 6.2: event, topic, status, formulator and type. The event property points to the Pricing Project event in which the knowledge claim has been formulated, using the timeline we constructed in the first stage of the analysis. We found the following events in the Pricing Project: project start decision, project definition, regional company selection, consultant selection, preliminary lever selection, on site diagnosis, results of diagnosis. We describe the topic of the knowledge claim using the list of topics we identified in the first stage of the analysis of the Pricing Project: project objective, project focus, pricing levers, and regional companies. The status property indicates whether the knowledge claim has been rejected or accepted. The formulator property lists the group or person who formulated the knowledge claim. Pricing Project stakeholders who formulated knowledge claims were: the steering committee (steer-co), consultants, the project team, and others. Finally, the type property describes the type of knowledge claim according to the knowledge claim typology we discussed in Chapter 3 (see section 3.2.3): designative, definitive, explanatory, evaluative, predictive or advocative.

Table 6.2. Properties of knowledge claims in the Pricing Project

Knowledge claim Property	Description	Options in the Pricing Project
Event	Project event in which knowledge claim has been formulated	Project start decision, project definition, regional company selection, consultant selection, preliminary lever selection, on site diagnosis, or results of diagnosis
Topic	Topic of the knowledge claim	Project objective, project focus, pricing levers, or regional companies
Status	Indicates whether the knowledge claim has been accepted or rejected	Accepted or rejected
Formulator	Group who formulated the claim or data	Steer-co, consultants, project team or other
Type	Type of knowledge claim	Designative, definitive, explanatory, evaluative, predictive or advocative (see Chapter 3, section 3.2.3)

With regard to the warrant component, we assessed the type of warrant that was applied to justify the knowledge claim in light of the provided data. As discussed in Chapter 3, warrants usually remain implicit in practical argumentation, in so called enthymemes (i.e., argumentation structures with one or two implicit components). Chapter 3 presents two types of enthymemes: an enthymeme with an explicit data component and an implicit warrant component, and an enthymeme with both implicit data as well as an implicit warrant. In order to assess the type of warrant in the former type of enthymemes, i.e., with an explicit data component, we examined the type of evidence used in the data component(s). In this examination, we first described the data in the data components. This description was either a literal quote about the data or a condensed description about the nature of the data. Subsequently, we used the three evidence types that we defined in Chapter 3 to assess the type of warrant (see section 3.2.1.1). Table 6.3 summarizes the links between the various evidence types and warrant types. For the former type of enthymemes, i.e., with implicit data, we deduced the type of warrant following the five methods of deducing the type of warrant that we discussed in Chapter 3 (see section 3.2.1.2).

Argumentative analysis – step 4 – Identification of methods used to challenge knowledge claims

In this step, we analyzed whether and how the accepted and rejected knowledge claims have been challenged, i.e., through refutation, undercutting, and rebuttal (see Chapter 3, section 3.1.2). We summarize the workings of the three methods below:

1) The supporting data of a knowledge claim can be *refuted*, arguing that the data has not been adequately justified;
2) The argument can be *undercut* (or undermined) by asking one or more critical questions concerning the warrant, i.e., the inferential link between the data and the knowledge claim;
3) The claim can be *rebutted* by formulating a counter knowledge claim, which is a claim in the opposite (or different) direction of the opposed claim.

Table 6.3. Evidence types and associated warrants adopted from Chapter 3

Evidence type	Description	Sub types	Associated warrant type
Authority based evidence	evidence that stems from a source with a certain quality	*formal authority:* the legitimate power that a person or a group holds over another (i.e., formal authority) *expert authority:* experience, knowledge and skill that a person or group has *communitarian authority:* a (large) number of persons that supports the evidence or idea	Authoritative warrant
Empirical based evidence	evidence gained by means of observation, experience, or experiment	*primary data:* information gained by systematic studies and/or other research activities conducted by stakeholders *secondary data:* information gained by systematic studies and/or other research activities conducted by third parties *personal data:* information gained through personal observation, experience, or experiment	Substantive warrant
Existing knowledge claims	knowledge claims that have survived in past argumentative discussions	*epistemic evidence:* a form of existing knowledge that relates to one of the epistemic criteria as formulated by McElroy and Firestone (2003; see Chapter 2, and Appendix A) *organizational intentions:* a form of evidence that is given and fixed before the project started, or formulated and evaluated during the project and that relates to an organizational intention (e.g., strategy) or project intention (e.g., project objective, project scope, project set-up). *general intentions:* a form of evidence that concerns a general or commonly accepted kind of motivation, aspiration, or value. For instance, positive consequences are preferred over negative consequences; more profit is better than less profit, etc.	Motivational warrant

6.1.3 Data interpretation strategy and conclusion drawing

The result of the argumentative analysis – as we described above – was an argumentation structure for each accepted or rejected knowledge claim in the Pricing Project. In order to answer our research question, the identification of types of argumentation structures was the point of departure. We compared the argumentation structures that we identified in the Pricing Project with the argumentation structures of the Open, Managerial and Entrepreneurial approaches that we defined in Chapter 3. Subsequently, we counted the types of warrants used and the types of knowledge claims in the argumentation structures. In addition, we studied the nature of the data used, the methods of challenging knowledge claims and the (content) topics of the knowledge claims. These quantified results formed the starting point for the interpretation of the findings in the Pricing Project.

6.2 Results

The structure of this section follows the two stages of the analysis, as we explained in sections 6.1.2 and 6.1.3 (see figure 6.2). However, before we discuss the overall findings – the result of the argumentative analysis (stage 2) – we first describe the way we will present the results and provide a detailed description of the argumentative analysis, by concentrating on a sample of knowledge claims from the Pricing Project.

6.2.1 Identification of project events and accepted knowledge claims (stage 1)

Table 6.4 provides a chronological overview of events and knowledge claims in the Pricing Project. The first row displays the officially listed events of the Pricing Project for the initiation, set-up and diagnosis stages as listed in project documentation. From the interview and documentation data, we identified key events and listed these in the second row. Within each event, the Pricing Project team evaluated one or more knowledge claims. We gave each knowledge claim a unique identifier that corresponds with the event in which the knowledge claim was originally formulated (e.g., 2.x is a knowledge claim stemming from the project set up stage). We only display knowledge claims that were accepted, although several knowledge claims were modified during the project.

6.2.2 The argumentative analysis (stage 2)

We found that all knowledge claims, warrants and data in the Pricing Project followed the same type of argumentation structure: a combination of a multiple argumentation structure and a subordinative argumentation structure, which we will refer to as the multiple subordinative (M-S) argumentation structure. Figure 6.4 displays a general framework of the M-S argumentation structure as found in the Pricing Project. This M-S structure in the Pricing Project consisted out of two levels. The first level connected one or more data components to one of the accepted or rejected knowledge claims. The knowledge claims on this level were all of the advocative type. The second level connected one or more data components to the data component of the first level. On this level, we found the other types of knowledge claims, such as designative and evaluative knowledge claims. As expected, we did not find any explicit reference to the warrant components in the transcripts.

In order to keep the upcoming analysis as transparent and as understandable as possible we will present our findings in a nested table rather than in multiple displays of argumentation structures. The nested table follows the M-S argumentation structure and allows us to display the various properties to the argumentation components, while keeping the M-S argumentation structure intact. Figure 6.5 depicts the M-S argumentation structure from figure 6.4 as a nested table, including the properties we assign to each of the argumentation components (see also section 6.1.2).

Table 6.4. Chronological overview of Pricing Project events and accepted knowledge claims

Project stages	**1. Initial stage**		**2. Project set-up stage**			**3. Diagnosis stage**	
Project events	**Project start decision**	**Project definition**	**Regional company selection**	**Consultant lever proposals**	**Preliminary lever selection**	**On-site diagnosis @ regional companies**	**Presentation of results**
Project objective	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas	KC 1.1: Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas
		No change	No change	No change	No change	No change	No change
Project focus		KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE)	KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE)	KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE)	KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE), [but] KC 3.1b Pricing Strategy (PS) is a problem that should be dealt with in the future (e.g. in new project)	KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE), but Pricing Strategy (PS) is a problem that should be dealt with in the future (e.g. in new project)	KC 2.1d: Pricing is maximizing profit by Pricing Execution (PE), but Pricing Strategy (PS) is a problem that should be dealt with in the future (e.g. in new project)
			No change	No change	Minor change	No change	No change
Pricing levers				KC 2.4b: Lever selection proposed by consultants. Lever numbers: 3.1 to 3.10 for Pricing Execution (see Appendix YXZ)	KC 3.1a: General levers related to Pricing Execution are lever numbers: 2.8, 4.2, 4.3, 4.5 and 4.6. Core topics of Pricing Execution are lever numbers: 3.1, 3.2, 3.4, 3.7, 3.8, 3.9 and 3.10. (see Appendix A)	KC 3.1a: General levers related to Pricing Execution are lever numbers: 2.8, 4.2, 4.3, 4.5 and 4.6. Core topics of Pricing Execution are lever numbers: 3.1, 3.2, 3.4, 3.7, 3.8, 3.9 and 3.10. (see Appendix A)	KC 3.2: Levers to be included in the design stage are: <censored>
					Major change	No change	Minor change
Regional companies			KC 2.3c, 2.3d, 2.3e: The United States (USA), Poland and France are included in diagnosis	KC 2.3c, 2.3d, 2.3e: The United States (USA), Poland and France are included in diagnosis	KC 2.3c, 2.3d, 2.3e: The United States (USA), Poland and France are included in diagnosis	KC 2.3c, 2.3d, 2.3e: The United States (USA), Poland and France are included in diagnosis	KC 2.3c, 2.3d, 2.3e: The United States (USA), Poland and France are included in diagnosis
				No change	No change	No change	No change
Project scope		KC 2.2: Product Business is the focus of the Pricing project	KC 2.2: Product Business is the focus of the Pricing project	KC 2.2: Product Business is the focus of the Pricing project	KC 2.2: Product Business is the focus of the Pricing project	KC 2.2: Product Business is the focus of the Pricing project	KC 2.2: Product Business is the focus of the Pricing project
			No change	No change	No change	No change	No change

Another detail concerning the presentation of our findings is the way we deal with the methods of challenging knowledge claims. First of all, we only found the rebuttal method in the Pricing Project. We defined rebuttal in Chapter 3 as the method that challenges a knowledge claim by formulating a counter knowledge claim in the opposite (or different) direction. We do not display the counter knowledge claim. Instead, we use the relationship between the data component and the knowledge claim on the first level of the M-S argumentation structure (see figure 6.4) to present and include information about the rebuttals. The knowledge claim/data component can either "support" the knowledge claim or "challenge" the knowledge claim. Rebuttals are represented by knowledge claim/data components that "challenge" the knowledge claim.

Finally, note that we assess the type of motivational warrant in figure 6.5 by making use of the three sub types as defined in table 6.3: epistemic criteria (E), organizational intentions (OI), and general intentions (G).

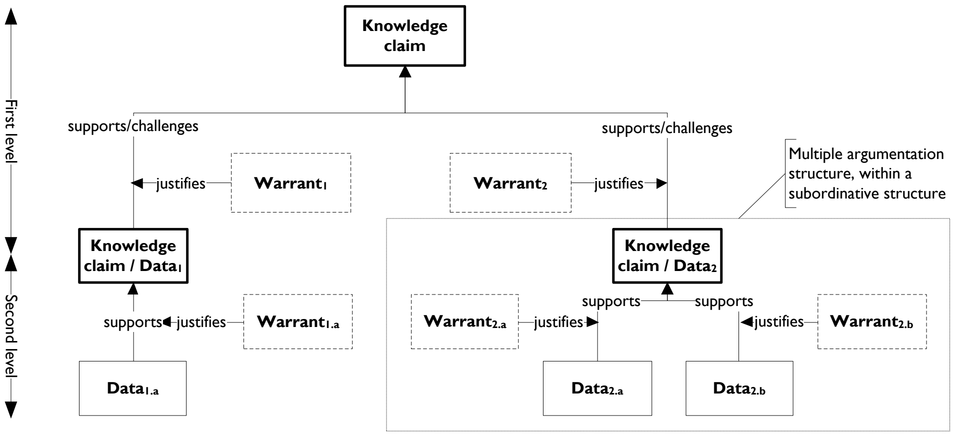


Figure 6.4. The general multiple subordinative (M-S) argumentation structure found in the Pricing Project

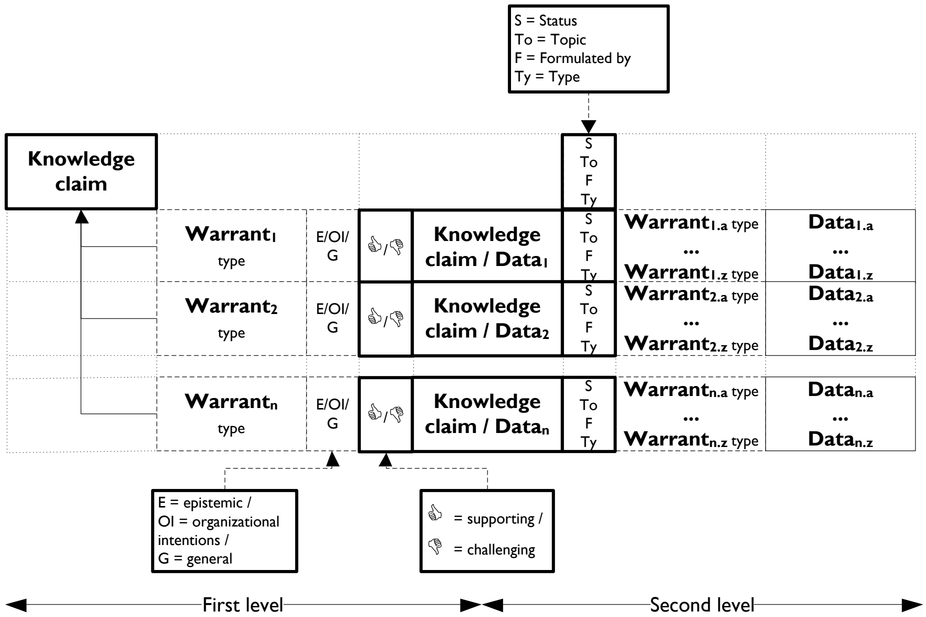


Figure 6.5. The general multiple subordinative (M-S) argumentation structure found in the Pricing Project depicted as nested table, including the properties of the argumentation components

6.2.2.1 Detailed description of the argumentative analysis based on a sample

Before we present the overall results of the analysis, we provide a detailed application of the steps of the argumentative analysis. We elaborate the argumentative analysis for one particular knowledge claim and the associated argumentation, namely "Pricing is maximizing profit by value-based pricing". Practically, this knowledge claim meant, if accepted, that the Pricing Project would adopt value-based pricing as the method to deal with pricing in Siemens BT. It was however rejected. Besides value-based pricing, three other pricing methods were considered: pricing execution, transfer pricing and pricing strategy[14]. The project team thus formulated various pricing methods as (rather abstract) definitive knowledge claims, e.g., "Pricing is maximizing profit by value-based pricing". Based on the various interviews, we found that, in practice, this definitive knowledge claim determined what course of action the project would pursue. Hence, these definitive knowledge claims actually functioned as advocative knowledge claims. We therefore labeled all definitive knowledge claims that implied a course of action for the Pricing Project as advocative knowledge claims.

The M-S argumentation structure in figure 6.6 depicts the knowledge claims, warrants and data associated with the rejection of the value-based pricing knowledge claim. We start this application of the argumentative analysis by reviewing data component KC2.1a.III: "Value-based pricing will not increase profits by 2-3% on the short term". The results of the argumentative analysis can be found in table 6.5, which is an excerpt from the table with all results of this study in Appendix G.

KC2.1a.III was related to a previously formulated and accepted knowledge claim, namely KC1.1: "Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas". KC1.1 was an advocative knowledge claim evaluated only by the steer-co based on data provided by consultants. KC1.1 functioned as an organizational intention (i.e., motivational warrant) in the justification of the knowledge claims about the pricing methods. KC2.1a.III is a predictive knowledge claim that rebutted the value-based pricing knowledge claim KC2.1a. The challenge

[14] Pricing execution aims at managing the gap between the production costs (cost basis) and the customer's final bid price. Value-based pricing sets the selling price of products on the perceived value to the customer, rather than on the actual cost of the product, or the market price. Transfer pricing refers to the pricing of products transferred within an organization. Pricing strategy covers more strategic features of pricing, for instance life-cycle-pricing.

is warranted through the organizational intention KC1.1: the project objective (2-3% profit increase) would not be met if the value-based pricing method was adopted. Note that the organizational intention is one of the three types of motivational warrants we recognize. The data underlying KC2.1a.III came from the steer-co, who formulated KC2.1a.III, and the project team, who believed the validity of steer-co's knowledge claim. We therefore conclude that KC2.1a.III was justified through an authoritative warrant (see table 6.5).

KC2.1a.II is another knowledge claim that rebutted the value-based pricing knowledge claim KC2.1a: "Value-based pricing is too costly and too time consuming [to implement]". The Pricing Project had a fixed time period (9 months) and budget, as defined in the project definition agreement. We consider the agreements in the project definition agreement as an organizational intention. Hence, the challenge of KC2.1a.II is warranted through an organizational intention (i.e., motivational warrant). The data underlying KC2.1a.II came again from the steer-co, who formulated the knowledge claim, and from the project team, who agreed with the steer-co. We therefore conclude that KC2.1a.II was justified through an authoritative warrant (see table 6.5).

KC2.1a.I is the data that originally supported the value-based knowledge claim: "Value-based pricing is the best pricing approach". There is no particular organizational intention that warranted the value-based knowledge claim KC2.1a based on this data. We therefore assessed it as a motivational warrant that was based on general intentions. It was claimed that value-based pricing would lead to more positive consequences than the other pricing methods. The data underlying KC2.1a.I came from the project team. They told us 'if you open a text-book on pricing, you'll learn the value-based pricing is the best method', 'everybody knows that' and 'we still believe value-based pricing is the best approach'. Like the two other knowledge claim/data components KC2.1a.II and KC2.1a.III, KC2.1.a.I was not supported by substantive evidence. Hence, KC2.1.a.I was again justified through the authoritative warrant (i.e., the authority of the project team).

Eventually, the value-based pricing knowledge claim KC2.1a was rejected in the view of the other three pricing methods, i.e., transfer pricing, pricing strategy and pricing execution (see Appendix G, KC2.1b, KC2.1c and KC2.1d). The transfer pricing and pricing strategy knowledge claims were rejected as well, because it was claimed that 1) Siemens BT was already improving transfer pricing elsewhere within the company (i.e., KC2.1b.I) and 2) Siemens BT had already implemented the pricing strategy method (i.e., KC2.1c.I). Both knowledge claims were justified through an authoritative warrant. Consequently, the project team expected that the potential improvements of the pricing execution and pricing strategy methods were lower compared to the remaining pricing method alternative: pricing execution. Hence, the motivational warrant was used. The pricing execution method (KC2.1d) withstood the arguments based on which the other pricing methods were rejected. In addition, the project team explored the situation at the regional companies and concluded that pricing execution could lead to the aspired improvements. Hence, the substantive warrant was applied (see Appendix G, KC2.1d.I).

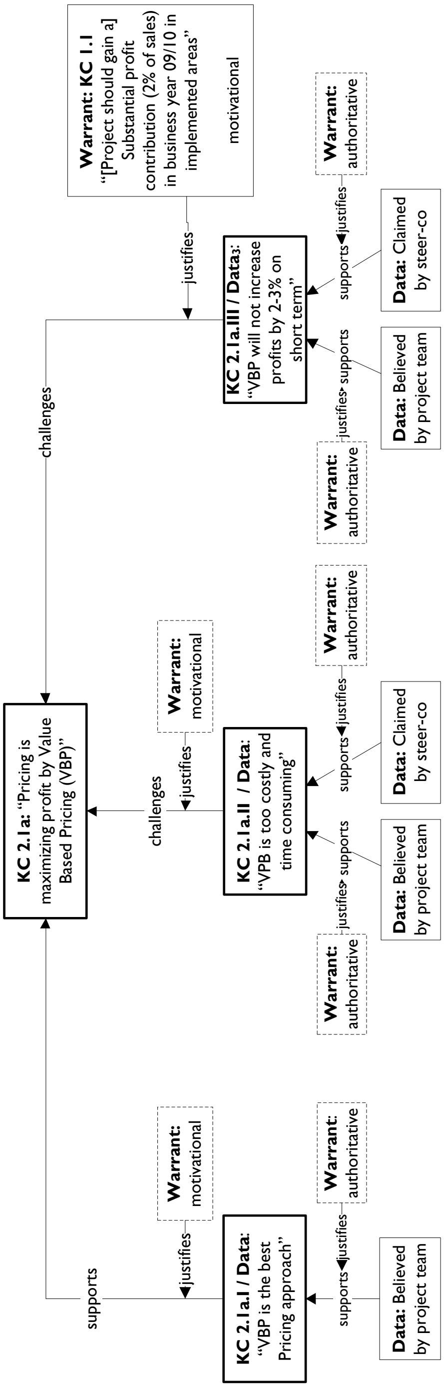


Figure 6.6. Argumentation structure for KC 2.1a: value-based pricing

Table 6.5. Analysis results for the value-based pricing knowledge claim (excerpt from Appendix G)

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍/👎	ID	KC / Data	✓/✗	KC topic	KC formulator	KC type	Warrant type(s)	Data
1.1	Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas						✓	Project objective	Steer-co	Advocative	Substantive + authoritative	Consultants provided previous business cases where on average a 2% profit was gained with pricing improvements
2.1a	Pricing is maximizing profit by Value Based Pricing (VBP)						✗	Project focus	Project team	Advocative		
		Motivational	General (positive consequence)	👍	**2.1a.I**	VBP is the best Pricing approach	✓		Project team	Evaluative	Authoritative	Claimed by the project team, based on existing belief that VBP is best approach
		Motivational	Organizational intentions (project scope)	👎	**2.1a.II**	VBP is too costly and time-consuming	✓		Steer-co	Evaluative	Authoritative	Claimed by the steer-co; and agreed by project team; no data, merely a belief
		Motivational	Organizational intentions (KC 1.1)	👎	**2.1a.III**	VBP will not increase profits by 2-3% on short-term	✓		Steer-co	Predictive	Authoritative	Claimed by the steer-co; and agreed by project team; no data, merely a belief

Note
✓= accepted, ✗ = rejected; [b] specification of the motivational warrant; 👍 supporting knowledge claim 👎 challenging knowledge claim

6.2.3 Overall findings

In reporting the overall findings we distinguish between the two levels of the multiple subordinative argumentation structure (see figure 6.4 and figure 6.5). Based on this distinction, table 6.6 shows that the Pricing Project team evaluated sixteen knowledge claims on the first level – all advocative knowledge claims – and twenty knowledge claims on the second level. The project team accepted ten knowledge claims and rejected six knowledge claims on the first level. On the second level, all knowledge claims have been accepted. There was no indication that refutation or undermining was used as a method to challenge knowledge claims. The majority of topics, which we only assessed for knowledge claims at the first level – were *not* about topics related to pricing levers, i.e., the actual aim of the Pricing Project: only four knowledge claims dealt with pricing levers. Yet this finding is not remarkable because we only analysed the early stages of the Pricing Project, where organizational issues and project definitions were extensively discussed.

As we already reported, the argumentation structures used in the Pricing Project are two-level multiple subordinative (M-S) argumentation structures (see figure 6.4). The motivational warrant was applied to justify the knowledge claims on the first level in the light of the data on the second level. Chapter 3 connects the M-S argumentation structure with the application of motivational warrants to (variants of) the Open or Managerial approaches. With regard to the M-S argumentation structure, thirteen knowledge claim/data components supported knowledge claims on the first level and eight knowledge claim/data components challenged knowledge claims on the first level. In total ten first level knowledge claims have been accepted, and six first level knowledge claims have been rejected. Hence, the (first level) knowledge claim to (second level) knowledge claim/data component ratio is 16 to 21. In other words, there were more first level knowledge claims, than second level knowledge claim/data components, that supported or criticized first level knowledge claims. This result indicates that knowledge claim evaluation in the Pricing Project did not involve an extensive argumentative discussion. Rebuttal was used eight times as a method to challenge knowledge claims.

The knowledge claim/data components on the second level supported or challenged the knowledge claims on the first level by using the motivational warrant (see table 6.7). We analyzed what type of motivational warrant was used. Motivational warrants were based on organizational intentions formulated before or during the

Pricing Project, and general justification criteria, such as positive and negative consequences. We did not find any application of one of the epistemic criteria as can be found in the Open approach (see Chapter 2). We however found two individual knowledge claims (i.e., Appendix G, KC 2.2.I and KC 2.3.a.II) where interviewees indicated that the supporting knowledge claim/data components on the second level were based on a hidden agenda of the steer-co. We did not include these hidden agenda claims in the numerical analysis (i.e., table 6.6 and table 6.7).

Table 6.7 shows the frequencies of the various types of knowledge claims and the warrant types per knowledge claim type. We notice that the advocative knowledge claim is the most prevalent knowledge claim type, followed by the evaluative, designative and predictive knowledge claim types. The Pricing Project did not use definitive and explanatory knowledge claim types. We identified twenty-two applications of a motivational warrant, sixteen applications of an authoritative warrant and eleven applications of a substantive warrant. The substantive warrant was only applied six times in order justify eighteen evaluative knowledge claims, whereas the authoritative warrant was applied twice as often: twelve times.

6.3 Discussion of results

In this section, we provide answers to our research questions by discussing the results of the study as reported in the previous section. We start the discussion by answering research question 3 (RQ 3).

RQ 3: Which practice of evaluating knowledge claims can be found in the Pricing Project at Siemens BT?

We found that all knowledge claims, warrants and data fitted a two-layered multiple subordinative (M-S) structure, in which the motivational warrant played an important role (see table 6.7). Within the motivational warrant, we identified both organizational intentions as well as general justification criteria (see table 6.6). We discuss to which of the three approaches these results correspond.

Table 6.6. Results of all knowledge claims from the Pricing Project

	Frequencies	
	First level	Second level
Formulator properties		
Steer-co	6	6
Project team	6	14
Consultants	4	0
Status properties		
Accepted	10	21
Rejected	6	0
Topic properties		
Project objective	1	
Project focus	6	
Regional companies	5	
Pricing levers	4	
Relationship properties		
Supporting	13	
Challenging	8	
Justification criteria properties		
Epistemic	0	
Organizational intentions	11	
General	9	

Table 6.7. Knowledge claim types versus warrant types in the Pricing Project

Knowledge claim	Total	Warrant types		
		Substantive	Authoritative	Motivational
Designative	5	4	1	0
Definitive	0	0	0	0
Explanatory	0	0	0	0
Evaluative	18	6	12	0
Predictive	1	0	1	0
Advocative	25	1	2	22

The management of Siemens BT had formulated a clear and explicit intention with the project: the Pricing Project should result in a profit increase of 2% within two years (i.e., project intention; KC1.1; see Appendix G). This intention was used for example to reject one of the competing knowledge claims in relation to pricing execution: the value-based pricing knowledge claim (KC 2.1a; see Appendix G). A second observation concerns the formulation of the project focus (KC2.2; see Appendix G): the steer-co decided that the Pricing Project should focus on the product business branch of Siemens BT rather than other branches. According to project staff, the reason for the steer-co's decision was the new corporate strategy of Siemens BT. KC2.2 was used to evaluate the regional companies where the diagnosis would take place and where the new pricing method would be tested. Thus, organizational intentions (i.e., a particular type of motivational warrant) played a crucial role in the Pricing Project. The usage of organizational intentions is in line with the Managerial approach of knowledge claim evaluation.

However, in order to label knowledge claim evaluation as Managerial, the Pricing Project should use as objectively verifiable evidence as possible alongside the organizational intentions. This was not the case. The application of the substantive warrant is much less apparent in the Pricing Project than the application of the authoritative or motivational warrant (see table 6.7). Moreover, most of the data components in the argumentation structures (see Appendix B) contained ad-hoc inquiries, personal observations, assumptions and beliefs. The data were rather subjective, incomplete and unverified, yet still, valid and reliable in the eyes of staff and management. These results disagree with the Managerial approach. Instead, they accord with the Entrepreneurial approach. It is obvious that all results exclude the Open approach: empirical evidence was hardly used, whereas authority-based evidence played a decisive role.

In conclusion, the results show that organizational intentions set by the steer-co had a decisive function in knowledge claim evaluation in the Pricing Project, which is an indication of the Managerial approach. However, we found a marginal role for the substantive warrant and, hence, marginal usage of empirical evidence in the evaluation of knowledge claims, which is an indication of the Entrepreneurial approach. We therefore conclude that the Pricing Project adopted a hybrid approach (Managerial and Entrepreneurial).

Sub-RQ 3a: *To what extent does knowledge claim evaluation in the Pricing Project at Siemens BT concord with the explanations found in knowledge management theory (Chapter 2)?*

First of all, the findings show that knowledge claim evaluation involves less objectivity and openness than suggested in the Open and Managerial approaches. Coherence (no contradictions in the existing knowledge base) was more important than correspondence (in agreement with the facts) in the Pricing Project. The Entrepreneurial approach relies on the Coherence theory of truth in knowledge claim evaluation. Boisot and MacMillan (2004, see Chapter 3, section 3.2.2) claim that their approach is effective when the intended innovation comes with high levels of novelty and uncertainty. They assume that facts, evaluated existing knowledge and other forms of empirical evidence do not exist in highly novel and uncertain situations. In such situations, other ways of evaluating knowledge claims, such as coherence and authorities, should be used to innovate. However, was the Pricing Project subject to highly uncertain and novel circumstances?

Project members, the steer-co and other Siemens BT staff had no prior experience in implementing a new pricing method. Consequently, they could not easily access facts and existing knowledge to justify certain knowledge claims. Yet, when we zoom in on the types of knowledge claims the Pricing Project had to evaluate, we notice that the situation was not always really uncertain and novel. Most notable in this respect was the evaluation of knowledge claims of the evaluative type. Most of these knowledge claims did not depend on a thorough understanding of pricing. The project team could have justified these evaluative knowledge claims through substantive warrants: these facts were available in the company. Nonetheless, the majority of evaluative knowledge claims were still justified through the authoritative warrant (see table 6.7). Moreover, when the substantive warrant was applied in relation to an evaluative knowledge claim, the evidence was highly subjective. The project team thus evaluated knowledge claims as if they had no access to empirical evidence and as if pricing expertise was required, yet this was not the case. The application of the Entrepreneurial approach in the Pricing Project seems to be inappropriate. This brings us to the criticism of organizations that adopt the Entrepreneurial approach, as can be found in the Open approach.

McElroy (2003) and Firestone and McElroy (2003b) pass criticism on coherence-based approaches such as the Managerial and Entrepreneurial approaches, and organizations that adopt such approaches. McElroy and Firestone argue that it increases the likelihood of falsehoods, because knowledge claims remain untested by others (Giroux and Taylor, 2002; Gourlay, 2006; McElroy, 2003; Notturno, 2000; Popper, 1972). We found that the number of knowledge claims on the second level of the M-S argumentation structure was hardly larger than the number of knowledge claims on the first level. On average, there was slightly less than one knowledge claim on the second level for one knowledge claim on the first level (i.e., a 16 to 21 ratio, see table 6.6). A higher average would mean that knowledge claims were more debated (more supporting and challenging knowledge claims) and could indicate that knowledge claims on the first level were evaluated in a more rigid manner. Our findings, however, indicate no rigid evaluation of knowledge claims, and therefore, support the concerns of McElroy and Firestone. Next, we single out two individual knowledge claims to illustrate these concerns.

The first of these two knowledge claims is KC 2.1c.I: "Siemens BT is already good in pricing strategy" (see Appendix G). Through this knowledge claim, the pricing strategy method was rejected (i.e., KC2.1c). KC2.1c.I was based on an unsubstantiated assumption by the steer-co and the project team. In a later stage of the Pricing Project, when pricing execution (KC2.1d) was already chosen as the main method, the project team found out that Siemens BT was actually *not* good in pricing strategy (see KC3.1b.I: "Pricing Strategy is problematic"). This knowledge claim was justified through a substantive warrant and based on facts. We did not investigate whether the faulty assumption had any serious consequences for the success of the project. Nevertheless, it illustrates McElroy and Firestone's criticism.

Another example illustrating McElroy and Firestone's criticism is the inclusion of the regional company in France as a test site for the project. According to project members, the regional company in France was included "due to political reasons" (see KC 2.3d, Appendix G). The project team claimed based on substantiated evidence (i.e., facts about the regional company in France), that the regional company in France was very unsuitable for designing and testing the pricing levers. The steer-co, however, claimed that France was suitable, but did not support this claim with any empirical evidence. According to an interviewee, the underlying reason for the steer-co to include the regional company in France was because "[…]

for one of the business units represented by a member in the steer-co, France is very important. A 2% profit increase would compensate the current losses in France". Hence, the steer-co commanded the project team to include the regional company in France, despite the possibility that this regional company was very unsuitable for designing and testing the pricing levers.

In conclusion, we found support in this study for the concerns about the Managerial and Entrepreneurial approaches of knowledge claim evaluation, as raised by Firestone and McElroy (see Chapter 2, section 2.2). The situation in the Pricing Project was oftentimes not novel and uncertain. Therefore, the hybrid Managerial-Entrepreneurial approach that we identified cannot be explained through the novelties and uncertainties that come with innovation projects. The findings support McElroy (2003) and Firestone and McElroy's (2003b) criticism of coherence-based approaches, such as the Managerial and Entrepreneurial approaches.

Sub-RQ 3b: *To what extent does knowledge claim evaluation in the Pricing Project at Siemens BT concord with the aspects from informal argumentation theory (Chapter 3)?*

Finally, we discuss the merits of using informal argumentation theory in our research. In this study we used informal argumentation theory to analyze knowledge claim evaluation in the Pricing Project. We identified argumentation structures and analyzed the elements of these structures. Consequently, we could explain how knowledge claims have been evaluated in the Pricing Project. We opened the black box of existing knowledge claim evaluation theories. We can therefore conclude that the application of informal argumentation theory was successful. There is, however, a limitation to our chosen approach and methods. Most importantly is that we relied on a reconstruction of the Pricing Project by project members. The first issue is that we could not interview members of the steer-co, who played an important role in the Pricing Project, to complement the reconstruction. Consequently, the reconstruction can be biased. A second issue is that, although we were able to conduct an argumentative analysis, the analysis itself was based on retrospective images of the argumentative discussions in the Pricing Project. We did not examine argumentative discussions, and hereby knowledge claim evaluation, in reality. Argumentative discussions take place e.g., in project meetings and in conversations between project members (per telephone, emails, and memos). The reconstructions, however, only include the highlights and results of the actual argumentative discussions. Moreover, it seems that project members informed us about the argumentative discussions in a very coherent way, whereas in practice, argumentative discussions can be far from being structured and coherent. The information was retrospectively processed and interpreted by project members. Based on these considerations, we decided to base our third study on real-time argumentative discussions. This study is presented in the next chapter: the GEON study.

6.4 Conclusion

This study focused on knowledge claim evaluation in the Pricing Project at the Siemens Building Technology (BT) headquarters in Switzerland. Siemens BT is a large multinational in building technologies. The Pricing Project implemented a new company-wide method of setting sales prices of Siemens BT's products. The main research question that this study aimed to answer was: *Which practice of evaluating knowledge claims can be found in the Pricing Project at Siemens BT?* We conducted an in-depth study of knowledge claim evaluation. We applied informal argumentation theory to a reconstruction of the Pricing Project, which we obtained through interviewing project members and a key informant.

We found that the Pricing Project had sufficient options to acquire supporting facts and other evidence to evaluate most knowledge claims, because, in reality, the Pricing Project was often not confronted with highly novel and uncertain circumstances. Hence, it was possible for the Pricing Project to evaluate knowledge claims with all three types of warrants: substantive, authoritative and motivational warrants. Nevertheless, the Pricing Project heavily relied on authoritative and motivational warrants. Substantive warrants fulfilled a minor role in knowledge claim evaluation. When the project applied the substantive warrant, the data (i.e., evidence) that supported knowledge claims were highly subjective or based on unsupported assumptions. Therefore, the Pricing Project adopted a hybrid approach, based on the Managerial and Entrepreneurial approaches. This hybrid approach possibly is an ineffective method to evaluate knowledge claims in the context of projects such as the Pricing Project. This study illustrated some of the criticisms of the Entrepreneurial and Managerial approaches as found in the Open approach: the success of innovation projects such the Pricing Project depends on the quality of knowledge claim evaluation.

Chapter 7

The GEON study: Analyzing argumentative discussions in an innovation project with informal argumentation theory

GEON is an independent consultancy firm in geographic information (geoinformation) management. The company's roots go back to the late eighties and early nineties. During that period, developments in ICT accelerated developments in the geoinformation field, e.g., the rising of Geographic Information Systems (GIS). At the same time, teaching staff of the polytechnic college *Hanzehogeschool* in Groningen formed a geoinformation unit that focused on the application of GIS technology in practice. This unit separated from the Hanzehogeschool in 2000 as GEON.

GEON employed a workforce of sixteen employees in 2009: one managing director, two senior managers, four senior advisors, five advisors, three technical advisors, and one desk manager. The organizational structure is highly flat, where, with respect to functional coordination, only the managing director is responsible. According to Gerlof (2008), GEON's mission is "to support effective and efficient usage of spatial information in government institutions" (p. 2; *my translation*). Government institutions include the Dutch Federal Government, Provinces, district water boards, local authorities, and semi state-controlled companies. The majority of GEON's services are provided to local authorities. These services include consultancy, project management, coaching and education. GEON strives to accomplish their mission by maintaining and improving a quality-driven organization; market leadership is not an objective.

In 2009 the primary goal of GEON was "to grow in a steady way" (Gerlofs, 2008). GEON further aimed at enlarging its workforce to twenty employees. To realize the main objective a number of projects have been organized in the beginning of 2009 that concerned the following goals:

- Organizing knowledge management by implementing "knowledge areas";
- Creating a new corporate identity of GEON;
- Extending GEON's work force;
- Creating career and personal development possibilities;
- Improving GEON office layout as preparation for workforce increase;
- Implementing GEON customer relationship management;
- Organizing meetings with peers;
- Improving labor/project hour registration;
- Implementing the web-based GEON Customer Portal;
- Internal ICT architecture;

Our study concentrated on the project that dealt with the implementation of a web-based GEON Customer Portal. A portal is a web site that provides an initial point of entry to the Internet or to internal company data (Laudon and Laudon, 2002). Two types of portals are distinguished in the literature: 1) general portals or horizontal portals (e.g. Yahoo, Simbaloo, AOL, Startpagina, etc.) that provide a directory of information on general topics such as the news, weather, sports, traffic, and maps, and 2) specialized portals or affinity portals to provide a service to users with specific interests or needs (Applegate et al., 2003). The latter type of portal was pursued at GEON.

The first ideas to develop a portal stem from 2008. Existing customers indicated a need for "aftercare" when GEON projects were finished: an interactive medium where the latest information about geoinformation developments can be found and further questions can be asked. The ideas for a customer portal took further shape in brainstorm sessions with visiting geo-information experts. In addition, GEON linked the topic to another goal: organizing knowledge management by implementing "knowledge areas". The customer portal was perceived as a means to organize external knowledge (management) processes. The Customer Portal project started in January 2009 and consisted out of five core members. The project leader was one of the non-senior advisors of GEON. Out of the four remaining project members, one member was a senior advisor and member of the management team, two members were technical advisor and one member was organizational advisor.

Together with the two other studies in Chapters 5 and 6, this chapter aims to answer our third research question as formulated in Chapter 1: *Which practices of evaluating knowledge claims can be found in existing innovation projects?* With regard to the GEON study we can re-formulate this question as follows:

Research question 3:

Which practice of evaluating knowledge claims can be found in the Customer Portal Project at GEON?

In comparison to the Siemens BT study, in the previous chapter, this study augments the empirical exploration by analyzing real-life argumentative discussions in an innovation project instead of a reconstruction. We associate two sub research questions with this study: Sub question 3a) *To what extent does knowledge claim evaluation in the Customer Portal Project at GEON concord with the explanations found in knowledge management theory (Chapter 2)?* And sub question 3b) *To what extent does knowledge claim evaluation in the Customer Portal Project at GEON concord with the aspects from informal argumentation theory (Chapter 3)?* We refer to figure 2 in Chapter 1 for an overview of all research questions in this thesis.

7.1 Methods

This section describes the methodological details of the GEON study. We principally adopted the same analysis approach based on informal argumentation theory as in the Siemens BT study. Figure 7.1, however, shows an essential difference between the method of data collection adopted in this study and the Siemens BT study. We used observations instead of semi-structured interviews. This change was due to the focus on argumentative discussions in the project rather than a reconstruction. We elaborate the methodological implications of this change in the upcoming sections.

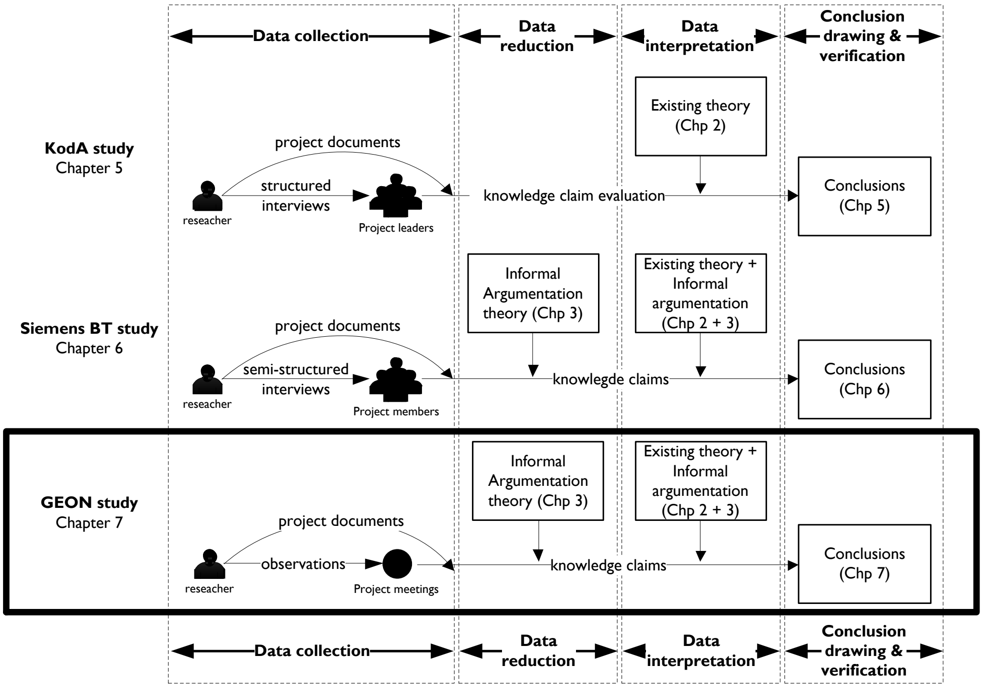


Figure 7.1. Overview of three empirical studies including data collection and analysis activities

7.1.1 Data collection

We conducted an overt, non-participant, and systematic observation of project meetings (see also Chapter 4, section 4.3.1.3) along with semi-structured interviews, key informants and document studies. Full access to project documentation, general company information and written communication (i.e., emails, project memos) was granted throughout the entire project. Table 7.1 provides an overview of the data sources we used in this study.

Within a period of nine months (March 2009 – December 2009) we observed nine project meetings, with a total length of 15 hours. The observation protocol was brief: we wrote down each and every articulated expression from project members, we noted how the expressions related to each other, and which project member formulated the expression. We did not participate in any of the discussions. All project members were informed about our research intentions. The names of the project members have been anonymized. We did not record the meetings because we feared it could influence the discussions in the meeting. All observation notes have been transcribed and stored in a Microsoft Access database.

Like in the Siemens BT study, we used a key informant. The key informant at GEON was the project leader. Because the project leader was replaced half way through the project, we used two different key informants. They provided us all the background information about the project and they regularly informed us about new developments. The key informant at GEON did not play the same role in obtaining data about knowledge claim evaluation as in the Siemens BT study. Instead, the bulk of the data was obtained by observing project meetings. Lastly, we conducted a semi-structured interview with GEON's managing director to obtain information about the company and about the rationale behind initiation of the Customer Portal Project.

Table 7.1. Overview of data sources

Data sources	Details
Observed project meetings (as non-participant observer)	9
Average length of project meetings	~100 mins
Number of interviews	1
Length of interviews	90 mins
Time spent with key informants	~ 4 hours
Site visits	12
Project documentation	Full access
Written communications	Full access
Company data	Full access

7.1.2 Data reduction

Similar to the Siemens BT study, we structured and reduced the collected data in two stages (see figure 7.2). The first stage is identical to the first stage of the Siemens BT study analysis. In this stage we identified advocative knowledge claims that had been accepted in the Customer Portal Project. The accepted knowledge claims were grouped according to topic and according to project event in order to keep track of developments. The topics were distilled from the set of accepted knowledge claims in project documentation. The one exception concerned the identification of accepted knowledge claims in the last stage of our study of the Customer Portal Project. Because project documentation was not available at the moment our data collection stopped, we identified the accepted knowledge claims based on the discussions in the final project meeting.

Instead of analyzing a reconstruction of the project, as in the Siemens BT study, we analyzed real-time argumentative discussions that we observed in the Customer Portal project meetings. Consequently, we needed to make some adjustments to the second stage: the argumentative analysis. First, we filtered the project meeting transcripts for expressions relevant in argumentative analysis. Beside knowledge claims, the expressions concerned questions, approvals and disapprovals, uttered in the discussions. We will discuss this step below. Secondly, it appeared that the project meeting transcripts did not include knowledge claims that could readily be connected to the accepted knowledge claims that we identified in the first stage (see above). Accepted knowledge claims as reported in project documentation were actually summaries, interpretations or combinations of the knowledge claims discussed in the project meetings. Hence, it was not possible to assign a status to knowledge claims (i.e., accepted and rejected). Consequently, the argumentative analysis consisted out of the following four steps, where the first step was different from the first step in the Siemens BT study in Chapter 6: 1) filtering of project meeting transcripts using the expression typology, 2) identification of argumentation structures, 3) assigning properties to the components of the argumentation structures, and 4) identification of methods used to challenge knowledge claims.

Step 1 – Filtering of project meeting transcripts using the expression typology

The project meeting transcripts contained various types of expressions[15] uttered by project members. For each expression, we assessed the type of expression: knowledge claims, questions, approvals and disapprovals (see below). Additionally, when an

[15] With expression we mean the act of expressing or setting something forth in words in the broadest sense

expression contained multiple expression types we decomposed and isolated each expression type.

- **Knowledge claim**: an expression of an assertive form; the knowledge claim expression can include data and/or warrant components;
- **Question**: an expression of an interrogative form;
- **Approval**: the expression of an approval, isolated from any explanation or reason (e.g., “yes”, “I like it” or “I agree”);
- **Disapproval**: the expression of a disapproval, isolated from any explanation or reason (e.g., “no” or “I disagree”);

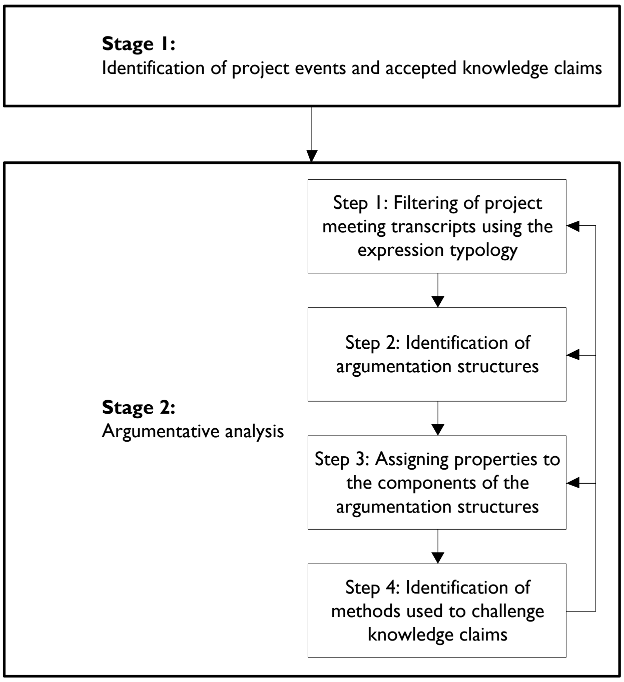


Figure 7.2. Data reduction analysis stages and steps in the GEON study

Step 2 - Identification of argumentation structures

In the second step of the argumentative analysis, we identified the argumentation structure associated with the accepted advocative knowledge claims identified in the previous step. Chapter 3 presents four argumentation structures: single argumentation, multiple argumentation, coordinative argumentation, subordinative argumentation (see section 3.1.3). We also explained in Chapter 3 that the more comprehensive argumentation structures can be decomposed into one or more components, based on the Toulmin (1958) framework.

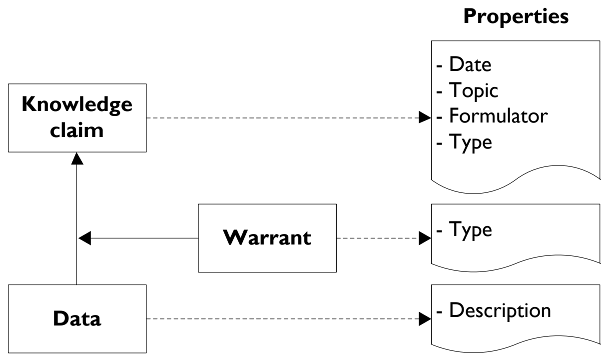


Figure 7.3. The Toulmin (1958) framework and properties assigned in the GEON study

Step 3 – Assigning properties to the components of the argumentation structures

In the third step of the argumentative analysis, we assigned properties to the components in the argumentative structures (see figure 7.3). With regard to the knowledge claim component, we analyzed five properties according to project-specific values as listed in table 7.2: date, topic, formulator, function, and type.

The date property refers to the date of the meeting in which the knowledge claim has been formulated. The topic property describes each knowledge claim by using the list of topics we identified in the first stage of the analysis of the Customer Portal Project (see section 7.2.1). The formulator property refers to the project member or other GEON personnel who formulated the knowledge claim. Finally, the type property describes the type of knowledge claim according to the knowledge claim typology we discussed in Chapter 3 (see section 3.2.3): designative, definitive, explanatory, evaluative, predictive or advocative. As indicated, we omitted the status property (i.e., accepted or rejected) because we could not establish a link with the accepted knowledge claims from project documentation. We used the same methods to analyze the data and warrant components of figure 7.3 as we used in the Siemens BT study (see Chapter 6, table 6.3).

In the upcoming argumentative analysis, we also include expression types other than knowledge claims, namely 1) questions, and 2) approvals and disapprovals. With regard to questions, we assessed the same properties as we did for knowledge claims (see table 7.2). Approvals and disapprovals were always related to a question or a knowledge claim. By approving or disapproving, a project member accepted or rejected the knowledge claim without further notice (e.g., data or knowledge claims about why he/she approves or disapproves).

Argumentative analysis – step 4 – Identification of methods of challenging knowledge claims

We analyzed how project members challenged knowledge claims in the Customer Portal Project. The Customer Portal Project meeting transcripts contained challenging knowledge claims (or questions) and project members' counter-reactions to these challenges. We discussed the interplay between challenges and counter-reactions as "burden of proof shifts" in Chapter 3 (see section 3.1.2).

7.1.3 Data interpretation strategy and conclusion drawing

We interpreted the argumentative data in the same way as we did in the Siemens BT study. In order to answer our research questions, we looked at the frequencies of usage of various expression types, knowledge claim and question types, topic types and warrant types. In addition, we calculated the same frequencies for each project member separately. We will present the results in section 7.2 and discuss the results in section 7.3, where we also include information about project members, and the content of the discussions.

Table 7.2. Properties of knowledge claims, questions, approvals and disapprovals in the Customer Portal Project

Property	Description	Options in the Customer Portal Project
Date	Project meeting date in which knowledge claim, questions, approval or disapproval has been formulated	*Various dates*
Topic*	Topic of the knowledge claim or topic of the question	Content subjects, form, content quality responsibility, interactivity, staff workload, role of current blog and GEON website, roll-out/testing, elements, architecture, KM objectives *Additional*: project action, project policy (the topics will be introduced in section 7.2.2)
Formulator	Person(s) who formulated the knowledge claim, questions, approval or disapproval	*Project members and GEON staff*: Gerlofs, and project members no. 1, 2, 3, 4, 5, 6 and 7 *Consultants*: Storm consultants, Ordina/iFonti consultants
Knowledge claim or question type*	Type of knowledge claim or type of question	Designative, definitive, explanatory, evaluative, predictive or advocative (see Chapter 3, section 3.2.3)

Note:
** these properties were not assigned to the approval and disapproval expression types*

7.2 Results

The structure of this section follows the two stages of the analysis as we explained in sections 6.1.2 and 6.1.3 (see figure 6.2).

7.2.1 Identification of project events and accepted knowledge claims (stage 1)

Based on project documentation, table 7.3 and table 7.4 provide an overview of the knowledge claims that have been accepted in the various stages of the Customer

Portal Project. The first column of both tables lists the ten topics that we identified in project documentation; we introduce the topics below. The topics relate to the design and development of GEON's Customer Portal. The dates of the project meetings are listed in the 'intermediate' column headers that span two report moments. The intermediate columns indicate to what extent an accepted knowledge claim has been modified with respect to previously accepted knowledge claims. We gave each knowledge claim a unique identifier. We identified the following topics in project documentation:

1. **Content subjects**: concerned accepted knowledge claims about the type of content that should be stored and displayed in the costumer portal;
2. **Form of the Customer Portal**: concerned accepted knowledge claims regarding the general direction the costumer portal was heading. This was a more abstract category; it mostly concerned the general philosophy of the costumer portal under development;
3. **Content quality responsibility**: concerned accepted knowledge claims about the way the quality of the content of the costumer portal would be assured;
4. **Interactivity**: concerned accepted knowledge claims about the way and extent to which users would be able to interact with the costumer portal;
5. **Staff workload**: concerns accepted knowledge claims about the new tasks and workload of staff when the costumer portal was implemented;
6. **Role of current blog and GEON website**: concerned accepted knowledge claims about the role of the current GEON knowledge blog and corporate website with regard to the new costumer portal;
7. **Roll-out/testing**: concerned accepted knowledge claims about how the new costumer portal would be tested and how the new costumer portal would be implemented (roll-out stage);
8. **Elements of Customer Portal**: concerned accepted knowledge claims about functional elements that would be installed in the new costumer portal;
9. **Architecture**: concerned accepted knowledge claims about the hardware + software architecture that would be used for the implementation of the new costumer portal;
10. **KM objective of Customer Portal**: concerned accepted knowledge claims about the role of the new costumer portal in the knowledge management

project, and herewith, the future knowledge management implementation within GEON.

Figure 7.4 provides a summary of the type of changes in the set of accepted knowledge claims over time. The project started without any predefined knowledge claims such as organizational intentions captured in project definition documents. The project seems to have had a 'carte blanche' to define its own goals and means to achieve its goals. The majority of 'major changes' occurred in the beginning of the project (see figure 7.4). Thus, it appears that the costumer portal has largely been formed after the first project meeting. A second observation is that we did not identify any alternative or competing knowledge claims in project documentation, i.e. undecided knowledge claims. It is an indication that knowledge claims were evaluated in project meetings (rather than e.g., brainstorm sessions) resulting in the acceptation and rejection of knowledge claims.

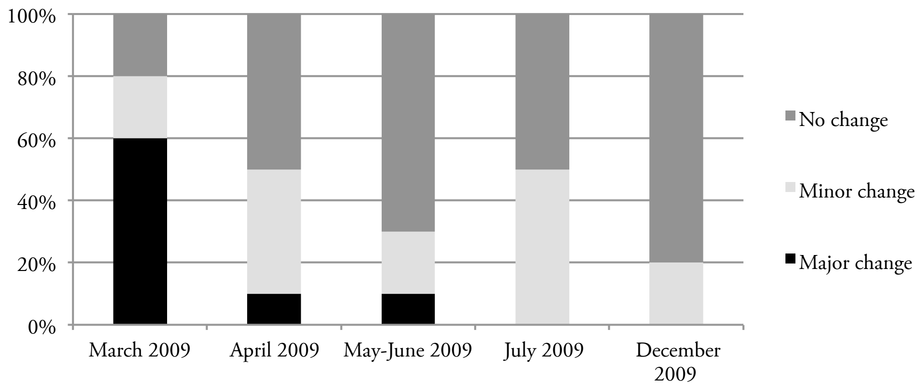


Figure 7.4. Bar chart: level of changes in the Customer Portal Project

Table 7.3. Overview of accepted knowledge claims and modifications (part A)

Accepted knowledge claims in the Customer Portal Project (Part A)						
Topic	**February 2009**	**March 2009**	**April 2009**	**June 2009**	**July 2009**	**December 2009**
Content subjects	KC 1.a: CP will be based on knowledge areas as defined in KM project	KC 1.b: Distinguish between internal blog items and external/public blog items	KC 1.c: Based on current GEON blog	KC 1.d: Subjects will be BAG, GEO-information management, and GEO-information distribution	KC 1.d: Subjects will be BAG, GEO-information management, and GEO-information distribution	KC 1.d: Subjects will be BAG, GEO-information management, and GEO-information distribution*
		Major change	Minor change	Minor change	No change	No change
Form of the CP	KC 2.a: CP will be an intelligent portal, e.g. linking subjects with aqua browse	KC 2.b: the CP goes beyond blogging; possibilities for opinions, column alike contributions	KC 2.c: The CP will be an external GEON blog++ and portal (see screenshot)	KC 2.c: The CP will be an external GEON blog++ and portal (see screenshot	KC 2.e: Primary objective: CP will be new GEON dynamic and actual website. Secondary objective: community	KC 2.e: Primary objective: CP will be new GEON dynamic and actual website. Secondary objective: community*
		Major change	No change	No change	Minor change	No change
Content quality responsibity	KC 3.a: Staff will be responsible for content and quality of content on CP; one person has the final responsibility	KC 3.b: Articles and blog will be subject to a form of moderation	KC 3.c: a moderator will have final responsibility	KC 3.d: For each subject (see KC 1.d) there will be one moderator; moderator has final responsibility	KC 3.d: For each subject (see KC 1.d) there will be one moderator; moderator has final responsibility	KC 3.f: Three editors will be appointed; staff can select one of the editors to publish content; also for project description additions*
		Minor change	No change	No change	No change	Minor change
Interactivity	KC 4.a: Only GEON can add new info to CP	KC 4.b: Only GEON can add new info to CP; external visitors will be able to reply/comment	KC 4.c: Closed forum ("ask a question to GEON")	KC 4.c: Closed forum ("ask a question to GEON")	KC 4.e: RSS newsfeeds	KC 4.e: RSS newsfeeds*
		Minor change	No change	No change	Minor change	No change
Staff workload	KC 5.a: Each staff member will be responsible for one or more designated knowledge areas (see also KC 3.a)	KC 5.b: Every GEON staff member should contribute and should become more critical	KC 5.c: Every GEON staff member should contribute and should become more critical	KC 5.d: 6 Each subject has three authors; each author is responsible for content	KC 5.e: One article per week (not per staff member)	KC 5.f: One item per week*
		Minor change	No change	Minor change	Minor change	No change

Table 7.4. Overview of accepted knowledge claims and modifications (part B)

Accepted knowledge claims in the Customer Portal Project (Part B)

Topic	February 2009	March 2009	April 2009	June 2009	July 2009	December 2009
Role of current blog and website		KC 6.b: Current GEON blog will be basis for new CO; The CP will replace the current GEON website	KC 6.c: The CP will be an external GEON blog ++; The CP could replace the current GEON website in the future	KC 6.c: The CP will be an external GEON blog ++; The CP could replace the current GEON website in the future	KC 6.e: The CP will be dynamic version of GEON homepage; The CP will replace the current GEON website	KC 6.f: The CP will be a Joomla based blog + website; The CP will replace the current GEON website*
		Major change	Minor change	No change	Minor change	No change
Roll-out/testing		KC 7.b: Selection out of existing customer base will be used in testing of the pilot CP	KC 7.c: First internal testing within GEON; Then CP open for select group for testing	KC 7.c: First internal testing within GEON; Then CP open for select group for testing	KC 7.e: First internal testing, then testing with selection of customer base	KC 7.f: First internal testing, then testing with selection of customer base*
		Major change	Minor change	No change	No change	No change
Elements of CP			KC 8.c: The CP will have, GEON basic knowledge, GEON information, columns, links, closed forum, login	KC 8.c: The CP will have, GEON basic knowledge, GEON information, columns, links, closed forum, login	KC 8.e: Weblog, GEON knowledge articles, project overview, presentation of advisors, WOZstats + faq	KC 8.f: No forum, projects overview, staff info pages, blog, new developments, newsletter*
			Major change	No change	Minor change	Minor change
Architecture		KC 9.b: It should technically be possible to grow beyond a blog	KC 9.c: Implementation architecture will be Joomla	KC 9.c: Implementation architecture will be Joomla	KC 9.c: Implementation architecture will be Joomla	KC 9.c: Implementation architecture will be Joomla*
		Major change	Minor change	No change	No change	No change
KM objective of CP	KC 10.a: The CP will be a KM tool; CP will be based on knowledge areas as defined in KM project	KC 10.a: The CP will be a KM tool; CP will be based on knowledge areas as defined in KM project	KC 10.a: The CP will be a KM tool; CP will be based on knowledge areas as defined in KM project	KC 10.d: The CP can be used as a KM tool	KC 10.d: The CP can be used as a KM tool	KC 10.d: The CP can be used as a KM tool*
		No change	No change	Major change	No change	No change

7.2.2 The argumentative analysis (stage 2)

The most important results of the following paragraphs have been visualized and summarized in figure 7.5. We discuss each component separately. Table 7.5 shows the types of expressions we found in project meeting transcripts. We analyzed 462 isolated expressions. An overview of the analyzed transcript of the first project meeting can be found in Appendix H. We did not include overviews of the other project meetings in the thesis because it extends over 50 pages. The majority of the expressions uttered in project meetings were knowledge claims (344 expressions, i.e., 74,5%). Table 7.6 exhibits that most knowledge claims were of the advocative (56,7%) and evaluative (31,7%) types. The distribution of question types was similar to the distribution of claim types (see table 7.7). Most questions concerned a question about the courses of action to be taken (i.e., advocative questions) and about what worth something was (i.e., evaluative questions).

Table 7.5. Overview of expression types in the Customer Portal Project

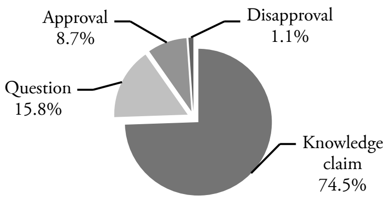
Expressions types	Number	Pie chart
Knowledge claim	344 (74,5%)	
Question	68 (15,8%)	
Approval	40 (9,7%)	
Disapproval	5 (1,1%)	
Total	462	

Table 7.6. Overview of knowledge claim types in the Customer Portal Project

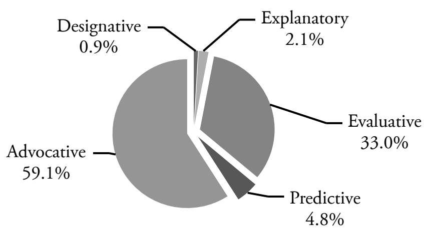
Knowledge claim types	Number	Pie chart
Definitive	14 (4,1%)	
Designative	3 (0,9%)	
Explanatory	7 (2,0%)	
Evaluative	109 (31,7%)	
Predictive	16 (4,7%)	
Advocative	195 (56,7%)	
Total	344	

Table 7.8 presents the distribution of the ten topics (see table 7.3 and table 7.4) among the advocative knowledge claims discussed in the project meetings. We only identified 81 advocative knowledge claims (41,5%) that related any of the topics listed in table 7.3 and table 7.4. Consequently, 114 advocative knowledge claims (58,5%) did not belong to a topic: these knowledge claims were not reported in project documentation. We found that these unreported knowledge claims concerned two topics that were not included in project documentation: project actions and project policies. Project actions were advocative knowledge claims that concerned the organization of the Customer Portal Project (e.g., to resolve questions, to retrieve information, to roll-out or test parts of the system, etc.). Project policies were advocative knowledge claims that concerned rules, guidelines, or procedures with respect to run the Customer Portal Project (e.g., “we should keep certain issues in mind”, “we should first take care of the internal organization”, etc.). Apparently, the project leader and project members did not find knowledge claims concerning the organization and procedures of the project relevant to report in the project documentation (see table 7.3 and table 7.4). Compared to the ten initial topics, these two topics did not directly relate to the ultimate aims and results of the project, i.e., building a customer portal for GEON. Yet, given that these two topics covered the largest part (58,5%) of the discussions in project meetings, they might be of equally importance to the project as the reported knowledge claims. Moreover, we reckoned with the possibility that the knowledge claims without a topic from project documentation (58,5%) were not evaluated in the same way as the knowledge claims (41,5%) with a topic.

Table 7.7. Overview of question types in the Customer Portal Project

Question types	Value
Definitive	9 (13,2%)
Designative	0 (0%)
Explanatory	1 (1,5%)
Evaluative	22 (32,4%)
Predictive	0 (0%)
Advocative	36 (52,9%)
Total	68

Pie chart

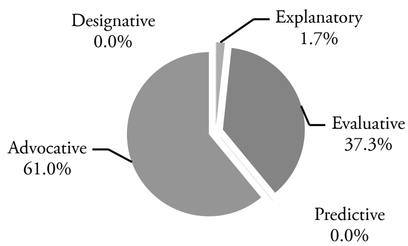
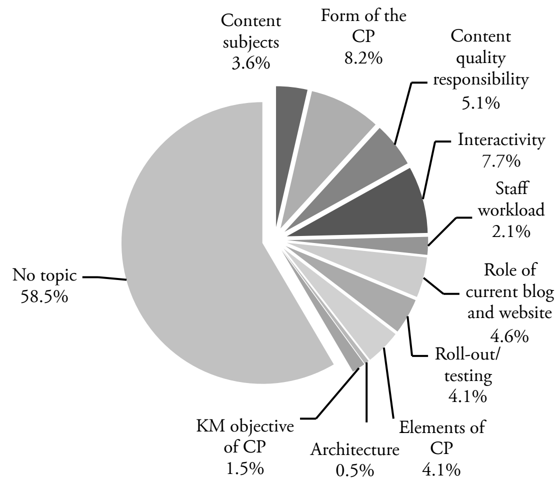


Table 7.8. Advocative knowledge claims related to one of the ten topics

Knowledge claim topics	Value	Pie chart
Content subjects	7 (3,6%)	
Form of the CP	16 (8,2%)	
Content quality responsibility	10 (5,1%)	
Interactivity	15 (7,7%)	
Staff workload	4 (2,1%)	
Role of current blog and website	9 (4,6%)	
Roll-out/testing	8 (4,1%)	
Elements of CP	8 (4,1%)	
Architecture	1 (0,5%)	
KM objective of CP	3 (1,5%)	
No topic	*114 (58,5%)*	
Total	195	



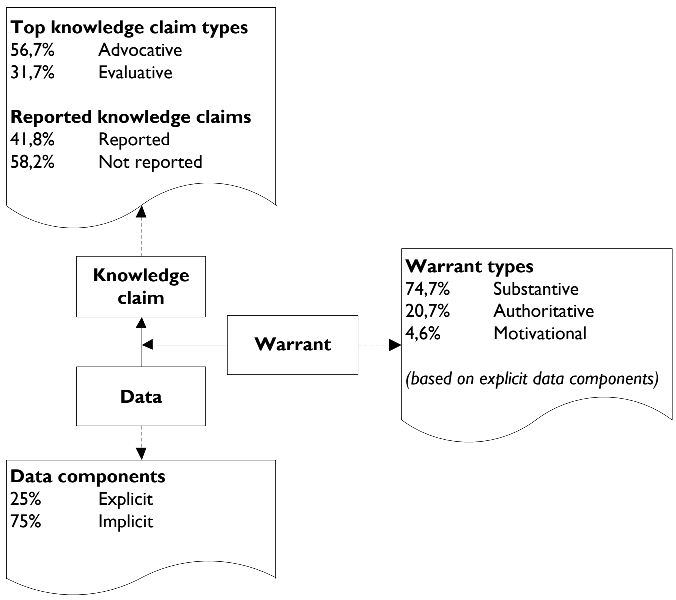


Figure 7.5. Summary of results

The relations between the knowledge claims in the project meeting transcripts were often unclear and the majority of the knowledge claims resided in enthymemes without explicit warrant and explicit data components. Argumentation structures corresponded to a combination of the Toulmin framework (i.e., single argumentation structure) and the subordinative argumentation structure (see Chapter 3, section 3.1.3). Figure 7.6 shows this combined argumentation structure, as found in the Customer Portal. Similar to the argumentation structures found in the Siemens BT study (see Chapter 6, section 6.2.2), we distinguished between two levels in figure 7.6. The knowledge claim on the second-level functioned as a data component of the knowledge claim on the first-level. First-level knowledge claims were always advocative knowledge claims. The borders of the warrant components in figure 7.6 are dotted, which indicates that warrants always remained implicit in the Customer Portal Project.

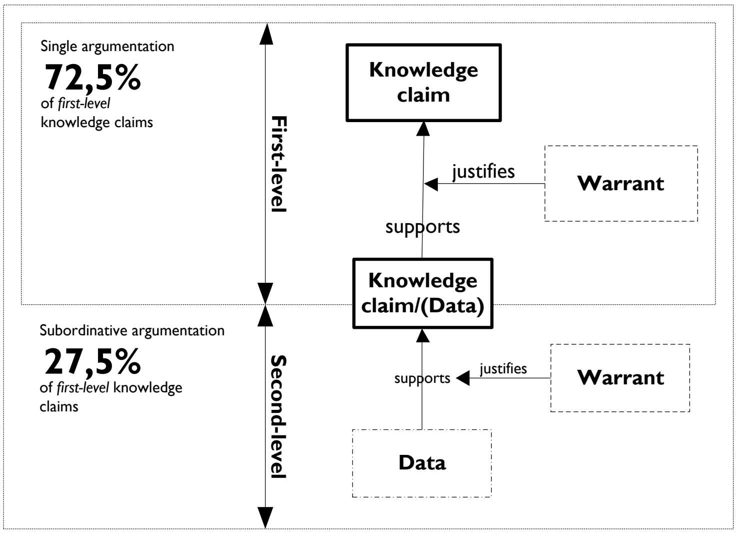
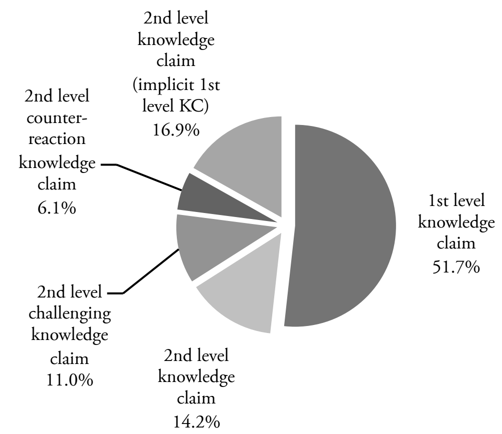


Figure 7.6. The argumentation structure found in the Customer Portal Project

We found 187 first-level knowledge claims and 107 second-level knowledge claims (see table 7.9). These numbers represent respectively 51,7% and 31,1% of the total number of knowledge claims. Out of the 107 second-level knowledge claims, only 49 knowledge claims supported an *explicit* first-level knowledge claim. The other 58 second-level knowledge claims were of a non-advocative type and had no clear function in the argumentative discussion. Hence, 16,9% of all knowledge claims in the Customer Portal Project neither proposed a course of action, nor supported or challenged other advocative knowledge claims. The 49 second-level knowledge claims supported 49 first-level knowledge claims in a subordinative argumentation structure. Consequently, 129 first-level knowledge claims (72,5%) did not have support from underlying second-level knowledge claims, and thus, resided in a single argumentation structure (see figure 7.6). The same findings hold for the subset of knowledge claims relating to one of the ten topics reported in table 7.3 and table 7.4.

Table 7.9 also provides information about the challenges and counter-reactions to challenges. 11% of the knowledge claims challenged a knowledge claim; 6,1% of the knowledge claims were reactions to challenges. In comparison to the large percentage of the first-level and second-level knowledge claims (82,8%), the number of challenges and counter challenges (17,1%) is very moderate in the Customer Portal Project.

Table 7.9. Overview of the argumentation structure components in the Customer Portal Project

Knowledge claim functions	**Number**	**Pie chart**
First-level knowledge claim	178 (51,7%)	
Second-level supporting knowledge claim	49 (14,2%)	
Second-level challenging knowledge claim	38 (11,0%)	
Second-level counter-reaction	21 (6,1%)	
Second-level knowledge claim, with relation to *implicit* first-level knowledge claim	58 (16,9%)	
Total	**344**	

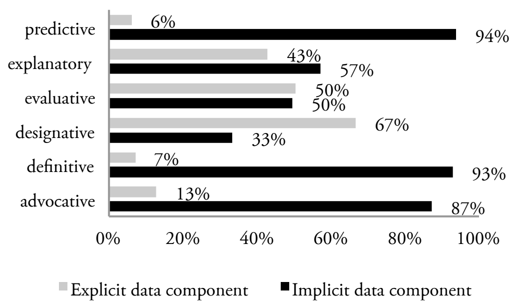
We decomposed all expressions tagged as knowledge claims (regardless of the level in figure 7.6) in the three elements of the Toulmin framework: knowledge claim components, warrant components and data components. As we already indicated, no explicit warrant components have been found in the project meeting transcripts. We found that only 25% of the 344 knowledge claims had an explicit data component (see table 7.10). For the group of first-level knowledge claims, which were all advocative knowledge claims, the explicit data component percentage is even lower: only 13% of 178 first-level knowledge claims had an explicit data component. In combination with the abovementioned finding that 72,5% of all first-level knowledge claims had no support from second-level knowledge claims, we can conclude that the vast majority of first-level knowledge claims in the Customer Portal Project were not supported by explicit argumentation.

Table 7.10. Implicit versus explicit data components per knowledge claim type in the Customer Portal Project

Frequencies

Knowledge claim types	**Implicit data component**	**Explicit data component**
predictive	15 (94%)	1 (6%)
explanatory	4 (57%)	3 (43%)
evaluative	54 (50%)	55 (50%)
designative	1 (33%)	2 (67%)
definitive	13 (93%)	1 (7%)
advocative	170 (87%)	25 (13%)
Total	257 (75%)	87 (25%)

Bar chart



We inferred the type of warrant based on the type of evidence found in the explicit data components. The results displayed in table 7.11 confirmed that the substantive warrant was the most applicable warrant for evaluative knowledge claims, as argued in Chapter 3 (see section 3.2.4). Additionally, the results support the theory that substantive warrants have limited applicability for advocative knowledge claims. The application of substantive warrants for evaluative knowledge claims is much higher in the Customer Portal Project at GEON that it was in the Pricing Project at Siemens BT, where most evaluative knowledge claims were justified through authoritative warrants. Furthermore, we found a very low number of applications of the motivational warrant in the Customer Portal Project. Motivational warrants are related to organizational intentions or epistemic criteria in knowledge claim evaluation. Thus, these two types of criteria were hardly used explicitly in the Customer Portal Project. Again, this result contrasts the findings in the Pricing Project at Siemens BT where almost all advocative knowledge claims were justified through motivational warrants. It should be noted however that table 7.11 shows the warrant types for 87 knowledge claims with explicit data components, out of 344 knowledge claims in total. Hence, the findings with regard to warrant usage relate to a small set of knowledge claims.

Table 7.11. Knowledge claim types versus warrant types (deduced from explicit data components) in the Customer Portal Project

		Warrant type deduced from explicit data components		
Knowledge claim type	**Frequency**	**Substantive**	**Authoritative**	**Motivational**
Designative	2	2	0	0
Definitive	1	1	0	0
Explanatory	3	3	0	0
Evaluative	55	48	6	1
Predictive	1	1	0	0
Advocative	25	10	12	3
Total	**87**	**65**	**18**	**4**

The results thus showed an abundance of implicit data and warrant components (i.e., 75% of the knowledge claims). This could indicate the application of implicit authoritative warrants and implicit motivational warrants. In order to learn more about implicit warrant usage, we examined the role of individual project members in the Customer Portal meetings. Table 7.12 shows that only two project members were responsible for the bulk of the knowledge claims discussed in the Customer Portal Project: Member no. 3 and Member no. 6. They respectively formulated 111 and 109 claims, which is 64% of all knowledge claims. Their share in the discussions was even higher for knowledge claims relating to one of the ten topics: 70% of the knowledge claims belonging to one of the topics have been formulated by Member no. 3 or Member no. 6. The other project members' shares in the discussion varied from 3,2% to 13,1%. We therefore concentrate on the role of project members Member no. 3 and Member no. 6 in the discussions.

Member no. 6 formulated 31,7% of the knowledge claims in the Customer Portal project, for which he hardly provided any support. For every first-level knowledge claim that Member no. 6 formulated, he provided only 0,19 second-level knowledge claims, challenges or counter-reactions, and only 0,14 data components (regardless of the level in figure 7.6). Member no. 3, however, provided 0,38 second-level knowledge claims, challenges or counter-reactions for every first-level knowledge claim he formulated and 0,36 explicit data components. Member no. 3 thus supported his first-level knowledge claims more than twice as much than Member no. 6 did: 0,19 versus 0,36 and 0,14 versus 0,38.

The other types of expressions relevant in reviewing implicit warrant usage are questions, approvals and disapprovals, and challenges and counter-reactions (see table 7.5 and table 7.9). As reported, 73 questions have been raised of which Member no. 3 and Member no. 6 raised the majority: respectively 29 (39.2%) and 16 (21,6%). Member no. 3 especially raised advocative questions, whereas Member no. 6 raised more evaluative questions. Additionally, we identified 45 approvals and disapprovals in the project meetings. Member no. 6 approved or disapproved 21 times (47%); Member no. 3 approved and disapproved only 8 times (18%). With regard to the challenges and counter-reactions (see table 7.9), we found that Member no. 3 challenged most knowledge claims (17 out of 38 challenges in total), whereas Member no. 6 formulated most counter-reactions (i.e., 12 out 21 counter-reactions in total). This finding indicates that Member no. 3 disagreed with knowledge claims more often, and Member no. 6 had to defend knowledge claims more often.

Table 7.12. Knowledge claim types per project member in the Customer Portal Project

				Knowledge claim types					
	Total	**2^{nd} level knowledge claims per 1^{st} level knowledge claim**	**Data components per knowledge claim**	**Advocative**	**Definitive**	**Designative**	**Evaluative**	**Explanatory**	**Predictive**
Member no. 1	**23** (6,7%)	0,00	0,17	17	1		4	1	
Member no. 2	**11** (3,2%)	0,40	0,09	6	3		2		
Member no. 3	**111** (32,3%)	0,38	0,36	53	3	2	46	3	4
Member no. 4	**27** (7,8%)	0,25	0,30	14	1		9	1	2
Member no. 5	**18** (5,2%)	0,29	0,56	7			11		
Member no. 6	**109** (31,7%)	0,19	0,14	76	3		19	2	9
Member no. 7	**45** (13,1%)	0,52	0,20	22	3	1	18		1

7.2.3 Summary of findings

The findings with regard to the components of the argumentative discussions in the Customer Portal Project can be summarized as follows:

- Knowledge claim types and relation to reported knowledge claims:
  - The majority of knowledge claims were advocative (56,7%) and evaluative (31,7%) knowledge claim types (see table 7.6);
  - The majority of knowledge claims (58,5%) in the Customer Portal Project had no connection to the knowledge claims reported in project documentation (see table 7.8);
- Argumentation structures:
  - We found two basic argumentation structures: single argumentation structures and subordinative argumentation structures (see figure 7.6);
  - 27,5% of the knowledge claims resided in subordinative argumentation structures, and 72,5% in single argumentation frameworks (see figure 7.6);
  - We found a group of knowledge claims (16,9%) that did not relate to an explicit first-level knowledge claim in the subordinative

structure (see table 7.9). These knowledge claims had no apparent function in the discussions.

- Challenges:
    - Only 17,1% of the knowledge claims (compared to 82,8% of the knowledge claims) functioned as challenge or counter-reaction to a challenge in the argumentation structures (see table 7.9).
- Data and warrant components:
    - The number of knowledge claims with an *implicit* data component (75%) outnumbers the number of knowledge claims with an *explicit* data component (25%, see table 7.10);
    - Evaluative knowledge claims were mainly justified through substantive warrants; advocative knowledge claims were mainly justified through authoritative warrants;
    - Motivational warrants were hardly used;

With regard to the role of project members in the argumentative discussions we found the following:

- Project members Member no. 3 and Member no. 6 formulated the bulk of the knowledge claims in the CP project (64%)
    - Member no. 6 formulated most of the first-level knowledge claims (i.e., advocative knowledge claims), most of the approvals and most of the disapprovals;
    - Compared to Member no. 6, Member no. 3 formulated twice as many second-level knowledge claims per first-level knowledge claim, and twice as many data components per knowledge claim;
    - Member no. 6 had to defend knowledge claims more often, whereas Member no. 3 attacked claims more often;

Unless mentioned otherwise, all findings hold for the subset of knowledge claims (41,5%) that related to one of the ten topics reported project documentation (see table 7.3 and table 7.4). In the upcoming section we elaborate on these and the other results in the light of our research questions and existing theory.

7.3 Discussion of results

In this section, we provide answers to our research questions by discussing the results of the study as reported in the previous section. We start the discussion by answering research question 3 (RQ 3). We will first review the results about the explicit components of the argumentative discussions in the Customer Portal Project. Subsequently, we will concentrate on the implicit parts.

Which practice of evaluating knowledge claims can be found in the Customer Portal Project at GEON?

The basis for answering the research question is the types of argumentation structures we found in the Customer Portal. The findings show that the vast majority of knowledge claims resided in the simplest argumentation structure (see figure 7.6): the single argumentation framework. A minority of knowledge claims resided in a two-level subordinative argumentation structure. Multiple or coordinative argumentation structures were not found. Additionally, we found that 16,9% of all knowledge claims resided in an subordinative enthymeme without an explicit first-level knowledge claim (see table 7.9). Hence, 16,9% of all knowledge claims had no clear role in the argumentative discussion. With respect to levels of controversy and critical attitude in the project, we found that only 17,1% of all knowledge claims challenged and counter-challenged the other 82,9%. Based on these findings, we can typify the argumentative discussions in the Customer Portal Projects as superficial (only two-level subordinative structures; no coordinative or multiple argumentation), unstructured (many enthymemes) and unchallenged (low number of challenges and counter-reactions). One could ask, looking at these results, whether the project meetings were actually brainstorm sessions rather than sessions in which knowledge claims were evaluated. Yet, as we indicated in section 7.2.1, accepted knowledge claims were reported after each project meeting in project documentation, which is an indication that knowledge claims were evaluated and that we did not study brainstorm sessions.

With regard to warrant and data components, only 25% of the knowledge claims had an explicit data component. Organizational intentions and epistemic criteria have hardly been used, at least not explicitly. The findings support informal argumentation Theory in that substantive warrants justified the majority of evaluative knowledge claims, and authoritative warrants justified the majority of advocative knowledge claims. Whereas this finding points to a correspondence-based approach of knowledge claim evaluation such as the Open approach (based on 25% of the knowledge claims), the rest of the findings clearly point to a coherence-based approach in the Customer Portal Project, such as the Managerial or Entrepreneurial approach: We found that 75% of the knowledge claims were residing in enthymemes with *implicit* data and *implicit* warrants components.

To explore this large number of enthymemes, we highlighted the role of project members in the Customer Portal Project. We found that project members Member no. 3 and Member no. 6 formulated the bulk of the knowledge claims in the Customer Portal Project (i.e., 64%, see table 7.12). Member no. 3 however substantiated his knowledge claims twice as often as Member no. 6 did. Moreover, Member no. 3 also challenged more knowledge claims and raised more questions. Why did Member no. 3 do this? We present two explanations based on existing knowledge claim evaluation theory and informal argumentation (see Chapter3, section 3.2.1.2): 1) the application of implicit authoritative warrants and 2) the application of implicit motivational warrants.

The first explanation is that participants in knowledge claim evaluation, who are considered as authorities by other participants, may not need to provide data or supporting knowledge claims because their knowledge claims come with an implicit authoritative warrant. Member no. 3 was a junior advisor and was not part of the management team, whereas Member no. 6 was a senior advisor and a member of GEON's three-headed management team. Therefore, Member no. 6 could be regarded as an authority by other project members. As a result of this, Member no. 6 did not need to substantiate his knowledge claims, which he hardly did in the project; Member no. 3, on the other hand, substantiated his knowledge claims twice as often as Member no. 6. It could indicate that Member no. 6's knowledge claims were been justified through an implicit authoritative warrant. Following this explanation, knowledge claim evaluation in the Customer Portal Project resembled the Managerial approach.

The second explanation concerns the role of implicit motivational warrants. This practically means that knowledge claims that cohered best with this personal knowledge were accepted. The knowledge and experience of the project members with respect to designing, implementing and running a customer portal was limited. Their existing knowledge was based on working with existing ICT tools in GEON:

the internal GEON blog and corporate website. With respect to the new Customer Portal, they could neither rely on advanced existing knowledge nor on empirical evidence (i.e., facts). Therefore, most knowledge claims were implicitly evaluated based on existing personal knowledge. When existing knowledge, personal beliefs, aspirations and motivations are used to evaluate knowledge claims, the motivational warrant is applied (see Chapter 3).

There is more support for the second explanation concerning the implicit motivational warrant when we consider the topics of the knowledge claims that Member no. 6 and Member no. 3 discussed extensively. We found that Member no. 3 argued for a Web 2.0 approach for the Customer Portal, using contemporary web-based technology and interactive social media. Meanwhile, Member no. 6 argued that this approach would be too experimental. Table 7.8 confirms this discussion: the "form of the customer portal" (8,2%) and "interactivity" (7,7%) are the two most debated topics in project meetings (see also section 7.2.1). According to Member no. 6, it would be better to rely on existing in-house (Web 1.0) technology, with which GEON was familiar, and that could be modified for public usage. In this respect, the most recent set of accepted knowledge claims (see the accepted knowledge claims in December 2009 in table 7.3 and table 7.4) were heavily skewed towards Member no. 6's ideas, and had little resemblance with the original ideas for a customer portal. Member no. 6 characterized the ultimate result of the Customer Portal Project as "a dynamic new version of the current GEON website with a blog" (from project transcript). Experiments with Web 2.0 technology were future steps according to him. Member no. 6's knowledge claims cohered best with existing personal knowledge of other project members (except Member no. 3's). Because nobody was an expert in designing or building a corporate customer portal and that many uncertainties existed (e.g., detailed customer/user demands and requirements were unknown), project members assessed Member no. 6's "conservative" ideas as inheriting less risks than Member no. 3's idea of building a completely new Web 2.0 platform. This may also explain why Member no. 6 did not need to support his knowledge claims with arguments, i.e., supporting knowledge claims or explicit data components. It further explains why Member no. 3 had to formulate more second-level knowledge claims per first-level knowledge claim, more explicit data components per knowledge claim, more challenging knowledge claims, and more questions than Member no. 6. Member no. 3 had the *burden* to convince Member no. 6 and others that the more risky and innovative Web 2.0 Customer Portal would be a better alternative (i.e., the 'burden of proof', see Chapter 3, section 3.1.2).

Although we find the second explanation more plausible, we do not have more evidence in order to accept it as the only valid explanation. The application of an implicit authoritative warrant cannot be ruled out. What we can conclude as fact is that knowledge claim evaluation in the Customer Portal Project was largely coherence-based, instead of correspondence-based. The observed practice of knowledge claim evaluation mimics the Entrepreneurial approach (i.e., Boisot and MacMillan, 2004): it was highly unstructured, superficial and undisputed. Yet, one aspect fundamentally differs from how we positioned the Entrepreneurial approach in Chapter 2. Boisot and MacMillan (2004) depart from the innovative beliefs and experiences of entrepreneurs, who are willing to take risks and explore new opportunities based on (implicit) motivational warrants. The variant of the Entrepreneurial approach we found in the Customer Portal Project adopts coherence as theory of truth, and relies on the more conservative beliefs and experiences of non-entrepreneurs and non-experts, who appeared to be risk averse. Only project member Member no. 3 showed characteristics of an entrepreneur based on the content of his knowledge claims.

To what extent does knowledge claim evaluation in the Customer Portal Project at GEON concord with the explanations found in knowledge management theory (Chapter 2)

Boisot and MacMillan (2004) deem coherence-based approaches useful in novel and uncertain situations. However, customer portals have been around for years. The earliest online business-to-business portals were first launched in the late 1960s and 1970s, and online consumer portals emerged in the 1980s with the adoption of the personal computer (Applegate et al., 2003). Many companies have experience with building Customer Portals and consultants are specialized in helping organizations building a Customer Portal. With respect to the latter, the Customer Portal Project invited two consultancy firms between the second and third project meetings, yet their expertise has hardly been used. Thus, from an outsider's perspective on innovation, the project appears not to be highly novel or uncertain, and existing knowledge and facts were available. For that reason, it is possible that adopting a correspondence-based approach, like the Open approach, would have led to a more innovative result in the Customer Portal project. For instance, what if project members thoroughly assessed the needs of customers in the early stages of the project, according to the Open approach, and that they found out that a need existed for a Web 2.0-based solution? Although we are speculating, this scenario sheds a different light on our discussion about knowledge claim evaluation in innovation. Whereas in highly uncertain and novel situations a coherence-based approach may lead to the most innovative outcome, in less uncertain and novel situations a correspondence-based approach may lead to the most innovative outcome. The latter especially applies to a situation in which entrepreneurs are missing. We elaborate on this insight in the final chapter.

A second possibility is that GEON could have saved valuable time by adopting a correspondence-based approach right from the start, because then, more facts would have been known in the early stages of the project. If e.g., information about customer needs would have been available in an earlier stage of the project, less uncertainty would have existed, and more knowledge claims could have been supported explicitly through the substantive warrant: ultimately, decisions could have been taken earlier. Both possibilities underline the criticism of the Entrepreneurial and Managerial approaches as found in the Open approach in Chapter 2 (Firestone and McElroy, 2003b; McElroy, 2003): the success of innovation projects, such as the Customer Portal Project, is jeopardized when subjective sources of evidence and knowledge are used in knowledge claim evaluation.

To what extent does knowledge claim evaluation in the Customer Portal Project at GEON concord with the aspects from informal argumentation theory (Chapter 3)?

Finally, we discuss the role of applying informal argumentation theory to analyze knowledge claim evaluation. The effectiveness of applying the tools offered by informal argumentation theory largely depends on the explicitness of the ingredients in argumentative discussions: knowledge claims, warrant and data components, and the relations between these elements, as residing in argumentation structures. In this study, we analyzed real-time argumentative discussions through observing project meetings. A large part of the relations, data and warrants were implicit, and could not be inferred from other explicit components. We did not have to deal with an abundance of implicit argumentation components in the Siemens BT study, because we analyzed a reconstruction of the project based on interview with project members. The problem of implicitness could have been tackled by conducting a round of interviews with project members after the observation period.

Beside methodological implications, the high extent of implicitness in argumentation could have lead to practical implications as well. We wonder to what extent project members of the Customer Portal Project were able to fill in the "gaps" in the argumentative discussions, i.e., the implicit knowledge claims, warrant and data components. Project members could have (unconsciously) experienced problems similar to the methodological and analytical problems as described above. For Customer Portal project members, structure in the argumentative discussions and substantive support for knowledge claims were lacking too. For instance, large parts of the discussions were about the features of the Customer Portal, e.g., how should it look like, what functions should it have, etc. Yet, in order to discuss its feautures and formulate arguments for it, project members should know the goal(s) of the portal: what does GEON want to achieve with it, what user needs should be met, etc. These "goal" knowledge claims were hardly touched upon and remained implicit during the discussion. We believe this could be harmful for the quality of the discussion, and consequently, the project result. For that reason, it may be fruitful project staff to know more informal argumentation theory in order to reflect upon their argumentative discussions. A basic understanding of informal argumentation could help discussants to structure arguments (e.g., the high number of second-level knowledge claims without any function in the Customer Portal Project could have been prevented), to substantiate knowledge claims whenever possible, and to raise critical questions to challenge claims. Additionaly, more contemporary informal argumentation theory can be considered, such as Walton (2006; 2007; 2008), Walton et al. (2008), and Kock (2006; 2007).

In this regard, we also emphasize the importance of reporting the outcomes of knowledge claim evaluation as proposed by Firestone and McElroy (2003; the Open approach, see Chapter 2). Only 41,5% of the knowledge claims were related to the knowledge claims reported in project documentation (see table 7.8). Hence, 58,5% of knowledge claims discussed in project meetings concerned topics, which were not reported. We argue that the content of the Customer Portal Project reports (emails, presentation slides, project notes) of the project meetings could have contributed to the implicitness and ambiguousness of knowledge claims in the discussions. Our analysis identified only a couple of references to accepted knowledge claims in previous meetings, yet none to any of the physical reports. A detailed overview of the outcomes, in terms of accepted knowledge claims, rejected knowledge claims, undecided knowledge claims and rationale supplements, could have improved the quality of the discussions. For instance, we noticed that some knowledge claims, which had already been reported in project documentation as accepted based on previous meetings, were discussed again as if they were never discussed before. This applies to all topics discussed in the project meeting, thus, also the topics not reported in the project documentation about the organization of the project and its procedures.

7.4 Conclusion

This study concentrated on knowledge claim evaluation in the Customer Portal Project at GEON (Groningen, The Netherlands). GEON is a small-sized organization (SME) in the domain of geo-information management. The aim of the Customer Portal Project was to design and to implement a customer portal by which GEON's services could be offered through the Internet. The main research question that this study aimed to answer was: *Which practice of evaluating knowledge claims can be found in the Customer Portal Project at GEON?* Like the Siemens BT study (Chapter 6), we investigated knowledge claim evaluation at the level of knowledge claims using the insights from informal argumentation theory. In this study however we examined project documentation and real-time argumentative discussions through observing project meetings.

Knowledge claims were evaluated in a superficial, unstructured and unchallenged way in the Customer Portal Project. Only one quarter of the knowledge claims were evaluated with help of explicit components of an argumentative discussion, such as data and warrant components. The rest of the argumentative discussion remained implicit. With regard to this implicit part, we looked at the role of project members in the discussions and the topics they discussed. It appeared that project members accepted the most familiar and consequently conventional solutions for the new customer portal, based on their limited personal knowledge about customer portals and experience with existing systems at GEON. It should be noted however that it is not excluded that implicit authoritative warrants were also at play (i.e., a Managerial approach). The findings highlight the concerns about using coherence-based approach, as can be found in the (correspondence-based) Open approach of knowledge claim evaluation.

Chapter 8

Conclusions and directions for further research

The opening paragraphs of this thesis introduced a statement from the year 2005:

> "*With more and more people carrying around devices that capture video – from digital cameras to cell phones – YouTube is set to become an essential destination for watching and sharing these experiences*" – Chad Hurley, co-founder of YouTube (YouTube, 2005).

This statement describes the future of a young and innovative Internet venture called YouTube. YouTube served as an example to introduce a number of issues that we studied in this thesis. First, the example introduced the notion of knowledge claims. A knowledge claim is a particular form of explicit knowledge. Toulmin (1958) defines a claim as an assertion put forward publicly for general acceptance: "a man who makes an assertion puts forward a claim – a claim on our attention and to our belief" (p. 11). An essential requirement of a claim is that it can be evaluated. That is, we can "demand to have our attention drawn to the grounds (backing, data, facts, evidence, considerations, features) on which the merits of the assertion are to depend" (ibid, p. 11). We use Toulmin's definition of claims in the context of innovation and knowledge management, and hence refer to those claims as knowledge claims.

Secondly, the YouTube example introduced the relation between knowledge and innovation, a relation which Schumpeter (1934) already characterized as immensely difficult. YouTube is a success story about innovation of epic proportions. In innovation, knowledge is shrouded in uncertainty, making individuals and organizations reluctant to dive into the unknown (Schumpeter, 1934; Schumpeter, 1983). The success of innovations, however, depends on knowledge. The founders of YouTube experienced difficulties when they tried to acquire funding from venture capitalists and kindle enthusiasm in the media. Objective facts and existing knowledge were unavailable and could not be used to support their ideas. Consequently, the founders could initially not convince others to invest in YouTube.

Thirdly, the example introduced the aim of this thesis: to understand the role of knowledge claim evaluation in innovation. Knowledge claim evaluation is the activity in which organizations evaluate the grounds of a knowledge claim in order to accept or reject it. The YouTube example illustrated how the leading theory on knowledge claim evaluation (i.e., Nonaka and Takeuchi, 1995) fails to explain why YouTube's initial knowledge claims have been accepted. Understanding knowledge claim evaluation improves our understanding of how innovations become a success or not. This thesis aimed to set the first step into this direction. In line with this aim, we formulated our main research question:

What is the role of knowledge claim evaluation in innovation?

This final chapter summarizes the conclusions. We provide an answer to the main research question and its associated research questions. An overview of the research questions can be found at the end of Chapter 1 (see figure 1.2). We conclude with a general discussion on directions for further research and practical recommendations.

8.1 Conclusions

Research question 1*: Which approaches in knowledge management theory are available to explain the role of knowledge claim evaluation in innovation?*

McElroy (2008) defines knowledge management as the "management discipline that seeks to enhance the quality of knowledge processing in human social systems [such as organizations]" (p. 43). The function of knowledge management is to understand, support and facilitate the processing of knowledge in organizations, that is, knowledge creation, knowledge evaluation, knowledge integration, and knowledge application. McElroy (2003) argues that a large number of knowledge management theories have only addressed a few of these knowledge processes, mostly knowledge integration and knowledge application. He labels these theories first-generation knowledge management. Second-generation knowledge management addresses all relevant knowledge processes in organizations, including the knowledge claim evaluation. Correspondingly, second-generation knowledge management explicitly makes a distinction between information and knowledge. Most knowledge management theories do not fulfill these criteria and therefore belong to first-generation knowledge management (McElroy, 2003).

Based on a literature review of second-generation knowledge management theories, we identified three approaches of knowledge claim evaluation: the Open approach, the Managerial approach and the Entrepreneurial approach. The approaches prescribe how an innovating organization should evaluate knowledge claims. Each approach borrows principles from epistemology, i.e., the philosophical study of knowledge.

The Open approach prescribes innovative organizations to evaluate knowledge claims based on empirical-based evidence and epistemic criteria (Firestone and McElroy, 2003b; McElroy, 2003; McElroy, 2008). Doing otherwise jeopardizes the quality of knowledge, and thereby the quality of innovations. Knowledge claim evaluation is not limited to a select group within the company, e.g., managers or experts; it is *open* to anyone. The corresponding evaluation mechanism is based on the principles of critical rationalism and falsificationism, comparable to the methods scientists apply in research.

The Managerial approach assumes that innovations do not come into being through merely rationality and objectivity (Nonaka and Takeuchi, 1995). It is argued that top managers bring in an innovative vision and that they formulate this vision in the form of organizational intentions. Middle managers translate top management's organizational intentions to mid-range evaluation criteria. Subordinates use the evaluation criteria to justify innovative concepts using empirical-based evidence. Thus, in the Managerial approach, top and middle management set the standards for evaluating knowledge claims. The corresponding mechanism of evaluating knowledge is justification rather than falsification.

The Entrepreneurial approach also assumes entrepreneurial hunches of individuals in order to innovate. However, according to the Entrepreneurial approach, entrepreneurship is not only limited to top management: anyone with an "entrepreneurial mindset" can formulate a valid knowledge claim or evaluation criteria (Boisot and MacMillan, 2004). Yet, the contrasting assumption of the Entrepreneurial approach is the limited availability of empirical-based evidence in innovative settings. Therefore, empirical-based evidence is of little use in innovation. Moreover, when managers require subordinates to provide empirical evidence in knowledge claim evaluation, less innovative concepts may be substituted over more innovative concepts.

The three approaches are highly abstract and empirically unexplored theories of knowledge claim evaluation. We believe knowledge claim evaluation is much more detailed and multifaceted in real-life innovative settings than the three approaches describe, explain and prescribe. The way the approaches explain knowledge claim evaluation can be characterized as a "black box". This black box has as inputs knowledge claims, evidence of a certain type, and evaluation criteria of a certain type, and as output evaluated knowledge claims, e.g., as justified, as falsified, or as believed as true. It is unclear exactly how evidence, criteria, knowledge claims – the internal workings of the black box – interact in an innovative setting and whether any other objects, factors or variables should be taken into account. Based on the literature review, we believe that opening the black box is essential in understanding the role of knowledge claim evaluation in innovation.

We pursue the aim of opening the black box of knowledge claim evaluation both theoretically as well as empirically. In order to improve the theoretical basis of knowledge claim evaluation, this thesis embraces informal argumentation theory. Informal argumentation theory is a practically oriented approach for analyzing argumentative discussions (Toulmin, 1958; Van Eemeren et al., 2002; Walton, 2009): it explains how an argument works and how it can be examined. By adopting informal argumentation theory, we consider knowledge claim evaluation in innovation as an argumentative discussion (Schreyögg and Geiger, 2007). The inclusion of informal argumentation theory in the research led to our second research question.

Research question 2*: What is the role of informal argumentation theory in describing knowledge claim evaluation in innovation?*

Below, we provide a summary of insights from informal argumentation that we used to augment extant knowledge claim evaluation theory and to improve the study of knowledge claim evaluation in empirical settings.

First, the types of evidence and evaluation criteria mentioned in the three existing approaches are wrapped up in (comprehensive) argumentation structures. The basic structure is the Toulmin framework, encompassing knowledge claim, warrant and data components (see figure 8.1). There are three types of warrants – the substantive, authoritative and motivational warrants – that are applied by discussants to make the movement from data to a knowledge claim. Each type of warrant assumes different types of data (or evidence). The substantive warrant assumes empirical-based data, the authoritative warrant assumes authority-based data, and the motivational warrant assumes existing beliefs, aspirations, assumption, intentions and motivations. Additionally, we discussed more comprehensive argumentation structures: coordinative, multiple and subordinative argumentation structures. For the Open, Managerial and Entrepreneurial approaches, we propose argumentation structures in which the main ingredients of the existing theory, i.e., types of evidence and types of evaluation criteria, are wrapped. We used these structures in the empirical research in Chapters 6 and 7 to recognize (elements of) the approaches in practice and to explore other practices of knowledge claim evaluation.

Secondly, knowledge claims are often accepted or rejected without explicit references to evidence or evaluation criteria in innovations. This is in contrast to what the Open and Managerial approaches of knowledge claim evaluation assume. These two approaches assume that organizations explicitly evaluate knowledge claims. Informal argumentation theory offers guidelines to deduce the types of evidence and evaluation criteria that are used implicitly. Furthermore, in argumentative discussions, knowledge claims can be challenged and defended in multiple ways. While the three approaches only discuss refutation, informal argumentation theory provides more insights in how knowledge claim can be challenged and defended (i.e., the rebuttal and undercutting principles, and the burden of proof principle).

Thirdly, we adopt a typology of knowledge claims: designative, definitive, explanatory, evaluative, predictive and advocative knowledge claims (Brockriede and Ehninger, 1960; Verschure and Doorenwaard, 1999). In contrast to the three traditional approaches, informal argumentation distinguishes between the six types of knowledge claims and the way they are supported through the three types of warrants. For instance, theory suggests that the substantive warrant has limited applicability for advocative, predictive and definitive knowledge claims. On the other hand, the substantive warrant should be applied in relation to designative, explanatory and evaluative knowledge claims, if empirical-based evidence is available. We investigated whether these differences were also recognizable in argumentative discussions in the Siemens BT and GEON studies (Chapters 6 and 7), and whether they could be used in understanding knowledge claim evaluation.

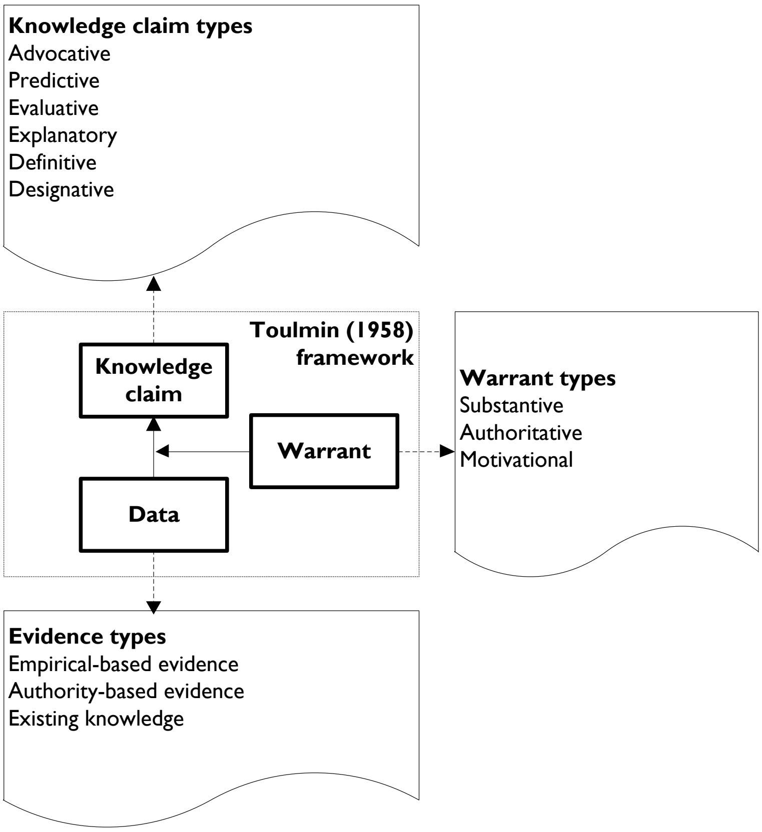


Figure 8.1. The Toulmin framework with component typology

The third research question guided our empirical research.

Research question 3*: Which practices of evaluating knowledge claims can be found in existing innovation projects?*

We have conducted an exploratory empirical research to investigate the role of knowledge claim evaluation in real-life innovations. We took the two theoretical pillars – the three approaches from knowledge management literature and the insights from informal argumentation theory – as starting points for the exploration and we concentrated on innovation projects in organizations and innovation programs. Within the empirical research we integrated qualitative and quantitative research. We adopted different methods to explore the practices of knowledge claim evaluation, namely structured and semi-structured interviews, questionnaires, key informants, observations, and document analysis.

The exploratory research consisted of three empirical studies: the KodA study, the Siemens BT study and the GEON study. In the KodA study (Chapter 5), we studied sixteen innovation projects in the Kennis op de Akker (KodA) innovation program (The Netherlands). We interviewed project leaders to collect information about knowledge claim evaluation in KodA projects. This study explored the frontiers of extant knowledge claim evaluation theory on the level of the innovation project. In the Siemens BT study (Chapter 6), we examined knowledge claim evaluation in the Pricing Project at Siemens BT's headquarters in Switzerland. Based on the conclusions of the literature review and the results of the KodA study, we decided to study knowledge claim evaluation in more detail by utilizing informal argumentation theory. We applied informal argumentation theory to a reconstruction of the Pricing Project. The reconstruction was based on document studies and interviews with a key informant and project members. In the GEON study (Chapter 7), we examined knowledge claim evaluation in the Customer Portal Project at GEON in Groningen (The Netherlands). Like the Siemens BT study, we studied knowledge claim evaluation utilizing informal argumentation theory. However, instead of a reconstruction of the project, we analyzed real-time argumentative discussions through observing project meetings.

The KodA study

In this study, we concentrated on analyzing the types of evidence that were used in the sixteen KodA projects, to what extent, and in which configurations. The types of evidence derive from the three approaches of knowledge claim evaluation. We considered empirical-based evidence, authority-based evidence, intuition-based evidence, organizational intentions and existing knowledge. We did not apply informal argumentation theory.

The findings did not show the clear-cut distinctions that exist between the Open, Managerial and Entrepreneurial approaches in Chapter 2. Instead, we found a variety of configurations none of which providing a clear image of knowledge claim evaluation. The findings thus supported our earlier concern that knowledge claim evaluation in practice is much more detailed and multifaceted than extant theory describes, explains and prescribes. We therefore introduced informal argumentation theory and applied this extension on a lower aggregation level (i.e., on the level of knowledge claims in two innovation projects): in the Siemens BT and GEON studies.

Additionally, the KodA study exposed the difficulties of dealing with the notion of innovativeness, which is a central concept in the three approaches. The three approaches take different positions with regard to the availability and usefulness of empirical-based evidence in highly innovative settings. Whereas the interviewed project leaders regarded their projects as highly innovative, four surveyed domain experts indicated that none of the KodA projects was highly innovative. Moreover, the experts' survey results were inconsistent too. These findings show how subjective the concept of innovativeness can be in reality. It complicates the discussion about the role of knowledge claim evaluation in innovation, because people tend to perceive and assess innovation differently. What may appear as highly innovative from an insider's perspective (i.e., the project leaders), can be regarded as less innovative or even not innovative from an outsider's perspective (i.e., the domain experts). Because of the unclear notion of innovativeness, we were unable to explain why e.g., intuition-based evidence was hardly used in KodA projects, whereas empirical-based evidence was used. Moreover, a biased perception of innovativeness could affect what practice or approach of knowledge claim evaluation organizations adopt.

The Siemens BT study

In this study, we applied informal argumentation theory to a reconstruction of the Pricing Project. The findings showed that the Pricing Project heavily relied on authoritative and motivational warrants in knowledge claim evaluation. The associated argumentation structures pinpointed to an approach similar to the Managerial approach in the Pricing Project. However, substantive warrants fulfilled a minor role (i.e., using empirical-based evidence). When the project applied the substantive warrant, the data that supported knowledge claims were highly subjective or based on assumptions (i.e., untested existing knowledge). These findings indicate that knowledge claim evaluation in the Pricing Project involved less objectivity and openness than is suggested in the Managerial approach. Instead, the Pricing Project reconstruction showed signs of the Entrepreneurial approach. This finding is peculiar because it appeared that project members had sufficient options to acquire supporting facts and other evidence to evaluate most knowledge claims using the substantive warrant. The observation underlines the concern raised by McElroy and Firestone (the Open approach) that, in general, companies tend to evaluate knowledge claims in a rather subjective and uncritical way. We discussed two events from the Pricing Project that illustrated how Siemens's practice of knowledge claim evaluation appeared to have led to wrong and disputable decisions. The success of innovation projects such the Pricing Project (i.e., not highly innovative; empirical evidence and existing knowledge available) is jeopardized when subjective sources of evidence and knowledge are used in knowledge claim evaluation.

It was the first time that informal argumentation theory was applied to study knowledge claim in an innovation project. The analysis and its results show that informal argumentation theory can substantially improve our understanding of knowledge claim evaluation in innovation. In this study, we analyzed a reconstruction of the project, which was based on document studies and interviews with project members and a key informant. However, we did not examine argumentative discussions, and hereby knowledge claim evaluation, in reality. Argumentative discussions take place e.g., in project meetings and in conversations between project members (per telephone, emails, and memos). The reconstructions, however, only include the highlights and results of the actual argumentative discussions. Moreover, it seems that project members informed us about the argumentative discussions in a very coherent way, whereas in practice, argumentative discussions can be far from being structured and coherent. The information was retrospectively processed and interpreted by project members. In this sense, we did not reach our objective to fully disclose the black box of knowledge claim evaluation. The upcoming and final empirical study about the Customer Portal Project at GEON dealt with empirical data about real-life argumentative discussions from an innovation project.

The GEON study

In this study, we analyzed real-time argumentative discussions by observing project meetings and studying project documentation. The findings showed that only one quarter of the knowledge claims were evaluated using explicit components of an argumentative discussion, such as data and warrant components. By far the largest part of the argumentation was implicit. With respect to the explicit components, substantive warrants justified the majority of knowledge claims. Organizational intentions and epistemic criteria were used sparely. Beside explicit data components, knowledge claims can be supported through other knowledge claims in various types of argumentation structures. We found only a small proportion of the knowledge claims residing in a comprehensive argumentation structures. Additionally, a substantial number of knowledge claims had no clear function in the argumentative discussions. Therefore, we described knowledge claim evaluation in the Customer Portal Project as superficial, unstructured and unchallenged.

We studied the role of individual project members in the argumentative discussions to explore the implicit part of the discussion. We found that two project members formulated the majority of knowledge claims. Member no. 6 substantiated his knowledge claims less, provided fewer explicit data components, and challenged fewer knowledge claims than project Member no. 3. However, most of Member no. 6's knowledge claims have been accepted. We reviewed two explanations for this finding. The first explanation was that an implicit authoritative warrant was applied to justify project member 1's knowledge claims, because Member no. 6 was a senior advisor and member of GEON's management team. We, however, found the second explanation more plausible, namely that an implicit motivational warrant was applied to evaluate the majority of knowledge claims in the Customer Portal Project. It appeared that project members accepted non-innovative solutions over innovative solutions, based on their limited personal knowledge about customer portals and their experience with existing systems at GEON. The knowledge claims of the Member no. 6 cohered best with the ideas and beliefs of the other project members. The knowledge claims that were reported as accepted in project documentation stemmed from Member no. 6. Member no. 3's knowledge claims were more novel and more uncertain, and were all rejected. All findings pointed to the same coherence-based principles as are described in the Entrepreneurial approach. Yet, there were too few "entrepreneurs" in the project team in order to get innovative results.

Like in the KodA study, this study exposed the difficulties of dealing with the notion of innovativeness. From an outsider's perspective, it can be argued that the project is not highly novel or uncertain, and existing knowledge and facts were available. For that reason, it is possible that adopting a correspondence-based approach, like the Open approach, would have led to more innovative results in the Customer Portal project. GEON staff, however, regarded the project as innovative and an approach towwards knowledge claim evaluation could be chosen accordingly.

With respect to observing real-life argumentative discussions, the advantage was that we collected every single explicit component of the argumentative discussions in the Customer Portal Project. The disadvantage of this choice was that implicit components remained concealed. As a result we had to infer these components based on the small number of explicit elements, which was very difficult to accomplish. Therefore, the analysis of real-life argumentative discussions may be improved by collecting data about the implicit components by conducting retrospective interviews with project members after project completion, like we did in the Siemens BT study.

The abovementioned methodological issue translates into a practical issue. Whereas we, as observers, missed explicit components in the discussions, these explicit components were not available to project members either. Naturally, project members could have possessed knowledge, which we, as outsiders, did not possess, and which can be used to bridge some of the gaps in the discussions. Nevertheless, we found examples in the project meetings where certain “fundamental” knowledge claims remained unclear or implicit, and led to the superficial, unstructured and unchallenged evaluation of knowledge claims. For instance, knowledge claims about the exact purpose of the Customer Portal or about the needs of GEON customers. For that reason, it may be fruitful for members of innovation projects to learn about informal argumentation theory and reflect upon their argumentative discussion and knowledge claim evaluation practices. They can learn how to structure arguments and how to substantiate knowledge claims, whenever possible, and to raise critical questions to challenge knowledge claims. In this regard, we also stressed the importance of reporting the outcomes of knowledge claim evaluation as proposed by Firestone and McElroy (the Open approach, see Chapter 2).

8.2 Directions for further research

Our research concentrated on coming to grips with measuring, analyzing and understanding knowledge claim evaluation in innovations. We reflected on the role of knowledge claim evaluation in innovations based on existing theory in Chapters 2 and 3 and the findings from the empirical studies in Chapters 5, 6 and 7. We propose five (interrelated) priority areas in order to advance the understanding of knowledge claim evaluation in future research.

The innovation projects that we investigated adopted a large variety of practices, none of which were highly objective, rational and transparent, as the Open and Managerial approaches propose, or highly subjective, intuitive and fuzzy, as the Entrepreneurial approach proposes. We learnt that knowledge claim evaluation in innovations can be studied and understood through informal argumentation theory. As first priority area for future research, section 8.2.1 proposes to further exploit the synergy between informal argumentation and knowledge claim evaluation, both in theory as well in practice. Based on this research, we also argue that future research should start from the notion that innovation projects cannot evaluate knowledge claims using one single approach or method, as is argued in the traditional theories of knowledge claim evaluation. Multiple factors should be considered in explaining the practice and role of knowledge claim evaluation in innovations. In future research, we will continue to investigate the two factors we concentrated on in this research: the type of knowledge claim under evaluation and the availability of empirical-based evidence (i.e., the facts) and existing knowledge in innovative situations. With respect to the former factor, section 8.2.2 discusses the need for an improved and clearer understanding of innovation and innovativeness in relation to knowledge claim evaluation. Additionally, sections 8.2.3 and 8.2.4 propose two new factors relating to knowledge claim evaluation: the role of time and resources and the impact of the epistemological base of profession. Finally, section 8.2.5 discusses the possibilities of automation to make the argumentative analysis a less laborious activity.

8.2.1 Improving the understanding of knowledge claim evaluation based on informal argumentation theory

Our first proposal is to understand what organizations can gain from learning more about informal argumentation in relation to innovation. This idea is based on the practical recommendation that we discussed in the GEON study in Chapter 7. We proposed that a basic understanding of informal argumentation theory could be very helpful to managers and staff involved in the Customer Portal Project. Additionally, they can learn through informal argumentation theory how to review the arguments supporting these knowledge claims and how to criticize and challenge knowledge claims. Contrariwise, practitioners may recognize situations in which knowledge claims cannot be supported with empirical-based evidence, and that an approach such as the Entrepreneurial approach should be adopted.

In this regard, recent work in informal argumentation theory offers even more insights and tools. These insights help practitioners to evaluate knowledge claims in argumentative discussions, and researchers to analyze argumentative discussions. The contributions by Walton (2006; 2007; 2008), Walton et al. (2008), and Kock (2006; 2007) augment our work by deepening the understanding of *practical reasoning*[16], a highly relevant branch for argumentative discussions in innovation within the theory of informal argumentation. Furthermore, an empirical study by Gold et al. (2002) showed that managers who obtained a basic understanding of informal argumentation theory were better able to deal with certain aspects of knowledge claim evaluation, such as a critique of knowledge and a critique of authority. We believe this is a fruitful direction for future research and future applications of our theory. For example, by using an experimental research design, the effect of possessing a basic understanding of informal argumentation theory on knowledge claim evaluation and project outcomes can be studied.

Secondly, the field of knowledge management can greatly benefit from informal argumentation theory. Schreyögg and Geiger (2007) notice the "striking discrepancy between the great importance nowadays attributed to knowledge (knowledge economy, knowledge resources, knowledge societies, knowledge-intensive firms, etc.) on the one hand and the vague and blurring conceptualizations of knowledge on the other hand" (p. 77). They propose to make "discursive examination" as a central part of the notion of knowledge. With our research, we are among the first who adopted this re-orientation by analyzing argumentative discussions through informal argumentation theory. Informal argumentation theory would prove to be very helpful to the field of knowledge management from both a theoretical and methodological point of view, as well as a practical point of view. It provides a means to improve the understanding what knowledge means in organizational and innovative settings; to make the concepts used and measured in knowledge management more distinctive, and less abstract and vague.

Finally, the research of knowledge claim evaluation should be systematized and expanded by using informal argumentation theory. For example, a multiple-case

[16] Practical reasoning is "a goal-driven, knowledge-based, action-guiding species of reasoning that coordinates goals with possible alternative courses of action that are means to carry out these goals; in relation to an agent's given situation as he/she/it sees it, and concludes in a proposition that recommends a prudent course of action" (Walton, 1997b; as referred to in Kock, 2007).

study of various innovation projects in similar contexts yields more generalizable insights about successful and unsuccessful forms of knowledge claim evaluation.

8.2.2 Improving the understanding of innovation and innovativeness

A second area of priority for further research is the issue concerning innovativeness: what measure of innovativeness should be adopted in relation to analyzing knowledge claim evaluation. We distinguished between an insider and outsider's perspective in our empirical studies, but this led to two completely different interpretations of the results. Moreover, we believe that managers and practitioners need to have a thorough understanding of how innovative something is in order to select a practice of knowledge claim evaluation. This involves the assessment of how novel and uncertain a certain situation is in relation to the knowledge claims under discussion.

If project members do not realize that facts exist or that existing knowledge can be obtained elsewhere, they could choose an inappropriate practice of knowledge claim evaluation. We refer to the Siemens BT and GEON studies, where we argued, based on *our* perception of innovativeness, that managers and project members overestimated the innovativeness of their projects by evaluating knowledge claims according to an approach similar to the Entrepreneurial approach. Contrariwise, if managers and practitioners underestimate the innovativeness attached to a project they might search for evidence that is not available (yet). As a result, the innovation project may take longer, because it takes more time and effort to acquire empirical-based evidence and existing knowledge. Another scenario is that the original innovative knowledge claims may be substituted for less uncertain and less novel knowledge claims (Boisot and MacMillan, 2004).

In this research, we experienced how subjective the notion of innovativeness is. Innovation literature acknowledges this issue too (Garcia and Calantone, 2002). The pressing question is to what extent practitioners in innovative organizations are able to assess the novelty and uncertainty of a situation in order to choose an appropriate practice of knowledge claim evaluation, and how this understanding can be improved. Furthermore, we as researchers should use understanding to select cases to be studied in future research in order to test the relation between approaches of knowledge claim evaluation and innovative performance. In retrospective, we believe that we did not study knowledge claim evaluation in projects that Boisot and

MacMillan (2004) would describe as highly novel and uncertain; empirical evidence and existing knowledge were amply available in our study contexts. An improved measure of innovativeness should pinpoint to companies and projects that radically innovate, e.g., a company such as YouTube (see Chapter 1) or a project such as Sony's Walkman (see Chapter 2, section 2.3), and should make comparisons between cases more meaningful.

8.2.3 Understanding the role of time and resources in innovation projects

Our third area for further research focuses on understanding the role of time and resources within the project and organization in relation to knowledge claim evaluation. Although we have not explored this issue in detail, the Siemens BT and GEON studies provide some indications that because of time pressure knowledge claims were evaluated less objectively and less thoroughly. For instance, project members of the Pricing Project at Siemens BT indicated in the interviews that they knew, based on facts, that their management accepted a faulty knowledge claim[17], but that there were no opportunities left to debate about it because of the heavy schedule of Siemens BT's top management. Waiting for a new opportunity was not considered an option because it would delay the project. Hence, project members accepted the faulty knowledge claim because of a lack of time. In the Customer Portal Project at GEON, we noticed that the project was executed in the sideline of daily operations (e.g., Friday mornings and/or afternoons were allocated for the project on an irregular basis), which limited the amount of time and resources available to evaluate knowledge claims. Project members felt time pressure, which could be the reason why, for instance, they did not choose to conduct a thorough investigation of customer needs in the beginning of the project (see Chapter 7). Because of limited time and resources, project members did not locate and collect empirical-based evidence or existing knowledge, which was available according to us. In further research on knowledge claim evaluation, the return of investing time and resources in knowledge claim evaluation should be central. We should make clear what the positive and negative consequences are of adopting an appropriate or inappropriate practice of knowledge claim evaluation in innovation.

[17] The knowledge claim concerned the inclusion of Siemens BT's regional company in France, in the diagnosis stage of the project (see KC 2.3d in Appendix G).

8.2.4 Understanding the impact of the epistemological base of the profession

The fourth direction for future research relates to what Robertson et al. (2003) refer to as the epistemological base of the profession. This concept constitutes the educational backgrounds and area(s) of competence of staff members (Garud and Rappa, 1994; Giroux and Taylor, 2002). Robertson et al. (2003) present a comparative analysis of two professional service companies residing in different institutional contexts: a scientific and a legal context. They argued that the way these companies "legitimated knowledge" (i.e., a different label for knowledge claim evaluation) differed because of different epistemological bases. The company in the scientific context emphasized experimentation and induction, and the company in the law context emphasized reinterpretation and deductions of existing judgments and previous cases. Although the study by Robertson et al. (2003) just scratches the surface with respect to measuring and explaining knowledge claim evaluation, it suggests that the epistemological base may explain why organizations (unintentionally) choose an inappropriate practice. For instance, the Open approach of knowledge claim evaluation may be more likely to be found in firms that have a scientific base. Additionally, Robertson et al. (2003) distinguishes between normative (e.g., clergy and law) and syncretic professions (i.e., military and academia).

The epistemological base of profession may illuminate new aspects of knowledge claim evaluation in relation to why innovations succeed or fail. For instance, governmental institutes and businesses traditionally attribute an important role to universities and knowledge institutes in innovation processes. It was also one of the reasons why the Dutch government subsidized the KodA program (Chapter 5), in which a large number of projects were executed by universities and knowledge institutes. The conjecture that the epistemological base of a profession may cause inappropriate practices of knowledge claim evaluation sheds a different light on the role of universities and knowledge institutes in innovations. Universities and knowledge institutes are known to adopt practices of knowledge claim evaluation that correspond to an Open alike approach. The central question is whether such organizations are capable to drop the "familiar" scientific approach in exchange for an approach similar to the Entrepreneurial approach, when pressed by really novel and uncertain circumstances.

8.2.5 Automating parts of the argumentative analysis

We indicated that analyzing and interpreting argumentative discussions proved to be a laborious activity. A potential solution to overcome this problem is to automate parts of the analysis by using intelligent techniques, such as information retrieval (IR) and natural language processing (NLP). Such techniques can process the transcripts of an argumentative discussion from a project meeting, and identify relevant components of the argumentative discussion. For instance, relevant concepts (terms) and the relations existing between terms, pertaining to knowledge claims in innovation projects, can be extracted (Ittoo et al., 2010; Ittoo, Maruster et al., 2010). As future work, we see the usage of information retrieval and natural language processing techniques applied to the argumentative analysis in a broader sense, as potential tools contributing to the field of business intelligence and business process change.

8.3 Epilogue

With this research, we set the first step in improving the understanding of the role of knowledge claim evaluation in innovation. The findings indicate that there is little known about knowledge claim evaluation in innovation. Yet, drawing on informal argumentation theory, we are better able to explain the diversity and the details of knowledge claim evaluation in theory and practice. Further research should be directed at advancing the theory, by exploiting the synergy between informal argumentation and knowledge claim evaluation, by studying and experimenting how practitioners can use the lessons from informal argumentation theory in innovations and by understanding the benefits of appropriate practices of knowledge claim evaluation.

Appendix A

Fair comparison criteria (adopted from McElroy, 2008):

1) *Completeness*: this criterion refers to the extent to which a set of alternative knowledge claims includes all reasonable competitive alternatives;
2) *Commensurability*: this criterion refers to the extent to which alternative knowledge claims can be evaluated based on a common conceptual framework. This criterion is based on Kuhn's (1970) work on incommensurability. Organizations must create commensurability if it is not present. Firestone and McElroy adopt Popper's (1970) notion that commensurability can always be constructed;
3) *Equal specification*: this criterion refers to the extent to which alternative knowledge claims are equally specified in terms of abstraction and detailedness. Competing knowledge claims should be equally specified;
4) *Continuity*: this criterion refers to the extent to which each alternative knowledge claim is faithful to its previous expression

Epistemic criteria (adopted from Firestone and McElroy, 2003b; McElroy, 2008)

1) *Logical consistency* (or coherence): this criterion provides that logical arguments in knowledge claims must be consistent, and that conclusions follow from premises;
2) *Empirical fit* (or correspondence): this criterion argues that knowledge claims should be consistent with independently arrived at descriptions of the facts;
3) *Projectibility*: this criterion refers to the extent a knowledge claim can be extended to new cases successfully. A posteriori (after previous KCE moments) measurements in the face of reality are required to use this criterion;
4) *Systematic fruitfulness*: this criterion refers to the ability of the organization to deduce new knowledge claims from previous knowledge claims. Again a posteriori measurements are required;

5) *Systematic coherence*: this criterion relates to the extent to which a knowledge claim is integrated by specified linguistic relationships in the organization. The higher the better;
6) *Simplicity*: this criterion is based on the principle of Occam's razor, in which the extent to which a knowledge claim is simple;
7) *Heuristic quality*: this criterion refers to the extent to which a knowledge claim encourages the formulation of new knowledge claims.

Appendix B

Brockriede and Ehninger's (1960) extend substantive warrant typology:

- The *Cause Warrant* attributes to facts about a person, object, event or condition (i.e., the data) a "creative or generative power and specifies the nature of the effect they will produce" (p. 48);
- The *Sign Warrant* provides an interpretation of the meaning or significance of clues or symptoms (i.e., the data);
- The *Generalization Warrant* assumes that what is true for a sample consisting out of information about a number of persons, objects, events, or conditions (i.e., the data), which is perceived as a representative and adequate sample of a given class of phenomenon, will also be true of additional members of that class that are not represented in the sample;
- The *Parallel Case Warrant* asserts that one or more statements about a single object (i.e., the data) bear an essential similarity with a second object in the same category as the first;
- Based on a relationship of a certain nature between two items (i.e., the data), the *Analogy Warrant* assumes that a similar relationship exists between a second pair of items;
- The *Classification Warrant* assumes that what is true in a generalized conclusion about known members of a class of persons, objects, events, or conditions (i.e., the data), will also be true of "a hitherto unexamined item which is known (or thought) to fall within the class there described" (p. 50)

Appendix C

This appendix presents the detailed results of the the KodA study (see Chapter 5). First, the questions and detailed results of the epistemological position are presented. Subsequenty, the questions and detailed results (i.e., descriptives and correlations) that belong to the five dimensions are presented: empirical evidence, authority-based evidence, intuition-based evidence, organizational intentions and existing knowledge.

Epistemological positions

Table C.0.1. Interview questions for epistemological positions

Dimension	**Interview question**	**Statement/question**	**Likert scale**
Role of empirical data in KCE	Q 7a	Statement: The project took for granted that in order to avoid errors, the project might overlook or ignore opportunities	1 = disagree 5 = agree
	Q 7b	Statement: Knowledge development on the long term was more important than knowledge development on the short term	1 = disagree 5 = agree
	Q 7c	Statement: The (universal) truth was more important than the usefulness of knowledge	1 = disagree 5 = agree

Table C.0.2. Descriptives for epistemological positions

	Epistemological positions		
Item	Error-avoidance vs. ignorance-avoidance	Short-term versus long term knowledge development	Useful knowledge versus useful knowledge
Interview question	7a	7b	7c
Project 1	4.0	3.0	3.0
Project 2	1.0	4.0	1.0
Project 3	5.0	3.0	1.0
Project 4	1.0	3.0	1.0
Project 5	4.0	5.0	1.0
Project 6	4.0	2.0	1.0
Project 7	4.0	3.0	1.0
Project 8	2.0	2.0	1.0
Project 9	1.0	3.0	2.0
Project 10	3.0	5.0	1.0
Project 11	2.0	2.0	1.0
Project 12	3.0	4.0	1.0
Project 13	4.0	3.0	1.0
Project 14	5.0	1.0	1.0
Project 15	5.0	3.0	2.0
Project 16	2.0	3.0	2.0
N	16	16	16
median	3,5	3,0	1,0
IQ 25%	2,0	2,25	1,0
IQ 75%	4,0	3,75	1,75

Dimension details: Empirical evidence

Table C.0.3. Interview questions for dimension: Empirical Evidence

Dimension	Interview question	Statement/question	Likert scale
Role of empirical data in KCE	Q 8a	Statement: Primary data (i.e., self-collected data) played an important role in supporting intermediate results and conclusions	1 = disagree 5 = agree
	Q 8b	Statement: Secondary data (i.e., 3rd party evidence/data) played an important role in supporting intermediate results and conclusions	1 = disagree 5 = agree
	Q 8c	Statement: Personal data (i.e., data from experience by project members) played an important role in supporting intermediate results and conclusions	1 = disagree 5 = agree
	Q 8l	Statement: Knowledge was always subjected to discussion if data changed or became available	1 = disagree 5 = agree
	Q 8m	Statement: Knowledge was always modified or rejected if changed data or additional data indicated this	1 = disagree 5 = agree
	Q 8o	Statement: Data were always decisive in accepting knowledge	1 = disagree 5 = agree
Critical attitude towards data	Q 8h	Question: How often was 3rd party data subject to debate?	1 = never 5 = always
	Q 8j	Question: How often was data from personal experience subject to debate?	1 = never 5 = always
Drive for verification through empirical data	Q 8n	Statement: When existing (empirical) data was wrong or irrelevant, we always searched for (empirical) data that supported our knowledge	1 = disagree 5 = agree

Table C.0.4. Descriptives for dimension: Empirical evidence

	Dimension: Empirical evidence								
	1 Role in knowledge claim evaluation						2 Critical attitude		3 Justificationism
	1a Importance			1b Discussion	1c Change	1d Decisiveness			
	Primary data	Secondary data	Personal data				Secondary data	Personal data	
Interview question	8a	8b	8c	8l	8m	8o	8h	8j	8n
Project 1	4	4	5	2	4	4	4	2	1
Project 2	4	4	4	4	4	2	3	4	1
Project 3	3	4	5	5	3	3	1	4	2
Project 4	3	4	5	4	4	2	4	4	1
Project 5	5	4	4	5	3	3	2	5	2
Project 6	5	2	5	4	2	3	-	4	2
Project 7	5	5	4	3	4	4	5	3	1
Project 8	3	1	4	4	4	3	-	3	2
Project 9	5	2	5	4	4	5	-	5	1
Project 10	5	4	3	4	5	4	3	3	3
Project 11	5	4	5	3	3	2	4	4	2
Project 12	2	2	5	4	4	2	-	4	-
Project 13	4	4	4	4	4	4	2	4	2
Project 14	5	2	4	5	3	4	-	2	2
Project 15	5	4	1	4	-	5	2	-	-
Project 16	5	4	3	4	5	2	5	5	1
N	16	16	16	16	15	16	11	15	14
median	5,0	4,0	4,0	4,0	4,0	3,0	3,0	4,0	2,0
IQ 25%	3,25	2,0	4,0	4,0	3,0	2,0	2,0	3,0	1,0
IQ 75%	5,0	4,0	5,0	4,0	4,0	4,0	4,0	4,0	2,0

Table C.0.5. Correlation coefficients for role of the empirical evidence

		8a	8b	8c	8l	8m	8o
8a	Correlation Coefficient	1,00					
	N	16					
8b	Correlation Coefficient	0,24	1,00				
	N	16	16				
8c	Correlation Coefficient	-0,39	-0,22	1,00			
	N	16	16	16			
8l	Correlation Coefficient	-0,01	-0,28	-0,21	1,00		
	N	16	16	16	16		
8m	Correlation Coefficient	-0,11	0,25	-0,58	-0,25	1,00	
	N	15	15	15	15	15	
8o	Correlation Coefficient	0,40	-0,10	-0,07	-0,08	0,05	1,00
	N	16	16	16	16	15	16

Dimension details: Authority

Table C.0.6. Interview questions for dimenson: Authority

Dimension	Interview question	Statement/question	Likert scale
Role of authority in KCE	Q 9a	Statement: Experts and key figures played an important role in developing and supporting intermediate results and conclusions	1 = disagree 5 = agree
	Q 9j	Statement: Knowledge was always subjected to discussion if experts and key figures disagreed with it (different opinion)	1 = disagree 5 = agree
	Q 9k	Statement: Knowledge was always modified or rejected if experts and key figures disagreed with it (different opinion)	1 = disagree 5 = agree
	Q 9l	Statement: The opinion and knowledge of experts was always decisive in accepting knowledge	1 = disagree 5 = agree
Critical attitude towards authority	Q 9i	Statement: Project members were always critical towards experts and key figures	1 = disagree 5 = agree
Drive for verification through authority	Q 9n	Statement: If existing evidence did insufficiently support knowledge, experts and other authorities who could support the knowledge were searched for	1 = disagree 5 = agree

Table C.0.7. Descriptives for dimension: Authority

	Dimension: Authority						
	1 Role in knowledge claim evaluation					2 Critical attitude	3 Justificationism
	1a Importance	1b Discussion	1c Change	1d Decisiveness	Aggregate score		
Interview question	9a	9j	9k	9l		9i	9n
Project 1	4	5	1	2	3,00	5	1
Project 2	4	5	1	3	3,25	4	1
Project 3	5	5	4	4	4,50	5	5
Project 4	4	5	2	2	3,25	5	1
Project 5	4	5	4	4	4,25	5	5
Project 6	2	2	1	1	1,50	5	1
Project 7	4	3	3	3	3,25	3	1
Project 8	5	4	1	2	3,00	5	2
Project 9	4	4	4	4	4,00	5	4
Project 10	5	4	4	4	4,25	4	4
Project 11	4	4	2	2	3,00	4	1
Project 12	5	4	1	2	3,00	5	2
Project 13	4	4	2	2	3,00	3	4
Project 14	5	4	4	5	4,50	4	4
Project 15	2	4	1	1	2,00	4	1
Project 16	5	4	2	3	3,50	3	2
N	16	16	16	16	16	16	16
median	4,0	4,0	2,0	2,5	-	4,5	2,0
mean	-	-	-	-	3,33	-	-
std. dev	-	-	-	-	0,84	-	-
IQ 25%	4,0	4,0	1,0	2,0	-	4,0	1,0
IQ 75%	5,0	4,75	4,0	4,0	-	5,0	4,0

Table C.0.8. Correlation coefficients for role of the authority

		9a	9j	9k	9l
9a	Correlation Coefficient	1,00			
	N	16			
9j	Correlation Coefficient	0,44	1,00		
	N	16	16		
9k	Correlation Coefficient	0,39	0,25	1,00	
	N	16	16	16	
9l	Correlation Coefficient	0,62	0,31	0,88	1,00
	N	16	16	16	16

Dimension details: Intuition

Table C.0.9. Interview questions for dimension: Intuition

Dimension	Interview question	Statement/question	Likert scale
Role of intuition in KCE	Q 11a	Question: How often did the project rely on the intuition and gut feeling of certain project members in accepting or rejecting knowledge	1 = never 5 = always
	Q 11e	Statement: If somebody disagreed based on his/her intuition, knowledge was always subjected to discussion	1 = disagree 5 = agree
	Q 11f	Statement: If somebody disagreed based on his/her intuition, knowledge was always modified or rejected	1 = disagree 5 = agree
	Q 11i	Statement: Intuition was always decisive in accepting knowledge	1 = disagree 5 = agree
Critical attitude towards intuition	Q 11d	Statement: Project members always kept a critical attitude towards knowledge based on the intuition of project members	1 = disagree 5 = agree
Drive for verification through intuition	Q 11h	Statement: If existing evidence did insufficiently support knowledge, people with supportive intuitive ideas (i.e., gut feeling) who could support the knowledge were searched for	1 = disagree 5 = agree

Table C.0.10. Descriptives for dimension: Intuition

	Dimension: Intuition						
	1 Role in knowledge claim evaluation					2 Critical attitude	3 Justificationism
	1a Importance	1b Discussion	1c Change	1d Decisiveness	Aggregate score		
Interview question	11a	11e	11f	11i		11d	11h
Project 1	1	1	1	1	1,00	5	1
Project 2	3	4	3	1	2,75	4	1
Project 3	5	5	4	3	4,25	5	-
Project 4	5	5	5	3	4,50	5	-
Project 5	5	5	5	2	4,25	5	1
Project 6	4	4	4	2	3,50	4	1
Project 7	4	5	1	1	2,75	5	1
Project 8	1	1	1	1	1,00	-	-
Project 9	4	3	2	4	3,25	3	4
Project 10	2	4	1	1	1,00	4	-
Project 11	3	4	2	2	2,75	4	2
Project 12	4	4	4	2	3,50	4	-
Project 13	2	1	1	1	1,00	-	-
Project 14	4	4	2	2	3,00	4	2
Project 15	1	1	1	1	1,00	-	-
Project 16	1	1	1	1	1,00	-	-
N	16	16	16	16	16	12	8
median	3,5	4,0	2,0	1,5	-	4,0	1,0
mean	-	-	-	-	2,53	-	-
std. dev	-	-	-	-	1,33	-	-
IQ 25%	1,25	1,0	1,0	1,0	-	4,0	1,0
IQ 75%	4,0	4,75	4,0	2,0	-	5,0	2,0

Table C.0.11. Correlation coefficients for role of the intuition

		11a	11e	11f	11i
11a	Correlation Coefficient	1,00			
	N	16			
11e	Correlation Coefficient	0,89	1,00		
	N	16	16		
11f	Correlation Coefficient	0,81	0,69	1,00	
	N	16	16	16	
11i	Correlation Coefficient	0,72	0,48	0,58	1,00
	N	16	16	16	16

Dimension details: Organizational intentions

Table C.0.12. Interview questions for dimension: Organizational intentions

Dimension	Interview question	Statement/question	Likert scale
Role of organizational/project intentions in KCE	Q 12a	Statement: KodA innovation agenda has a strong influence during project formulation	1 = disagree 5 = agree
	Q 12b	Statement: KodA innovation agenda has a strong influence during project execution	1 = disagree 5 = agree
	Q 12c	Statement: KodA innovation agenda has a strong influence during project finalization (i.e., delivery of project results)	1 = disagree 5 = agree
	Q 12e	Statement: It was always possible to deviate from the KodA innovation agenda	1 = disagree 5 = agree
	Q 12f	Statement: Because of the KodA innovation agenda certain knowledge was modified or falsified, even if contradicting evidence was available	1 = disagree 5 = agree
	Q 14a	Statement: The project proposal had a strong influence on the choices made in the project	1 = disagree 5 = agree
	Q 14d	Statement: It was always possible to disregard the project proposal	1 = disagree 5 = agree
	Q 14e	Statement: Because of the project proposal certain knowledge was modified or falsified, even if contradicting evidence was available	1 = disagree 5 = agree
Critical attitude towards organizational/project intentions	Q 12d	Statement: Project members always kept a critical attitude towards KodA innovation agenda	1 = disagree 5 = agree
	Q 14c	Statement: Project members always kept a critical attitude towards the project proposal	1 = disagree 5 = agree

Table C.0.13. Descriptives for dimension: Organizational intentions

	Dimension: Organizational intentions										
	1 Role in knowledge claim evaluation									2 Critical attitude	
	1a Importance					1c Change		1d Decisiveness			
	Role program agenda before project	Role program agenda during project	Role program agenda after project	Project proposal	Aggregate score	Program agenda	Project proposal	Program agenda	Project proposal	Program agenda	Project proposal
Interview question	12a	12b	12c	14a		12f	14e	12e	14d	12d	14c
Project 1	5	4	4	5	4,50	-	-	-	4	3	4
Project 2	5	5	4	4	4,50	2	-	2	2	3	4
Project 3	4	1	1	1	1,00	-	-	-	1	-	5
Project 4	1	1	1	4	1,75	1	-	1	-	5	-
Project 5	2	4	4	3	3,25	-	-	-	-	3	2
Project 6	2	1	1	5	2,25	-	5	-	4	-	5
Project 7	4	4	4	5	4,25	2	-	2	2	4	4
Project 8	2	2	4	5	3,25	1	-	1	5	2	2
Project 9	3	3	2	5	3,25	-	5	-	5	1	1
Project 10	4	4	4	4	4,00	-	-	-	-	2	4
Project 11	2	2	2	1	1,75	-	-	-	-	-	-
Project 12	2	1	1	2	1,50	-	2	-	1	-	4
Project 13	1	1	1	4	1,75	-	2	-	2	-	2
Project 14	2	1	4	3	2,50	-	-	-	-	-	-
Project 15	1	1	1	5	2,00	-	2	-	1	-	4
Project 16	1	1	1	1	1,00	-	-	-	-	-	-
N	16	16	16	16	16	4	5	4	12	8	12
median	2,0	1,5	2,0	4,0	-	1,5	2,0	1,5	2,0	3,0	4,0
mean	-	-	-	-	2,66	-	-	-	-	-	-
std. dev	-	-	-	-	1,21	-	-	-	-	-	-
IQ 25%	1,0	1,0	1,0	2,25	-	1,0	1,0	1,0	1,0	2,0	2,0
IQ 75%	3,75	4,0	4,0	5,0	-	2,0	4,25	2,0	4,25	3,75	4,0

Table C.0.14. Correlation coefficients for role of the organizational intentions dimension

		12a	12b	12c	14a
12a	Correlation Coefficient	1,00			
	N	16			
12b	Correlation Coefficient	0,88	1,00		
	N	16	16		
12c	Correlation Coefficient	0,73	0,78	1,00	
	N	16	16	16	
14a	Correlation Coefficient	0,42	0,34	0,33	1,00
	N	16	16	16	16

Dimension details: Existing knowledge

Table C.0.15. Interview questions for dimension: Existing knowledge

Dimension	Interview question	Statement/question	Likert scale
Role of intuition in KCE	Q 13a	Statement: Results of similar previous project had a strong influence on the choices made in this project	1 = disagree 5 = agree
	Q 13d	Statement: It was always possible to disregard the results from previous project	1 = disagree 5 = agree
	Q 13e	Statement: Because of the knowledge developed in previous projects certain knowledge was modified or falsified, even if contradicting evidence was available	1 = disagree 5 = agree
Critical attitude towards intuition	Q 13c	Statement: Project members always kept a critical attitude towards similar previous projects	1 = disagree 5 = agree

Table C.0.16. Descriptives for dimension: Existing knowledge

	Dimension: Existing knowledge			
	1 Role in knowledge claim evaluation			2 Critical attitude
	1a Importance	1c Change	1d Decisiveness	
Interview question	13a	13e	13d	13c
Project 1	4	4	-	4
Project 2	5	1	2	4
Project 3	5	1	4	5
Project 4	1	-	-	-
Project 5	4	1	5	5
Project 6	3	1	2	5
Project 7	4	1	2	4
Project 8	5	2	2	4
Project 9	5	4	5	4
Project 10	5	2	5	4
Project 11	2	-	-	-
Project 12	4	2	2	3
Project 13	3	2	2	4
Project 14	5	2	2	4
Project 15	2	-	-	-
Project 16	5	1	-	5
N	16	13	11	13
median	4,0	2,0	2,0	4,0
IQ 25%	3,0	1,0	2,0	4,0
IQ 75%	5,0	2,0	5,0	5,0

Table C.0.17. Correlation coefficients for role of the existing knowledge dimension

		13a	13e	13d
13a	Correlation Coefficient	1,00		
	N	16		
13e	Correlation Coefficient	0,35	1,00	
	N	13	13	
13d	Correlation Coefficient	0,29	0,31	1,00
	N	11	11	11

Appendix D

This appendix presents the interview guide (in Dutch) as used in the KodA study (see Chapter 5).

Introductie interview met een KodA projectleider

In kader van mijn promotieonderzoek en het Innovatiesysteem ZLTO/transforum project 'bijdrage van collectieven aan innovaties' doe ik onderzoek naar de manier waarop er binnen KodA projecten met kennis is omgegaan. Ik richt me in het bijzonder op welke wijze project betrokkenen bepaalde kennis wel selecteerden en gebruikten, en andere kennis weer niet. Denk hierbij aan wat voor soort bewijs werd ingezet om iets aan te tonen of hoe er werd omgegaan met kritiek op bepaalde kennis. De KodA opzet is een heel interessante projectomgeving voor dit onderzoek. Ander onderzoek naar dit vraagstuk heb ik uitgevoerd bij Siemens in Zwitserland en GEON in Groningen. Op deze manier kunnen we de KodA manier van werken ook vergelijken met andere contexten.

Daarnaast wil ZLTO vaststellen hoe projectleiders de KodA werkstijl waarderen en in hoeverre de gestelde KodA vernieuwingsopgaven en innovatieagenda's zijn gehaald. Dit om effectiviteit van KodA te evalueren en lessen te trekken voor de toekomst. De resultaten van beide partijen – RuG en ZLTO – zullen worden gebundeld om een uitgebalanceerd beeld te krijgen van het KodA programma.

De resultaten van dit onderzoek zullen aan U als projectleider/partner schriftelijk worden teruggekoppeld. Hierbij zullen we uw project kunnen vergelijken met de andere KodA projecten op het gebied van omgaan met kennis – met name over kennis selectie en evaluatie. Daarnaast hebben de Partners in KodA een mooi systeem ontwikkeld. Partners hebben er belang bij als het breder ingevoerd wordt, en er meer programma's zonder rompslomp ontstaan. Een gedegen studie helpt om het systeem breder in te voeren

Het gesprek duurt ongeveer een uur tot anderhalf uur. Ik wil in dit gesprek onderscheid maken tussen de verschillende projecten die u geleid heeft, en waar mogelijk, de verschillende stadia per project. Het liefst wil ik vragen naar zo gedetailleerd mogelijke informatie, als het kan per project, ook al zijn het er soms veel. Dit levert de beste en meest betrouwbare onderzoeksresultaten op.

Om de informatie grondig te analyseren zou ik het gesprek graag willen opnemen. Ik zal op een vertrouwelijke manier met de informatie omgaan. Ook zal uw informatie geanonimiseerd worden. Tevens hebt u de mogelijkheid om de resultaten voor publicatie in te kijken. Hebt u er bezwaar tegen dat ik het gesprek opneem. U kunt verder op elk moment aangeven of zelf op de pauze knop drukken, als u iets 'off the record' kwijt wil.

Hebt u vragen? Is tot zover alles duidelijk? Dan begin ik nu met het interview.

Interviewvragen

Het interview bestaat grofweg uit drie onderdelen. Ten eerste wil ik wat meer over de achtergronden van het project en uw rol in het project te weten komen. Vervolgens ga ik dieper in op de materie rondom kennisontwikkeling en gebruik. Ten slotte stel ik nog een aantal vragen over de KodA context. Ik begin nu met de achtergronden.

Vraag 1a Kunt u mij in het kort iets vertellen over uw achtergrond en hoe u betrokken bent geraakt bij dit KodA project?

Vraag 1b Wat was u rol binnen dit project?

Vraag 1c Hoeveel mensen waren er betrokken?

Vraag 1d Kunt u de achtergrond en de rol van de belangrijkste betrokkenen beschrijven?

Ik ga u nu een aantal stellingen voorleggen die over het project en het doel van het project gaan. Zou u kunnen aangeven in hoeverre u het eens bent met deze stellingen. Ik ben ook erg benieuwd naar de redenen en achtergronden. Hier wil ik graag na deze stellingen op terugkomen.

Vraag 2a Het projectdoel zoals gesteld in het projectvoorstel is **onveranderd** gebleven

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2b Het projectdoel zoals gesteld in het projectvoorstel heeft een **politieke lading**

1. Sterk mee oneens

2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2c Naast het projectdoel zoals gesteld in het projectvoorstel is er ook een **officieuze** projectdoel

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2d Het **officiële** projectdoel is gehaald

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2e Het **officieuze** projectdoel is gehaald

0. Niet van toepassing
1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2f Het project is te bestempelen als **succesvol**

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2g De betrokken (u, partners, projectdeelnemers) kunnen de resultaten van het project **gebruiken** in de praktijk

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 2h Is het project budget overschreden, en zo ja, ongeveer hoeveel % heeft het project meer gekost

Vraag 2i Heeft het project langer geduurd dan gepland, en zo ja, ongeveer hoeveel % heeft het langer geduurd

De volgende stellingen gaan over de KodA vernieuwingsopgave

Vraag 3a Ik ben vertrouwd met de KodA vernieuwingsopgave van thema X

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 3b <Het perspectief onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 3c <Het afspraken onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 3d <Het routines onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 3e <Het inzichten onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal

4. Eens
5. Sterk mee eens

Vraag 3f <Het ontwerpen onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 3g <Het competenties onderdeel> is gehaald met dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraaf 4a Het project kon **vooraf** bestempeld worden als innovatief

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Wat is innovatie: the **intentional** introduction and application within a role, group or organization of ideas, processes, products or procedures, **new to the relevant unit of adoption**, designed to significantly benefit the individual, the group, organization or wider society

Vraag 4b Het project kon **achteraf** bestempeld worden als innovatief

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Ik ga nu een aantal posities voorleggen over de organisatie principes in dit KodA project

Vraag 5a In dit project is het dominante principe

1. Autonomie
2. Afhankelijkheid
3. Er tussen in

Vraag 5b In dit project is het dominante principe

1. Regels
2. Eigen initiatief
3. Er tussen in

Vraag 5c In dit project is het dominante principe

1. Hiërarchie
2. Platte organisatie
3. Er tussen in

Vraag 5d In dit project is het dominante principe

1. Geslotenheid
2. Openheid
3. Er tussen in

Vraag 5e In dit project is het dominante principe

1. Centralisatie
2. Decentralisatie
3. Er tussen in

Vraag 5f In dit project is het dominante principe

1. Kennis wordt gedeeld
2. Kennis wordt niet gedeeld (blijft privé)
3. Er tussen in

Vraag 6a Wat was het **officiële** doel van het project?

Vraag 6b Wat was het **officieuze** doel van het project?

Ik ga nu een aantal vragen stellen en stellingen voorleggen over de manier waarop kennis met kennis werd omgegaan in dit KodA project, en dan met name kijk ik naar hoe kennis werd geëvalueerd. Ik begin met een paar algemene stellingen en richt me daarna op de rol van bewijsmateriaal voor de onderbouwing van kennis.

Vraag 7a Bij dit KodA project werd voor lief genomen dat om zo **weinig mogelijk foute** kennis te creëren en te vinden, je bepaalde mogelijkheden **over het hoofd** kunt zien of moet links laten liggen.

1. Sterk mee oneens

2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 7b Bij dit KodA project was kennisontwikkeling **op lange termijn** belangrijker dan kennisontwikkeling **op korte termijn**

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 7c Bij dit KodA project was de **universele waarheid** van kennis belangrijker dan de **bruikbaarheid** van kennis

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 7d In dit KodA project is er nooit gewerkt me **tegenstrijdigheden** of **inconsistenties** in de kennis

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 8a Primaire data, dat wil zeggen bewijs verzameld in eigen onderzoek, speelde een belangrijke rol bij het **ondersteunen** van tussenresultaten en conclusies

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: "We hebben geconstateerd dat de meeste telers X vinden/willen, dus daarom doen we actie Y"

Vraag 8b Secundaire data, dat wil zeggen bewijs overgenomen van derden buiten het project, speelde een belangrijke rol bij het ondersteunen van tussenresultaten en conclusies

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: "Uit secundaire bronnen weten we dat de meeste telers X vinden/willen, dus daarom doen we actie Y"

Vraag 8c Persoonlijke data, dat wil zeggen bewijs op basis van de ervaringen van een of meerdere projectleden en/of projectbetrokkenen, speelde een belangrijke rol bij het ondersteunen van tussenresultaten en conclusies

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: "Van een projectlid weten we dat de meeste telers X vinden/willen, dus daarom doen we actie Y"

Vraag 8d Het was mogelijk om het bewijsmateriaal uit tweede hand – de secundaire data - te controleren op validiteit en betrouwbaarheid?

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 8e Kunt u hierbij een voorbeeld geven? In hoeverre is dit voorbeeld representatief voor het gehele project?

Vraag 8f Het was mogelijk om het persoonlijke bewijsmateriaal – op basis van persoonlijke ervaringen - te controleren op validiteit en betrouwbaarheid?

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens

5. Sterk mee eens

Vraag 8g Kunt u hierbij een voorbeeld geven? In hoeverre is dit voorbeeld representatief voor het gehele project?

Vraag 8h Hoe vaak stond het bewijs uit tweede hand (secundaire data) dat gebruikt werd als onderbouwing voor bepaalde ideeën of keuzes ter discussie?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Probe: met betrekking tot validiteit en betrouwbaarheid "Was het wel echt zo?"

Vraag 8i Kunt hierbij een voorbeeld geven? In hoeverre is dit voorbeeld representatief voor het gehele project?

Vraag 8j Hoe vaak stond het persoonlijke bewijs dat gebruikt werd als onderbouwing voor bepaalde ideeën of keuzes ter discussie?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Probe: "Was het wel echt zo?"

Vraag 8k Kunt hierbij een voorbeeld geven? In hoeverre is dit voorbeeld representatief voor het gehele project?

Vraag 8l Bij een verandering in of aanvulling van de bewijslast werd gerelateerde kennis altijd ter discussie gesteld

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: denk aan "er komt nieuwe primaire en secundaire data bij" of "een *projectlid brengt een tegenstrijdige ervaring in" of "bepaalde secundaire data is toch niet zo nauwkeurig als we dachten"*

Vraag 8m Als na een verandering in of aanvulling van de bewijslast gerelateerde kennis moest worden aangepast of verworpen, dan werd dit te allen tijde ook gedaan

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: denk aan "de secundaire bewijslast die onder onze keuze lag om theorie X te hanteren blijkt onjuist te zijn; hierdoor waren we genoodzaakt theorie X aan te passen"

Vraag 8n Als bestaande bewijslast onjuist of irrelevant bleek te zijn, gingen we altijd op zoek naar nieuw bewijs wat onze ideeën wel zou ondersteunen

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: denk aan "de data ondersteunde hetgeen we wilden aantonen niet. In plaats dat we onze ideeën veranderden, gingen we verder opzoek naar data die onze ideeën wel ondersteunden"

Vraag 8o Data heeft altijd de doorslag gegeven bij het aannemen van kennis

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 9a Experts en sleutelfiguren in de industrie speelden een belangrijke rol bij het ontwikkelen en ondersteunen van de verkregen tussenresultaten en conclusies?

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens

5. Sterk mee eens

Vraag 9b Kunt u deze stelling toelichten? In hoeverre is dit representatief voor het gehele project?

Vraag 9c Hoe frequent werd er gebruik gemaakt van een expert *binnen* de projectorganisatie bij het ontwikkelen en ondersteunen van de verkregen tussenresultaten en conclusies?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 9d Hoe frequent werd er gebruik gemaakt van een expert *buiten* de projectorganisatie bij het ontwikkelen en ondersteunen van de verkregen tussenresultaten en conclusies?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 9e Hoe frequent werd er gebruik gemaakt van de koda stuurgroep bij het ontwikkelen en ondersteunen van de verkregen tussenresultaten en conclusies?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 9f Hoe frequent werd er gebruik gemaakt van een sleutelfiguur (lid met hoge status, lange staat van dienst, succesvolle ondernemer) van *binnen* de projectorganisatie bij het ontwikkelen en ondersteunen van de verkregen tussenresultaten en conclusies?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms

4. Vrijwel altijd
5. Altijd

Vraag 9g Hoe frequent werd er gebruik gemaakt van een sleutelfiguur (lid met hoge status, lange staat van dienst, succesvolle ondernemer) van *buiten* de projectorganisatie?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 9h Hoe frequent werd er gebruik gemaakt van externe partijen via wetenschappelijke publicaties of publicaties van andere instituten/of uit andere contexten?

0. Niet van toepassing
1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 9i Projectleden hielden altijd een kritische houding ten opzichte van de kennis en uitspraken van de eerder genoemde experts en sleutelfiguren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 9j Als een expert of sleutelfiguur andere ideeën er op na hield, werd gerelateerde kennis altijd ter discussie gesteld

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 9k Als een expert of sleutelfiguur andere ideeën er op na hield, dan werd gerelateerde kennis – ongeacht van de aanwezigheid van tegenstrijdig bewijs – altijd aangepast of verworpen

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 9l De mening en kennis van experts en sleutelfiguren heeft altijd de doorslag gegeven bij het aannemen van kennis

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: Dus primaire en secundaire data of persoonlijke ervaringen van projectleden die geen echte expert zijn, was ondergeschikt

Vraag 9m De kennis en ervaring van betrokkenen die als sleutelfiguur of expert bestempeld werden was net zo belangrijk als de kennis en ervaring van niet-experts en niet-sleutelfiguren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 9n Als gevonden bewijslast niet voldoende juiste ondersteuning kon bieden, gingen we op zoek naar experts of andere autoriteiten die deze ondersteuning wel konden realiseren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: denk aan "de data ondersteunde hetgeen we wilden aantonen niet; of er was te weinig van. In plaats dat we onze ideeën veranderden, gingen we verder opzoek naar experts die onze ideeën wel ondersteunden"

Vraag 10a Hoe frequent kwam het voor dat de stem van de meerderheid in de projectgroep een tussenresultaat of conclusie heeft moeten ondersteunen?

1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Voorbeeld: door middel van een stemming.

Vraag 10b Kunt u dit toelichten? In hoeverre is dit representatief voor het gehele project?

Vraag 11a Hoe frequent werd er gebouwd op de intuïtie en onderbuiksgevoelens van bepaalde groepsleden bij het aannemen of verwerpen van kennis?

1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 11b Kunt u hier een voorbeeld bij geven? In hoeverre is dit voorbeeld representatief voor het gehele project?

Vraag 11c Hoe vaak was er een sprake van een 'pure' gok, en zo ja, hoe vaak?

1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 11d Projectleden hielden altijd een kritische houding ten opzichte van de kennis en uitspraken gebaseerd op de intuïtie van groepsleden

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 11e Als een iemand door zijn/haar intuïtie er andere ideeën er op na hield, werd gerelateerde kennis altijd ter discussie gesteld

1. Sterk mee oneens
2. Oneens

3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 11f Als een iemand door zijn/haar intuïtie er andere ideeën er op na hield, dan werd gerelateerde kennis – ongeacht van de aanwezigheid van tegenstrijdige bewijs – altijd aangepast of verworpen

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 11g De intuïtie van betrokkenen die als sleutelfiguur of expert bestempeld werden was net zo belangrijk als de intuïtie van niet-experts en niet-sleutelfiguren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 11h Als gevonden bewijslast niet voldoende juiste ondersteuning kon bieden, gingen we op zoek naar iemand met onderbuikgevoelens die deze ondersteuning wel kon realiseren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Probe: denk aan "de data ondersteunde hetgeen we wilden aantonen niet; of er was te weinig van. In plaats dat we onze ideeën veranderden, gingen we verder opzoek naar mensen die via hun intuïtie onze ideeën wel ondersteunden"

Vraag 11i Intuïtie heeft altijd de doorslag gegeven bij het aannemen van kennis

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens

5. Sterk mee eens

De volgende stellingen hebben betrekking op de rol van de KodA vernieuwingsopgave

Vraag 12a De KodA vernieuwingsopgave heeft een sterke invloed gehad bij het formuleren van het projectvoorstel

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 12b De KodA vernieuwingsopgave heeft een sterke invloed gehad op keuze gemaakt tijdens de uitvoering van het project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 12c De KodA vernieuwingsopgave heeft een sterke invloed gehad bij de oplevering van de projectresultaten

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 12d Projectleden hielden altijd een kritische houding ten opzichte van KodA vernieuwingsopgave

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 12e Het was te allen tijde mogelijk om van de KodA vernieuwingsopgave af te wijken

1. Sterk mee oneens
2. Oneens
3. Neutraal

4. Eens
5. Sterk mee eens

Vraag 12f Door de KodA vernieuwingsopgave is - ongeacht van de aanwezigheid van tegenstrijdig bewijs - bepaalde kennis aangepast of veranderd in dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 13a Resultaten van eerdere vergelijkbare projecten hebben een sterke invloed gehad op de gemaakte keuzes in dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 13b Kunt u dit illustreren?

Vraag 13c Projectleden hielden altijd een kritische houding ten opzichte van eerdere en of gerelateerde projecten

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 13d Het was ten alle tijde mogelijk om resultaten uit eerdere projecten te negeren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 13e Door kennis verkregen in eerdere projecten is - ongeacht van de aanwezigheid van tegenstrijdig bewijs - bepaalde kennis aangepast of veranderd in dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal

4. Eens
5. Sterk mee eens

Vraag 14a Het projectvoorstel heeft gedurende het hele project een sterke invloed gehad op de gemaakte keuzes

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 14b Kunt u dit illustreren?

Vraag 14c Projectleden hielden altijd een kritische houding ten opzichte van het projectvoorstel

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 14d Het was ten alle tijde mogelijk om het projectvoorstel te negeren

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 14e Door het projectvoorstel - ongeacht van de aanwezigheid van tegenstrijdig bewijs - bepaalde kennis aangepast of veranderd in dit project

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Ik heb nu een aantal onderwerpen behandeld waarmee de verworven kennis in het project ondersteund kan worden. Ik noem ze zo cfnmeteen nog een keertje op.

Vraag 15 Zou u een rangorde van de onderwerpen kunnen maken voor dit project? Hoe zou deze rangorde er uit zien in de volgorde van belangrijk naar minder belangrijk?

1. Primaire data
2. Secundaire data van derden
3. Persoonlijke data
4. Kennis en expertise van experts, KodA stuurgroep of sleutelfiguren
5. Kennis en expertise van niet-experts of niet-sleutelfiguren
6. Meerderheidsstem
7. Intuïtie/onderbuikgevoel van experts en sleutelfiguren
8. Intuïtie/onderbuikgevoel van niet-experts, KodA stuurgroep of niet-sleutelfiguren
9. KodA vernieuwingsopgave
10. Samenhang eerdere projecten
11. Projectvoorstel
12. ....

Vraag: Of er nog een onderwerp mist.

Ik stel nu nog een aantal algemene vragen over kennisgebruik en evaluatie

Vraag 16a Hoe frequent kwam het voor dat er twee of meerdere 'stukken' kennis (ideeën, theorieën, ontwerpen. plannen, etc) welke beide of allemaal waar/juist zouden kunnen zijn?

1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Probes: dat wil zeggen, er is in termen van bewijs en ondersteuning ongeveer evenveel voor te zeggen

Omdat competitie soms, vrijwel altijd, of altijd voorkwam, hoe werd er hier knopen doorgehakt?

Vraag 16b Zou u kunnen uitleggen hoe er in deze situatie toch een keuze werd gemaakt.

De onderstaande lijst niet voorleggen. Zelf het antwoord uit de uitleg destilleren.

1. Epistemische keuze
2. Leiding/experts namen een besluit over het beste alternatief
3. Groep/overeenstemming nam een besluit over het beste alternatief
4. Op basis van intuïtie/onderbuikgevoel werd er een besluit genomen
5. De KodA vernieuwingsopgave of Koda stuurgroep was leidend
6. Samenhang met eerdere projecten was leidend
7. Anders....

Indien het vaak voorkwam: vragen of het representatief is wat de respondent nu uitlegt/vertelt

Vraag 17a Hoe vaak kwam het voor dat bepaalde kennis in eerste instantie voor juist werd aangenomen, maar op een later moment toch is verworpen of aangepast?

1. Nooit
2. Vrijwel nooit
3. Soms
4. Vrijwel altijd
5. Altijd

Vraag 17b Als bepaalde kennis verworpen moest worden, dan werd dit te allen tijde ook gedaan

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 17c Indien dit niet altijd gebeurde, hoezo werd de kennis niet verworpen? Kunt u dit illustreren?

Nu volgen nog een aantal afsluitende stellingen en vragen over de KodA context.

Vraag 18a Het leveren van eigen inzet, waarmee de KodA miles konden worden gespaard, zorgde 1) voor meer spanning en 2) een beklemmender competitief klimaat bij participanten. Dit in vergelijking tot projecten die buiten KodA vallen.

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 18b Het leveren van eigen inzet, waarmee de KodA miles konden worden gespaard, zorgde voor meer scherpte en betrokkenheid van participanten in de discussies. Dit in vergelijking tot projecten die buiten KodA vallen.

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 18c De beperking door maatwerk, bekostigd door verdiende KodA miles, zorgde voor meer scherpte en betrokkenheid van participanten in de discussies. Dit in vergelijking tot projecten die buiten KodA vallen.

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 18d De beperking van maatwerk, bekostigd door verdiende KodA miles, leidde tot een bekropen vraagstelling in vergelijking tot projecten in een ander context

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 18e Bedrijfsoverstijgende projecten betaald uit de samenwerkingspot leidden door besluitvorming in een grotere groep tot langdurigere en minder constructieve discussies dan in een andere contexten

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 18f Bedrijfsoverstijgende projecten betaald uit de samenwerkingspot leidden door besluitvorming in een grotere groep tot meer variatie en kritischere discussies dan in een andere contexten

1. Sterk mee oneens
2. Oneens
3. Neutraal
4. Eens
5. Sterk mee eens

Vraag 19a In het algemeen, wat voor een cijfer zou u een KodA project geven?
1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10

Appendix E

The innovativeness questionnaire (in Dutch): an outsider's perspective

Alle vragen svp scoren op een schaal van 1 tot 5 (1 = erg laag, 2 = laag, 3 = neutraal/gemiddeld, 4 = hoog, 5 = erg hoog)

		Scores				
No.	**Question**	**Project 1**	**Project 2**	**Project 3**	**…**	**Project 16**
1	In hoeverre is de kennis voor dit project reeds *aanwezig en beschikbaar* op het niveau van wereld, globale industrie/markt?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
2	In hoeverre is de kennis voor dit project reeds *aanwezig en beschikbaar* bij de uitvoerder?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
3	In hoeverre is de kennis voor dit project reeds *aanwezig en beschikbaar* bij de beoogde gebruiker en andere betrokkenen?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
4	In hoeverre is de kennis reeds *zeker* voor dit project op het niveau van wereld, globale industrie/markt?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
5	In hoeverre is de kennis voor dit project reeds *zeker* bij de uitvoerder?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
6	In hoeverre is de kennis voor dit project reeds *zeker* bij de beoogde gebruiker en andere betrokkenen?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5
7	In hoeverre is de combi van technologie en samenwerking nieuw in het *socio-technologische systeem*, i.e. wetenschap, politiek, producenten en gebruikers?	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	…	1-2-3-4-5

Appendix F

This appendix provides an overview of the *pricing levers* as used in the Pricing at Siemens BT Project (see Chapter 6).

1. Pricing strategy levers

1.1 Pricing target system

1.2 Life-cycle-pricing

1.3 Attainable price premium

1.4 Pricing philosophy

1.5 Dynamic pricing

1.6 Price communication

2. Price analysis and optimization levers

2.1 New product pricing

2.2 List price adaptations

2.3 Consistency of pricing structure

2.4 Pricing connected to cost increases

2.5 Price differentiation

2.6 Service pricing

2.7 Software pricing

2.8 Free-of-charge services/deliveries

2.9 Spare parts pricing

2.10 Pricing of phased-out products/solutions

2.11 International pricing

2.12 Global agreements

3. Price execution in sales levers

3.1 Condition/discount system

3.2 Terms of payment

3.3 Discount competencies/limits of authority

3.4 Price enforcement in sales channels

3.5 Pre-acquisition/project development

3.6 Offer creation/offer behaviour

3.7 Tactical behavior in negotiation process

3.8 Incentive system of the sales force

3.9 Training of the sales force

3.10 Information packages for the sales force

3.11 Coordination of HQ and regional company

4. Organization/monitoring/controlling levers

4.1 Systematic lost and won order analysis

4.2 Monitoring/controlling

4.3 Pricing KPIs

4.4 Commercial claim management

4.5 Knowledge about pricing of competitors

4.6 Pricing organization

Appendix G

This appendix provides a detailed overview of the knowledge claims identified in the Pricing Project (see Chapter 6) and the various properties that we analyzed for each knowledge claim.

Legend

✓ accepted knowledge claim;

✘ rejected knowledge claim;

👍 supporting argument;

👎 challenging argument.

Appendix G

Detailed overview of knowledge claims of the Pricing Project

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍 / 👎	ID	KC / Data	✓/ ✗	KC topic	Formu-lator	KC type	Warrant type(s)	Data
1.1	Substantial profit contribution (2% of sales) in business year 09/10 in implemented areas						✓	Project objective	Steer-co	Advocative	Substantive + authoritative	Consultants provided previous business cases where on average a 2% profit was gained with pricing improvements
2.1a	Pricing is maximizing profit by Value Based Pricing (VBP)						✗	Project focus	Project team	Advocative		
		Motivational	General (positive consequence)	👍	**2.1a.I**	VBP is the best Pricing approach	✓		Project team	Evaluative	Authoritative	Claimed by the project team, based on existing belief that VBP is best approach
		Motivational	Organizational intentions (project scope)	👎	**2.1a.II**	VBP is too costly and time-consuming	✓		Steer-co	Evaluative	Authoritative	Claimed by the steer-co; and agreed by project team; no data, merely a belief
		Motivational	Organizational intentions (KC 1.1)	👎	**2.1a.III**	VBP will not increase profits by 2-3% on short-term	✓		Steer-co	Predictive	Authoritative	Claimed by the steer-co; and agreed by project team; no data, merely a belief
2.1c	Pricing is maximizing profit by Pricing Strategy (PS)						✗	Project focus	Project team	Advocative		
		Motivational	General (negative consequence)	👎	**2.1b.I**	TP is already dealt with elsewhere in Siemens BT	✓		Project team	Designative	Substantive	Data from observations by project team

Detailed overview of knowledge claims of the Pricing Project (continued)

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍 / 👎	ID	KC / Data	✓/ ×	KC topic	Formu-lator	KC type	Warrant type(s)	Data
2.1c	Pricing is maximizing profit by Pricing Strategy (PS)						×	Project focus	Project team	Advocative		
		Motivational	General (negative consequences)	👎	**2.1c.I**	Siemens BT is already good in PS	✓		Project team	Evaluative	Authoritative	Shared belief by project team and steer-co
2.1d	Pricing is maximizing profit by Pricing Execution (PE)						✓	Project focus	Project team	Advocative		
		Motivational	General (positive consequences)	👍	**2.1d.I**	PE is done on ad-hoc basis in Siemens BT RCs	✓		Project team	Evaluative	Substantive	Based on data from project team's own investigation
2.2	Product Business is the focus of the Pricing project						✓	Project focus	Steer-co	Advocative	Authoritative	Claimed by steer-co
		Motivational	*(Implicit: organizational intention)*	👍	**2.2.I**	*Implicit: Product Business is included in new strategy*	✓		*Project team*	*designative*	*Authoritative*	*Arguments were not provided, however project team members 'think it involves the new strategy'*
2.3a	RCs to be included in Diagnosis: China, UAE, UK, USA, Germany, France and India						×	Regional companies	Steer-co	Advocative		
		Motivational	Organizational intentions (KC 2.2)	👍	**2.3a.I**	Countries operate in various markets that are represent-tative for Product Business market	✓		Steer-co	Evaluative	Authoritative	Claimed by steer-co
		Motivational	Organizational intentions (project scope)	👎	**2.3a.II**	The number of countries does not fit the project budget	✓		Project team	Designative	Substantive	Based on data from investigation by project team
2.3b	United Arab Emirates (UAE) is included in diagnosis						×	Regional companies	Steer-co	Advocative		

Detailed overview of knowledge claims of the Pricing Project (continued)

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍 / 👎	ID	KC / Data	✓ / ✗	KC topic	Formu-lator	KC type	Warrant type(s)	Data
		Motivational	General (positive consequences)	👍	**2.3b.I**	UAE operates in a representative Product Business market	✓		Steer-co	Evaluative	Authoritative	Claimed by steer-co
		Motivational	Organizational intentions (KC 2.2)	👎	**2.3b.II**	Unites Arab Emirates has no Product Business	✓		Project team	Designative	Substantive	Based on data from inquires made by project team
2.3c	The United States (USA) is included in diagnosis						✓	Regional companies	Steer-co	Advocative		
		Motivational	Organizational intentions (KC 2.2)	👍	**2.3c.I**	USA operates in a representative market	✓		Steer-co	Evaluative	Authoritative	Claimed by steer-co
		Motivational	General (positive consequences)	👍	**2.3c.II**	USA is already dealing with Pricing improvements	✓		Project team	Designative	Authoritative	Based on information from USA representative
2.3d	France is included in diagnosis						✓	Regional companies	Steer-co	Advocative		
		Motivational	Organizational intentions (KC 2.2)	👍	**2.3a.I**	France operates in a representative market	✓		Steer-co	Evaluative	Authoritative	Claimed by steer-co
		Motivational	*General (personal positive consequences)*	👍	***2.3.a.II***	*Implicit: France is an important RC for the steer-co*	✓		*Project team*	*Evaluative*	*Authoritative*	*Project team thinks "France is an important RC for a steer-co member, and is therefore included"*
		Motivational	General (negative consequences)	👎	**2.3a.III**	France has other problems than Pricing	✓		Project team	Evaluative	Substantive	Data based on inquiries by project team
2.3e	Poland is included in diagnosis						✓	Regional companies	Project team	Advocative		
		Motivational	Organizational intentions (KC 2.2)	👍	**2.3e.I**	Poland is a genuine Product Business country	✓		Project team	Evaluative	Substantive	Data based on inquiries by project team

Detailed overview of knowledge claims of the Pricing Project (continued)

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍 / 👎	ID	KC / Data	✓ / ✗	KC topic	Formu-lator	KC type	Warrant type(s)	Data
		Motivational	General (positive consequences)	👍	**2.3e.II**	Poland has all business units in one organization	✓		Project team	Designative	Substantive	Data based on inquiries by project team
2.4a	Levers that cover Pricing Strategy, Transfer Pricing, VBP, Pricing Execution and Pricing Organization (see Appendix A)						✗	Pricing levers	Consultants	Advocative		
		Motivational	Organizational intentions (KC 2.1d)	👎	**2.4a.I**	Levers do not fit the Pricing project scope	✓		Project team	Evaluative	Authoritative	Pricing theory and categorization offered by consultants
2.4b	Lever selection proposed by consultants. Lever numbers: 3.1 to 3.10 for Pricing Execution (see Appendix A)						✓	Pricing levers	Consultants	Advocative		
		Motivational	Organizational intentions (KC 2.1d)	👍	**2.4b.I**	Levers 3.1 to 3.10 fit to Pricing Execution focus	✓		Project team	Evaluative	Authoritative	Pricing theory and categorization offered by consultants
3.1a	General levers related to Pricing Execution are lever numbers: 2.8, 4.2, 4.3, 4.5 and 4.6. Core topics of Pricing Execution are lever numbers: 3.1, 3.2, 3.4, 3.7, 3.8, 3.9 and 3.10. (see Appendix A)						✓	Pricing levers	Consultants	Advocative		
		Motivational	General (positive consequences)	👍	**3.1a.I**	Selected levers are problematic in RCs	✓		Project team	Evaluative	Substantive + Authoritarian	Based on (subjective) observations and beliefs/knowledge

Detailed overview of knowledge claims of the Pricing Project (continued)

KC	Knowledge Claim (KC)	Warrant type(s)	Justification criteria	👍 / 👎	ID	KC / Data	✓/ ✗	KC topic	Formu-lator	KC type	Warrant type(s)	Data
3.1b	Pricing Strategy (PS) remains out of scope, however it is a problem that should be dealt with in the future (e.g. in new project)						✓	Pricing focus	Project team	Advocative		
		Motivational	General (positive consequences)	👍	**3.1b.I**	Pricing Strategy is problematic	✓		Project team	Evaluative	Substantive + Authoritarian	Partly based on (subjective) observations, partly based on beliefs/knowledge, partly based on consultant expertise
3.2	Levers to be included in the design stage are: <censored>						✓	Pricing levers	Consultants	Advocative		
		Motivational	Organizational intentions (KC 1.1, KC 2.1d)	👍	**3.2b.I**	Selected levers are problematic in RCs and implementation leads to desired improvements	✓		Consultants	Evaluative	Substantive + Authoritarian	Based on data gathered by the investigation of the consultants at the RCs; none of the project members participated in the data collection or analysis activities; RCs representatives "acknowledged" the consultant findings; project team and steer-co accepted the data and conclusions after presentation of consultants at HQ

Appendix H

This appendix provides an excerpt of the expressions observed in the Customer Portal Project (i.e., first project meeting only, see Chapter 7) and the various properties that we analyzed for each expression.

Appendix H

Detailed overview of knowledge claims of the Customer Portal Project

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
1	**C**	**1**	Member no. 6	Is there a need for a CP?		question	evaluative				implicit goal
2	**C**	**2**	Member no. 6	By opening up the current blog for customers. You need something to assess the need		multiple claims					
3	**C**	**2a**	Member no. 6	By opening up the current blog for customers	6	knowledge claim	advocative	first-level			goal is clear = C2b
4	**C**	**2b**	Member no. 6	You need something to assess the need		knowledge claim	advocative	first-level			goal here is to assess customer need
5	**C**	**3**	Member no. 3	The current GEON blog is too limited, and therefore not suitable for customers		multiple claims					
6	**C**	**3a**	Member no. 3	The current GEON blog is too limited		knowledge claim	evaluative	second-level	C3a	subjective observation	
7	**C**	**3b**	Member no. 3	and therefore not suitable for customers		knowledge claim	evaluative	challenge	C2		
8	**C**	**4**	Member no. 3	We ought to implement a medium with which customers can ask us questions	4	knowledge claim	advocative	first-level			goal unclear; customer need is already known?
9	**C**	**5**	Member no. 5	The Wadden islands project also implemented a kind of helpdesk. However, no questions were raised		knowledge claim	evaluative	challenge	C4	subjective observation	attack is implicit
10	**C**	**6**	Member no. 3	We can actively approach certain GEON customer groups. They can be invited to join a debate concerning a certain article [on the new blog]	7	knowledge claim	advocative	counter-reaction	C5		

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
11	**C**	**12**	Member no. 6	You cannot expect that people will visit you automatically. Pushing does work, like we do now at our current blog. […]		multiple claims					
12	**C**	**12a**	Member no. 6	You should not expect that people will visit you automatically.		knowledge claim	predictive	second-level	C12c		
13	**C**	**12b**	Member no. 6	Pushing does work, like we do now at our current blog.		knowledge claim	explanatory	second-level	C12c	subjective observation	or is it an advocative claim
14	**C**	**12c**	Member no. 6	We should offer a 'reaction' button [under our blog items] with an explicit promise that we always provide an answer in return.	4	knowledge claim	advocative	first-level			
15	**C**	**12d**	Member no. 6	The answer can be a personal answer or an answer suitable for the public.	11	knowledge claim	advocative	first-level			
16	**C**	**12e**	Member no. 6	Everyone can access our system.	4	knowledge claim	advocative	first-level			
17	**C**	**12f**	Member no. 6	You can place a 'reaction' question [on a blog item] and an 'open' question	4	knowledge claim	advocative	first-level			
18	**C**	**13**	Member no. 3	This sounds like a forum		knowledge claim	definitive	challenge	C12		attack is implicit
19	**C**	**14**	Member no. 6	No, GEON provides knowledge about facts, and people can react on that. Their reaction is only accessible by GEON staff. Consequently, we post an answer on the blog		knowledge claim	definitive	counter-reaction	C13		
20	**C**	**15**	Member no. 3	[But] This leads to an increase in workload because we need to keep track of things [i.e. answer questions]		knowledge claim	predictive	counter-reaction	C14		

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
21	**C**	**16**	Member no. 6	But otherwise we can stop, because information will get old		knowledge claim	advocative	counter-reaction	C15		good example of a knowledge claim thas has little to do with a data discussion; this is argumentation/reasoning!
22	**C**	**21**	Member no. 6	what surprised me is the NRC Newspaper's new website, where they offer a kind of blog with meta-news. You read the news through a different pair of glasses now		knowledge claim	evaluative	second-level		example	very personal opinion; used as premise
23	**C**	**22**	Member no. 3	Based on the way you describe it, I like the idea [of a blog] now		approval			C21		agrees with KC C21 on personal grounds
24	**C**	**23**	Member no. 6	We should thematically structure the blog and ensure proper management. We can merge the current GEON blog with it		multiple claims					
25	**C**	**23a**	Member no. 6	We should thematically structure the blog and ensure proper management.	1	knowledge claim	advocative	first-level			
26	**C**	**23b**	Member no. 6	We can merge the current GEON blog with it	6	knowledge claim	advocative	first-level			
27	**C**	**24**	Member no. 3	Don't forget the environment for implementation. Wordpress [i.e. the current environment] is only suitable for blogging. This [i.e. the entire CP project; meta-news & reaction…] goes beyond blogging		multiple claims					example how implementation issues are used as an argument; what the exact implementation GOAL is, is unknown
28	**C**	**24a**	Member no. 3	Don't forget the environment for implementation. Wordpress [i.e. the current environment] is only suitable for blogging.		knowledge claim	evaluative	second-level	C24b	subjective observation	
29	**C**	**24b**	Member no. 3	This [i.e. the entire CP project; meta-news & reaction…] goes beyond blogging		knowledge claim	evaluative	challenge	C23b		

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
30	**C**	**25**	Member no. 6	Presumably, it can be implemented on a small scale		knowledge claim	predictive	counter-reaction	C24b		presumably
31	**C**	**26**	Member no. 5	But do we want to implement a full solution?		question	advocative				ask what is the actual goal; no reaction however
32	**C**	**27**	Member no. 5	A mediator should be appointed during the start-up phase [of the CP]	3	knowledge claim	advocative	first-level			the 'why' (goal) remains implicit
33	**C**	**28**	Member no. 6	No we shouldn't do that, because we are all professionals		knowledge claim	evaluative	challenge	C27	subjective observation	
34	**C**	**29**	Member no. 5	The blog is a kind of network tool: It shows what GEON is capable of	2	knowledge claim	advocative	first-level			strange claim in middle of discussion
35	**C**	**30**	Member no. 6	Yes [I agree], to create a distinct profile of ourselves		multiple claims					
36	**C**	**30a**	Member no. 6	Yes		approval			C29		personal approval
37	**C**	**30b**	Member no. 6	to create a distinct profile of ourselves	2	knowledge claim	advocative	first-level extension	C29		
38	**C**	**31**	Member no. 2	Yes [I agree too], this coheres with the business plan [2009-2011]: to be distinctive		multiple claims					first time that organizational intentions are linked to KCE
39	**C**	**31a**	Member no. 2	Yes		approval			C30b		
40	**C**	**31b**	Member no. 2	this coheres with the business plan [2009-2011]: to be distinctive		knowledge claim	evaluative	second-level	C30b	organizational intention	
41	**C**	**32**	Member no. 3	But, one colleague deals better with it [i.e. writing content] than the other		knowledge claim	evaluative	counter-reaction	C28	subjective observation	

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
42	**C**	**33**	Member no. 6	The group will check [i.e. ensure content quality]. I believe in the strength of the group. It is in balance	3	knowledge claim	advocative	first-level		personal belief	first time personal belief is forwarded; it is a means based on an attack
43	**C**	**34**	Member no. 3	Big differences in writing style can be found at our current blog, for example, there are longer and shorter blog contributions		knowledge claim	evaluative	challenge	C33	subjective observation	
44	**C**	**35**	Member no. 6	If you know that your work will be published, you try to perform better. {…]		multiple claims					
45	**C**	**35a**	Member no. 6	If you know that your work will be published, you try to perform better		knowledge claim	predictive	counter-reaction	C34		no data, however, nice example to rebute an argument from analogy
46	**C**	**35b**	Member no. 6	First you need it for yourself, then you make it suitable for customers. it [i.e. publishing] does not consume much energy		knowledge claim	predictive	second-level	C35a		again no data; argument based on positive consequences
47	**C**	**36**	Member no. 5	[…] But we should focus what our missions statement is. What do we want with it [i.e. the blog/the CP] and what do we not want with it?		question	advocative				again Member no. 5 picks up the goal discussion
48	**C**	**37**	Member no. 6	Except whe n a customer asks for a specific topic, for example about BAG [i.e. de Wet Basisregistraties Adressen en Gebouwen]	1	knowledge claim	advocative	first-level	C36		Member no. 6 suggest an exception on the main goal
49	**C**	**38**	Member no. 2	You want to start on a small scale, I think		knowledge claim	advocative	first-level			isolated
50	**C**	**39**	Member no. 3	We should be able to select messages	11	knowledge claim	advocative	first-level			isolated
51	**C**	**40**	Member no. 6	Yes, we monitor what is happening; who looks at what and how often; I would like to see who is visiting [the CP]	7	knowledge claim	advocative	first-level			means to assess need!!!

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
52	**C**	**41**	Member no. 7	So, it's a kind of forum?		question	definitive				
53	**C**	**42**	Member no. 6	No, I don't want a forum		disapproval	advocative		C41		very personal statement
54	**C**	**43**	Member no. 5	There is no hierarchy on a forum		knowledge claim	evaluative	counter-reaction	C42		
55	**C**	**44**	Member no. 3	What if people are allowed to have discussions?		question		counter-reaction	C42		
56	**C**	**45**	Member no. 6	My thought now is: no		disapproval			C44		personal
57	**C**	**46**	Member no. 3	You might get reaction on reaction like on the Telegraaf website [which is not what we want]"		knowledge claim	predictive	counter-reaction	C44	subjective observation	argument from example; interesting how Member no. 3 attacks his own idee
58	**C**	**47**	Member no. 7	The advantage of a forum is that people need to register. The barrier to register is not high, as we experienced in the Wadden islands [Waddenzee?] project		multiple claims	-	-			
59	**C**	**47a**	Member no. 7	The advantage of a forum is that people need to register.		knowledge claim	evaluative	second-level	C41		
60	**C**	**47b**	Member no. 7	The barrier to register is not high, as we experienced in the Wadden islands [Waddenzee?] project		knowledge claim	evaluative	second-level	C47a	subjective observation	again the Waddenzee project
61	**C**	**48**	Member no. 5	The workload with respect to maintenance is reasonable. It is in line with the current GEON blog		knowledge claim	evaluative	second-level		subjective observation	analogy, however no clear relation
62	**C**	**49**	Member no. 3	But I'm still thinking not only a weblog, but also a website with knowledge areas and files [translation: dossier] for each subject	10	knowledge claim	advocative	first-level		personal belief	personal feeling: "thinking"

Detailed overview of knowledge claims of the Customer Portal Project (continued)

ID			Formu-lator	Expression	Topic	Expression type	Knowledge claim type	Function	Relating claims	Data type	Comments
63	**C**	**50**	Member no. 6	I would definitely argue now not to start with it. First we focus on the weblog, and we allocate parts of the design/implementation for the future website		multiple claims					
64	**C**	**50a**	Member no. 6	I would definitely argue now not to start with it		disapproval			C49		personal; rejects earlier KC indirectly
65	**C**	**50b**	Member no. 6	First we focus on the weblog, and we allocate parts of the design/implementation for the future website	10	knowledge claim	advocative	first-level			future possibility
66	**C**	**51**	Member no. 3	Ok [I agree], we should keep things separated		knowledge claim	advocative	second-level			personal

References

Applegate, L. M., Austin, R. D., and McFarlan, F. W. (2003). *Corporate information strategy and management* (6th ed.). New York, NY: McGraw-Hill.

Argyris, C., and Schön, D. (1996). *Organizational learning II: Theory, method and practice*. Reading, Mass: Addison Wesley.

Barth, E. M., and Krabbe, E. C. W. (Eds.). (1982). *From axiom to dialogue: A philosophical study of logics and argumentation*. Berlin: Walter de Gruyter.

Boisot, M. H. (1995). *Information space: A framework for learning in organizations, institutions and culture*. London, UK: Routledge.

Boisot, M. H. (1998). *Knowledge assets: Securing competitive advantage in the information economy*. New York, NY: Oxford University Press.

Boisot, M. H., and MacMillan, C. (2004). Crossing epistemological boundaries: Managerial and entrepreneurial approaches to knowledge management. *Long Range Planning, 37*, 505-524.

Brockriede, W., and Ehninger, D. (1960). Toulmin on argument: An interpretation and application. *The Quarterly Journal of Speech, 46*, 44-53.

Chapman, G. (2010). *YouTube serving up two billion videos daily.* Retrieved 10/06, 2010, from http://www.google.com/hostednews/afp/article/ALeqM5jK4sI9GfUTCKAkVGhDzpJ1ACZm9Q

Chia, R., and Holt, R. (2008). On managerial knowledge. *Management Learning, 39*(2), 141-158.

Choo, C. (2006). *The knowing organization* (2nd ed.). New York, NY: Oxford University Press.

CNN.com. (2011). *Blatter creates rift with winter 2022 world cup idea.* Retrieved 01/14, 2011, from http://edition.cnn.com/2011/SPORT/football/01/14/football.blatter.qatar.fifa/

Collinson, S., and Wilson, D. C. (2006). Inertia in japanese organizations: Knowledge management routines and failure to innovate. *Organization Studies, 27*(9), 1359-1387.

Conee, E., and Feldman, R. (2006). Epistemology. In *Encyclopedia of philosophy* (2nd ed.,). Detroit: Macmillan Reference USA.

Cook, S. D. N., and Brown, J. S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization Science, 10*(4), 381-400.

Daft, R. L. (2001). *Organization theory and design*. Cincinnati, OH: South-Western College Publishing.

Dalkir, K. (2005). *Knowledge management in theory and practice*. Burlington, MA: Elsevier Butterworth-Heinemann.

Davenport, T. H., and Prusak, L. (1998). *Working knowledge*. Boston, Mass: Harvard Business School Press.

De Groot, A. D. (1969). *Methodology: Foundations of inference and research in the behavioral sciences*. The Hague: Mouton.

Earl, M. J. (2001). Knowledge management strategies: Toward a taxonomy. *Journal of Management Information Systems, 18*(1), 215-233.

Edwards, P. (1967). *The encyclopedia of philosophy*. New York, NY: MacMillan Publishing Company.

Emans, B. (2004). *Interviewing: Theory, techniques and training*. Groningen, The Netherlands: Wolters-Noordhof.

Faber, N. R. (2006). *Knowledge in sustainable behaviour: Using knowledge-based decision support systems for the improvement of sustainability.* (Doctoral dissertation, University of Groningen).

Faber, N. R., Peters, K., Maruster, L., Van Haren, R., and Jorna, R. (2010). Sense making of (social) sustainability: A behavioral and knowledge approach. *International Studies of Management and Organization, 40*(3), 8-22.

FIFA.com. (2010a). *IFAB approves additional assistant referee experiment.* Retrieved 11/16, 2010, from http://www.fifa.com/aboutfifa/organisation/ifab/media/news/newsid=1276442/index.html

FIFA.com. (2010b). *IFAB decides not to pursue goal-line technology.* Retrieved 11/10, 2010, from http://www.fifa.com/aboutfifa/organisation/ifab/media/news/newsid=1177755/index.html

Firestone, J. M., and McElroy, M. W. (2003a). *Corporate epistemology: Competing philosophies of truth in business and how they influence knowledge management.* Retrieved 09/05, 2011, from http://www.macroinnovation.com/images/corporate_epistemolo.pdf

Firestone, J. M., and McElroy, M. W. (2003b). *Key issues in the new knowledge management*. Burlington, MA: Butterworth-Heinemann.

Firestone, J. M., and McElroy, M. W. (2005). Doing knowledge management. *The Learning Organization, 12*(2), 189-212.

Fletcher, K. E., and Huff, A. S. (1990a). Argument mapping. In A. S. Huff (Ed.), *Mapping strategic thought* (pp. 355-376). Chichester, UK: John Wiley & Sons Ltd.

Fletcher, K. E., and Huff, A. S. (1990b). Strategic argument mapping; A study of strategy reformulation at AT&T. In A. S. Huff (Ed.), *Mapping strategic thought* (pp. 165-194). Chichester, UK: John Wiley and Sons Ltd.

Flick, U. (2006). *An introduction to qualitative research*. London: Sage.

Fumerton, R. (2005). Foundationalist theories of epistemic justification. In E. N. Zalta (Ed.), *Stanford encyclopedia of philosophy* (). Stanford, CA: Stanford University. Retrieved from http://plato.stanford.edu/archives/spr2005/entries/justep-foundational/

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

Garud, R., and Rappa, M. A. (1994). A sociio-cognitive model of technology evolution: The case of cochlear implants. *Organization Science, 5*(3), 344-362.

Geels, F. W., and Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy, 36*, 399-417.

Geerligs, S. W. G., and Wolfert, J. (2007). Multi layer networked development: How is stakeholder involvement successfully applied in ICT development in agriculture? *Proceedings of the EFITA/WCCA Conference,* Glasgow.

Gerlofs, B. (2008). *Ondernemingsplan 2009-2011 (GEON).* Unpublished manuscript.

Gettier, E. (1963). Is justified true belief knowledge? *Analysis, 23*, 121-123.

Giroux, H., and Taylor, J. (2002). The justification of knowledge: Tracking the translations of quality. *Management Learning, 33*(4), 497-517.

Gold, J., Holman, D., and Thorpe, R. (2002). The role of argument analysis and story telling in facilitating critical thinking. *Management Learning, 33*(3), 371-388. doi:10.1177/1350507602333005

Gourlay, S. (2006). Conceptualizing knowledge creation: A critique of nonaka's theory. *Journal of Management Studies, 43*(7), 1416-1436.

Habermas, J. (1984). *The theory of communicative action, vol 1 reason and the rationalization of society*. Boston, MA: Beacon Press.

Hildreth, P. M., & Kimble, C. (2002). The duality of knowledge. *Information Research, 8*(1), 13/09/2011.

IPCC. (2007). Summary for policymakers. In *Climate change 2007: The physical science basis. contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change* (). New York, NY: Cambridge University Press.

Ittoo, A., Bouma, G., Maruster, L., and Wortmann, J. C. (2010). Extracting meronymy relationships from domain-specific, textual corporate databases. *Lecture Notes in Computer Science, 6177*, 48-59.

Ittoo, A., Maruster, L., Wortman, J. C., and Bouma, G. (2010). Textractor: A framework for extracting relevant domain concepts from irregular corporate textual datasets. In W. Abramowicz, & R. Tolksdorf (Eds.), *Lectures notes in business information systems* (47th ed., pp. 71-82). Heidelberg: Springer.

Johnson, P., and Duberley, J. (2000). *Understanding management research*. London: SAGE Publications Ltd.

Jorna, R. J. (2006). *Sustainable innovation: The organizational, human and knowledge dimension*. Sheffield: Greenleaf Publishing.

Jorna, R. J. (2007). Knowledge dynamics: A framework to handle changes in types of knowledge. In J. F. Schreinemakers, & J. Barthès (Eds.), *15 years of knowledge management* (pp. 25-46). Würzburg, Germany: ERGON Verlag.

Kakabadse, N., Kakabadse, A., and Kouzmin, A. (2003). Reviewing the knowledge management literature: Towards a taxonomy. *Journal of Knowledge Management, 7*(4), 75-91.

YouTube: From concept to hyper-growth. Karim, J. (Director). (2006).[Video/DVD] University of Illinois: ACM Conference, thesis' author owns a digital copy of the video.

Kock, C. (2006). Multiple warrants in practical reasoning. In D. Hitchcock, & B. Verheij (Eds.), *Arguing on the toulmin model: New essays in argument analysis and evaluation* (pp. 247-259). Dordrecht, The Netherlands: Springer Netherlands.

Kock, C. (2007). Is practical reasoning presumptive? *Informal Logic, 27*(1), 91-108.

Kvanvig, J. (2007). Coherentist theories of epistemic justification. In E. N. Zalta (Ed.), *Stanford encyclopedia of philosophy* () Stanford University. Retrieved from http://plato.stanford.edu/archives/fall2007/entries/justep-coherence/

Langley, A. (1999). Strategies for theorizing from process data. *Acedemy of Management Journal, 24*(4), 691-710.

Laudon, K. C., and Laudon, J. P. (2002). *Management information systems: Managing the digital firm*. Upper Saddle River, NJ: Prentice Hall Internation Inc.

Leonard-Barton, D. (1995). *Wellsprings of knowledge: Building and sustaining the sources of innovation*. Boston, Mass: Harvard Business School Press.

Lincoln, Y., and Guba, E. (1985). *Naturalistic inquiry*. London: Sage.

LTO Nederland. (2009). *Keyfigures arable farming.* Retrieved 04/10, 2010, from http://www.lto.nl/nl/25222800-Key_figures.html?path=12103175/10384248

McElroy, M. W. (2000). Integrating complexity theory, knowledge management and organizational learning. *Journal of Knowledge Management, 4*(3), 195-203.

McElroy, M. W. (2003). *The new knowledge management : Complexity, learning, and sustainable innovation*. Burlington, MA: Butterworth-Heinemann.

McElroy, M. W. (2008). *Social footprints: Measuring the social sustainability performance of organizations.* (Doctoral dissertation, University of Groningen).

McElroy, M. W., Jorna, R. J., and van Engelen, J. (2007). Sustainability quotients and the social footprint. *Corporate Social Responsibility and Environmental Management,* (4), 223-234.

Miles, M. B., and Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). Thousands Oaks, CA: SAGE Publication Ltd.

Mingers, J. (2008). Management knowledge and knowledge management: Realism and forms of truth. *Knowledge Management Research & Practice, 6*, 62-76.

Morton, A. (2003). *A guide through the theory of knowledge* (3rd ed.). Malden, MA: Blackwell Publishing.

Myers, M. D. (2009). *Qualitative research in business & management*. London: Sage.

Naess, A. (1966). *Communication and argument, elements of the applied semantics*. London: Allen and Unwin.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science, 5*(1), 14-37.

Nonaka, I., and Takeuchi, H. (1995). *The knowledge-creating company*. New York, NY: Oxford University Press.

Nonaka, I., and Tansley, D. (1999). *De kenniscreeërende onderneming*. Schiedam: Scriptum.

Nonaka, I., and Toyama, R. (2005). The theory of the knowledge-creating firm: Subjectivity, objectivity and synthesis. *Industrial and Corporate Change, 14*(3), 419-439.

Nonaka, I., Toyama, R., and Konno, N. (2000). SECI, ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning, 33*, 5-34.

Nonaka, I., and Von Krogh, G. (2009). Tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory. *Organization Science, 20*(3), 635-652.

Nonaka, I., Von Krogh, G., and Voelpel, S. (2006). Organizational knowledge creation theory: Evolutionary paths and future advances. *Organization Studies, 27*(8), 1179-1208.

Notturno, M. (2000). *Science and the open society*. Budapest, Hungary: Central European University Press.

Payne, G., and Payne, J. (2004). *Key concepts in social research*. London: Sage.

Peters, K., Maruster, L., and Jorna, R. J. (2010). Knowledge claim evaluation: A fundamental issue for knowledge management. *Journal of Knowledge Management, 14*(2), 243-257.

Peters, K., Maruster, L., and Jorna, R. J. (2011). The evaluation of knowledge claims in an innovation project: A case study. *Management Learning, 42(5), 537-563* .

Philips.com. (2011). *Company profile.* Retrieved 07/16, 2010, from http://www.philips.com/about/company/index.page

Polanyi, M. (1967). *The tacit dimension*. London: Routledge.

Popper, K. (1970). Normal science and its dangers. In I. Lakatos, & A. Musgrave (Eds.), *Criticism and the growth of knowledge* (pp. 51-58). Cambridge, UK: Cambridge University Press.

Popper, K. (1972). *Conjectures and refutations: The growth of scientific knowledge*. New York, NY: Routledge.

Robertson, M., Harry, S., and Swan, J. (2003). Knowledge creation in professional service firms: Institutional effects. *Organization Studies, 24*(6), 831-857.

Schreiber, A., Akkermans, T., Anjewierden, H., de Hoog, A., van der Velde, N., Shadbolt, R., and Wielinga, B. (2000). *Knowledge engineering and management, the CommonKADS methodology*. Cambridge, MA: The MIT Press.

Schreyögg, G., and Geiger, D. (2007). The significance of distinctiveness: A proposal for rethinking organizational knowledge. *Organization, 14*(1), 77-100.

Schumpeter, J. A. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.

Schumpeter, J. A. (1983). *The theory of economic development*. New Brunswick, NJ: Transaction Inc.

Shank, G. D. (2006). *Qualitative research: A personal skills approach* (2nd ed.). Upper Saddle River, NJ: Pearson Education.

Simon, H. A. (1991). Bounded rationality and organizational learning. *Organization Science, 2*(1), 125-134.

Soo, C., Devinney, T., and Midgley, D. (2004). The role of knowledge quality in firm performance. In H. Tsoukas, & N. Mylonopoulos (Eds.), *Organizations as knowledge systems: Knowledge, learning and dynamic capabilities* (pp. 252-275) Palgrave MacMillan.

Stebbins, R. A. (2001). *Exploratory research in the social sciences*. Thousand Oaks, CA: Sage Publications.

Steup, M. (2006). The analysis of knowledge. In E. N. Zalta (Ed.), *Stanford encyclopedia of philosophy* () Stanford University. Retrieved from http://plato.stanford.edu/archives/win2006/entries/knowledge-analysis/

Sveiby, K. (1996). Transfer of knowledge and the information processing professions. *European Management Journal, 14*(4), 379-388.

Swan, J., and Newell, S. (2000). Linking knowledge management and innovation. *8th European Conference on Information Systems,* 591-598.

Tell, F. (2004). What do organizations know? dynamics of justification contexts in R&D activities. *Organization, 11*(4), 443-471.

Toulmin, S. E. (1958). *The uses of argument*. Cambridge: Cambridge University Press.

Tripsas, M., and Gavetti, G. (2000). Capabilities, cognition, and interia: Evidence from digital imaging. *Strategic Management Journal, 21*(10/11), 1147-1161.

Tsoukas, H., and Vladimirou, E. (2001). What is organizational knowledge? *Journal of Management Studies, 38*(7), 973-993.

Tukey, J. W. (1977). *Exploratory data analysis*. Reading, Mass: Addison Wesley.

Turban, E., and Aronson, J. (2001). *Decision support systems and intelligent systems*. Upper Saddle River, NJ: Prentice-Hall.

Van Eemeren, F. H., Grootendorst, R., and Henkemans, F. S. (2002). *Argumentation: Analysis, evaluation and presentation*. Hahwah, MJ: Lawrence Earlbaum Associates.

Van Eemeren, F. H., and Houtlosser, P. (2003). The development of the pragma-dialectical approach to argumentation. *Argumentation, 17*, 387-403.

Verheij, B. (2005). Evaluating arguments based on toulmin's scheme. *Argumentation, 19*, 347-371.

Verschuren, P., and Doorewaard, H. (1999). *Designing a research project*. Utrecht, The Netherlands: LEMMA.

Vogt, W. (1999). *Dictionary of statistics and methodology: A nontechnical guide*. Newbury Park: SAGE Publication.

Volkskrant. (2011). *Blatter: Mogelijk doellijntechnologie in 2014.* Retrieved 03/28, 2011, from http://www.volkskrant.nl/vk/nl/2698/Sport/article/detail/1856024/2011/03/05/Blatter-mogelijk-doellijntechnologie-in-2014.dhtml

Von Krogh, G., and Roos, J. (1995). *Organizational epistemology*. New York, NY: Palgrave MacMillan.

Von Krogh, G., and Grand, S. (2000). Justification in knowledge creation: Dominant logic in management discourses. In G. von Krogh, I. Nonaka & T. Nishiguchi (Eds.), *Knowledge creation: A source of value* (pp. 13-35). New York, NY: Palgrave Macmillan.

Von Krogh, G., Ichijo, K., and Nonaka, I. (2000). *Enabling knowledge creation*. New York, NY: Oxford University Press.

Von Krogh, G., Roos, J., and Slocum, K. (1994). An essay on corporate epistemology. *Strategic Management Journal, 15*, 53-71.

Walton, D. (2006). How to make and defend A proposal in A deliberation dialogue. *Artificial Intelligence and Law, 14*, 177-239.

Walton, D. (2007). Evaluating practical reasoning. *Synthese, 157*(2), 179-240.

Walton, D. (2008). *Informal logic: A pragmatic approach* (2nd ed.). New York, NY: Cambridge University Press.

Walton, D. (2009). Argumentation theory: A very short introduction. In I. Rahwan, & G. R. Simari (Eds.), *Argumentation in artificial intelligence* (pp. 1-24) Springer US.

Walton, D., Reed, C., and Macagno, F. (2008). *Argumentation schemes*. Cambridge Etc.: Cambridge University Press.

West, M. A., and Farr, J. L. (1990). *Innovation and creativity at work: Psychological and organizational strategies*. West Sussex: John Wiley & Sons.

Wiche, R. T. P. (1993). *Eén of twee negaties in filosofie of natuurlijke taal?* (Doctoral dissertation, University of Groningen).

Wikipedia. (2011). *YouTube.* Retrieved 12/20, 2010, from http://en.wikipedia.org/wiki/YouTube

Williams, R. (2008). The epistemology of knowledge and the knowledge process cycle: Beyond the "objectivist" vs "interpretivest". *Journal of Knowledge Management, 12*(4), 72-85.

Wolfert, J., Paree, P., and van Gurp, H. (2009). Stakeholder management in dutch arable farming using KodA miles. *EFITA Conference '09. Proceedings of the 7th EFITA Conference,* Wageningen. 577-584.

YouTube. (2005). *YouTube receives $3.5M in funding from sequoia capital.* Retrieved 10/06, 2010, from http://youtube-global.blogspot.com/2005/11/youtube-receives-35m-in-funding-from.html

YouTube. (2010). *Introducing YouTube trends.* Retrieved 12/20, 2010, from http://youtube-global.blogspot.com/2010/12/introducing-youtube-trends.html

English summary

Innovation is an activity of vital importance for many organizations. Organizations innovate to benefit from the introduction or application of new ideas, processes, products or procedures (West and Farr, 1990). Examples of benefits are gaining (more) profits, providing better services and producing new sustainable products. In order to innovate, organizations have to develop and apply knowledge. These processes, referred to as e.g., knowledge creation, knowledge transfer and knowledge use in the literature, are well documented. Less is written about how organizations determine what constitutes good knowledge. We refer to this underexposed activity as *knowledge evaluation*. Because an understanding of knowledge evaluation is lacking, it is also unclear how knowledge evaluation affects innovation. This thesis aims to improve the understanding of knowledge evaluation and its role in innovation.

Literature study

Notwithstanding little attention has been paid to knowledge evaluation, we are able to identify three theoretical approaches of knowledge evaluation in the literature. In Chapter 2 of this thesis, we present the Open approach, the Managerial approach and the Entrepreneurial approach. The Open approach prescribes innovative organizations to evaluate knowledge about innovation based on empirical-based evidence and epistemic criteria (Firestone and McElroy, 2003b; McElroy, 2003; McElroy, 2008). Besides, knowledge evaluation is not limited to a particular group within the company, e.g., management or a group of R&D experts. On the contrary, knowledge evaluation is open to anyone who brings valid arguments and evidence. The evaluation mechanism is founded on the principles of critical rationalism and falsificationism (Popper, 1970, 1972). These principles are comparable to the principles scientists (should) use in conducting research. Criticizing knowledge should lead to the rejection of false knowledge and the conditional acceptation of knowledge that survived the critical evaluations. McElroy (2003), however, argues

that in many organizations management determines what constitutes true knowledge, which increases the risk that the knowledge that will be used to innovate is actually false.

The Managerial approach assumes that innovations do not come into being through merely rationality and objectivity (Nonaka and Takeuchi, 1995). This assumption thus conflicts with the principles of the Open approach, as described above. It is argued that the top managers of organizations are entrepreneurs who bring an innovative vision, and that they can transform this vision into organizational intentions such as strategy, mission and vision. Subsequently, middle management should translate the organizational intentions into concrete evaluation criteria. At last, subordinates should justify new knowledge (about e.g., a new product) in the light of the evaluation criteria by using empirical-based evidence. The associated evaluation mechanism is justification (i.e., proving that some knowledge is true or false) rather than falsification (i.e., proving that some knowledge is false, or conditionally and temporarily accepting some knowledge because it successfully passed critical evaluations).

The Entrepreneurial approach also assumes entrepreneurial hunches of individuals in order to innovate. However, according to the Entrepreneurial approach, entrepreneurship is not limited to management (Boisot and MacMillan, 2004). Anyone with the characteristics of an entrepreneur should be allowed to formulate a knowledge claims or evaluation criteria. Moreover, the Entrepreneurial approach assumes that empirical-based evidence (i.e., the facts), prior experiences and existing knowledge are usually unavailable in innovative settings. As a consequence, facts and existing knowledge cannot be employed to the same extent as in standard (non-innovative) settings. According to Boisot and MacMillan (2004) most organizations prefer to avoid the uncertainty that comes with innovation. For that reason, organizations are inclined to adopt an Open or Managerial approach towards knowledge evaluation, which results in little innovation or no innovation at all.

The three approaches, and in particular, the glaring contrasts between the approaches, provide a breeding ground for further research, both theoretically as well as empirically. Nevertheless, we notice a number of problems that need to be resolved first. The three approaches are highly abstract and have hardly, if not at all, been substantiated by empirical research. The only empirical study of knowledge evaluation we know of is by Nonaka and Takeuchi (1995), which we linked to the

Managerial approach. The validity and reliability of their empirical study, however, is highly questionable. As long as it is highly doubtful whether the three approaches actually exist in practice, or even can exist, it is of little use to study the validity of the competing claims that can be found in the approaches. Additionally, we believe knowledge evaluation is, in reality, much more detailed and multifaceted than the three approaches describe.

Based on the abovementioned concerns, we conclude that the three approaches form "a black box of knowledge evaluation". This black box needs to be opened in order to understand the role of knowledge evaluation in innovation. Chapter 3 of this thesis opens the black box of knowledge evaluation by introducing informal argumentation as a supplementary theory to the three approaches. We contend that argumentation forms the basis of knowledge evaluation in organizations. Subsequently, we conduct three empirical studies in Chapters 5, 6 and 7 to develop an improved understanding of knowledge evaluation in innovative settings.

Informal argumentation theory

Informal argumentation theory is a practically oriented approach for analyzing argumentative discussions (Toulmin, 1958; Van Eemeren et al., 2002). By adopting informal argumentation theory, we consider knowledge evaluation in innovation as an argumentative discussion. The basic argumentation structure is the Toulmin (1958) argumentation framework, encompassing the *claim*, *warrant* and *data* components. Toulmin (1958) defines an argument as a "movement" from accepted data through a warrant to a claim; the claim being an assertion put forward publicly for acceptance. The intrinsic value of a claim is being evaluated by drawing our attention to the grounds (i.e., the warrant and data components) on which the merits of the claim depend (Toulmin, 1958). Because we use Toulmin's definition of a claim in the context of innovation and knowledge management, we use the term *knowledge claim* instead. We therefore substitute the knowledge evaluation for *knowledge claim evaluation*. In Chapter 3, we propose separate argumentation structures for each of the three approaches. The empirical studies in Chapters 6 and 7 use these argumentation structures to determine whether the extant approaches exist in reality, and/or to identify other ways of knowledge claim evaluation.

Empirical research

The empirical research consists of three studies, which focus on real-life innovation projects. The research can be typified as *exploratory research* (see e.g., De Groot, 1969) and used both qualitative methods as well as quantitative methods, i.e., structured and semi-structured interviews, questionnaires, key informants, observations, and document analysis. Chapter 4 discusses the research methodology. We refer to the three studies, which we report in Chapter 5, 6 and 7, as the *KodA* study, the *Siemens BT* study and the *GEON* study.

The KodA study

The KodA study examines sixteen innovation projects within the *Kennis op de Akker* (KodA, translated: Knowledge at the Field) innovation program. KodA was a collaboration of various companies (from SME to large cooperatives) and interest groups from the Dutch agricultural sector. The objective of this study is to explore the frontiers of existing knowledge claim evaluation theory; thus, this study does not apply informal argumentation theory. The results confirm that the clear-cut theoretical distinctions between the Open, Managerial and Entrepreneurial approaches do not exist in practice. Instead, we found a variety of configurations none of which providing a clear image of how knowledge claims have been evaluated in KodA projects. For example, we are unable to determine which type of evidence or combination of evidences was decisive in knowledge claim evaluation. This finding confirms our belief that, in reality, knowledge evaluation is much more detailed and multifaceted than the three approaches describe. Additionally, the KodA study exposes that various participant groups of the KodA innovation program, e.g., project leaders, domain experts and scientists, have different notions of innovativeness. Whereas KodA project leaders assess their projects as highly innovative, scientists and domain experts assess the same KodA projects far less innovative. This yields a problem in answering our research questions, since we need a reliable assessment of innovativeness to understand the role of knowledge claim evaluation in innovation. Additionally, we wonder to what extent a biased perception of innovativeness leads to mistakes and faulty applications of insights and theory of innovation in practice.

The Siemens BT study

The Siemens BT study examines knowledge claim evaluation in the *Pricing Project* at Siemens Building Technology (BT) in Switzerland. The objective of the Pricing Project was to implement a new company-wide pricing method. We analyzed knowledge claim evaluation in the Pricing Project by applying informal argumentation theory to a reconstruction of the project. The results partially pinpoint to a Managerial approach of knowledge claim evaluation in the Pricing Project, namely the argumentation structures concerning the project intentions mostly consist of authoritative warrants. The Managerial approach, however, requires substantive warrants (and hence, empirical-based evidence) to be used when knowledge claims about pricing are being evaluated in the light of the project intentions. We identified very little usage of the substantive warrant in the Pricing Project. Therefore, our findings support critique of McElroy and Firestone, the founders of the Open approach, namely organizations evaluate knowledge claims based on authority only, which is a highly subjective way of knowledge claim evaluation. By highlighting a number of examples from the Pricing Project, we argue that the Pricing Project's way of knowledge claim evaluation may form a risk for successful innovation. The theory of Boisot and MacMillan – the founders of the Entrepreneurial approach – does not apply here. Their theory explains that substantive warrants cannot be used in highly innovative settings, because facts and existing knowledge are lacking. The setting of Pricing Project was however not highly innovative. Moreover, interviewed project members indicated that facts were available, yet they were hardly harvested and used.

The GEON study

The GEON study examines knowledge claim evaluation in the *Customer Portal Project* at GEON in Groningen. GEON is a Dutch company in the field of geo-information management. The objective of the project was to design and implement a customer portal, which offers some of GEON's services to customers over the Internet. By observing project meetings, we collected data about knowledge claims and arguments. Subsequently, we applied informal argumentation theory to examine the workings of knowledge claim evaluation. Chapter 7 summarizes knowledge claim evaluation in the Customer Portal Project as superficial, unstructured and unchallenged. We identified a low number of arguments in relation to the number of knowledge claims that were formulated; thus, a large amount of warrants and data elements used in argumentative discussions remained implicit. These results pinpoint to an Entrepreneurial approach of knowledge claim evaluation, yet the outcomes of the project were not innovative at all. It appears that project members accepted non-innovative solutions for the customer portal over innovative solutions, based on their limited personal knowledge about customer portals and modern IT techniques, such as Web 2.0. We argue that a more open and factual approach towards knowledge claim evaluation, such as the Open approach, could have led to GEON's desired innovative customer portal.

Conclusions and directions for further research

The results of our empirical studies confirm that, in reality, multiple forms of knowledge claim evaluation exist. None of the forms that we identify is as highly objective, rational, and transparent, as the Open approach proposes, or as highly subjective, intuitive, and fuzzy, as the Entrepreneurial approach proposes. Also, we do not find the Managerial approach in our studies, especially because the objective and factual elements of this approach lack in the projects we examine. Therefore, existing theory fails to explain how organizations evaluate knowledge claims.

This thesis improves the understanding of knowledge claim evaluation in innovations by incorporating informal argumentation theory. We successfully demonstrate the application of informal argumentation theory in two empirical studies. Moreover, the empirical studies show that knowledge claim evaluation plays a crucial role in the success of innovations. Based on our findings and conclusions, we propose four interrelated areas for future research to further improve the understanding of knowledge claim evaluation.

First, we propose to exploit the synergy between informal argumentation and knowledge claim evaluation in innovation projects. From a practical point of view, a basic understanding of informal argumentation theory may support practitioners in discussing and evaluating knowledge claims about innovation. For example, by using an experimental research design, the effect of possessing a basic understanding of informal argumentation theory on knowledge claim evaluation and project outcomes can be examined. From a theoretical point of view, the research of knowledge claim evaluation can be systematized and expanded. A multiple-case study of various innovation projects in similar contexts will yield generalizable insights about more successful and less successful forms of knowledge claim evaluation.

Secondly, future research should start from the notion that innovation projects cannot and do not evaluate knowledge claims using one single approach or method, as is argued in the traditional theories of knowledge claim evaluation. Our empirical studies show that organizations use a combination of the three approaches from the literature. The factors that determine the *actual* approach of knowledge claim evaluation in practice should be identified and understood in explaining the role of knowledge claim evaluation in innovations. This thesis concentrates on two of these factors: 1) the type of knowledge claim under evaluation, and 2) the availability of empirical-based evidence and existing knowledge in innovative situations. Two other factors to be considered in future research are: 3) the relation between organizational resources and knowledge claim evaluation, and 4) the relation between the epistemological base of the profession (i.e., educational background of employees, and routines of the company) and knowledge claim evaluation.

Thirdly, we stress an improved understanding of project innovativeness, i.e., the extent to which a project is actually innovative. We need a thorough understanding of project innovativeness to systemize and expand this research, e.g., in order select suitable projects in a multiple-case study. Furthermore, practitioners need a thorough understanding of project innovativeness to be able to apply theories and insights about innovation effectively. The project members, managers, policy makers and innovation experts, who we interviewed or surveyed in this research, use different or even opposite notions of innovativeness. Consequently, theories and insights about innovation from e.g., science, other industries, foreign countries, etc., are wrongly applied in practice.

Fourthly, the possibilities of automation (e.g., information retrieval and natural language processing) can be explored to make the argumentative analysis a less laborious activity than it is now. Additionally, linking theory of knowledge claim evaluation with information retrieval and natural language processing may contribute to the fields of business intelligence and business process change.

Nederlandse samenvatting

Innoveren is een essentiële activiteit voor veel organisaties. Met deze activiteit vernieuwt een organisatie haar ideeën, processen, producten of procedures met als doel er beter van te worden, denk aan het behalen van (meer) winst, het verlenen van betere service of het maken van nieuwe duurzame producten (West en Farr, 1990). Om te kunnen innoveren moet een organisatie nieuwe kennis ontwikkelen en toepassen. Over deze kennisprocessen is veel geschreven in de literatuur. Er is echter weinig bekend over de wijze waarop organisaties tijdens het innoveren bepalen of kennis van goede kwaliteit is. Wij noemen deze onderbelichte activiteit *kennisevaluatie*. Omdat een goed begrip van kennisevaluatie ontbreekt, weten we ook niet hoe kennisevaluatie innovaties beïnvloedt. Dit proefschrift heeft daarom als doel beter begrip te krijgen van kennisevaluatie, en de rol van kennisevaluatie binnen innovatie.

Literatuurstudie

Ondanks de geringe aandacht voor kennisevaluatie, hebben we in de literatuur drie theoretische benaderingen gevonden over hoe organisaties kennis evalueren tijdens het innoveren. In hoofdstuk 2 van dit proefschrift onderscheiden we de Open benadering, de Managementbenadering en de Ondernemersbenadering. De Open benadering schrijft voor dat organisaties alleen empirische bewijzen en epistemische evaluatiecriteria gebruiken om kennis over innovatie te evalueren (Firestone en McElroy, 2003b; McElroy 2003). Daarnaast is het evalueren van kennis niet beperkt tot een bepaalde groep mensen, zoals het management of een groep R&D medewerkers. Integendeel, kennisevaluatie is “open” voor iedereen met geldige argumenten of geldige bewijzen. Het mechanisme van evaluatie is gebaseerd op de principes van het kritisch rationalisme en falsificatie (Popper, 1970, 1972). Deze zijn vergelijkbaar met de principes die wetenschappers (zouden moeten) hanteren tijdens het verrichten van onderzoek. Het bekritiseren van kennis tijdens het innoveren zal leiden tot de verwerping van onjuiste kennis (i.e., falsificatie) en het onder voorbehoud aannemen van niet-gefalsificeerde kennis. McElroy (2003) stelt echter dat in veel organisaties het management bepaalt wat juiste en onjuiste kennis is waardoor er een groter risico bestaat dat de kennis om te innoveren van minder goede kwaliteit of zelfs onjuist is.

De Managementbenadering gaat ervan uit dat innovaties niet alleen ontstaan door rationaliteit en objectiviteit, dit in tegenstelling tot wat wordt aangenomen in de hierboven beschreven Open benadering (Nonaka en Takeuchi, 1995; Von Krogh et al., 2000). De Managementbenadering neemt aan dat de managers van een organisatie ondernemers zijn met een innovatieve visie, en dat zij deze visie kunnen omvormen in (organisatie)intenties zoals een strategie, missie en visie. Het middenkader zou vervolgens deze intenties moeten vertalen naar concrete evaluatiecriteria. Ten slotte rechtvaardigen ondergeschikte werknemers kennis over een innovatie in het licht van deze evaluatiecriteria door gebruik te maken van empirische bewijzen. Het bijbehorende mechanisme van evaluatie verschilt ten opzichte van de Open benadering en is gebaseerd op justificatie (i.e., rechtvaardiging: het aantonen dat iets juist of onjuist is) in plaats van falsificatie (i.e., het aantonen dat iets onjuist is, of het tijdelijk en onder voorbehoud accepteren van kennis die de falsificatie succesvol heeft doorstaan).

De Ondernemersbenadering gaat er ook van uit dat de ondernemersgeest van bepaalde individuen nodig is om te kunnen innoveren. Echter, volgens de Ondernemersbenadering is de ondernemersgeest niet uitsluitend te vinden bij managers (Boisot en MacMillan, 2004). Iedereen in een organisatie met ondernemerseigenschappen zou kennis en/of evaluatiecriteria moeten kunnen ontwikkelen. Bovendien wordt er in de Ondernemingsbenadering van uitgegaan dat feiten meestal afwezig zijn tijdens het innoveren. Dientengevolge kunnen feiten, maar ook ervaringen en bestaande kennis niet optimaal worden gebruikt. Volgens Boisot en MacMillan (2004) willen de meeste organisaties de onzekerheid die dit met zich meebrengt liever vermijden. Daarom kiezen organisaties vaak voor de Open benadering of de Managementbenadering. Tijdens het innoveren wordt dan de nadruk gelegd op feiten, bestaande ervaringen en bestaande kennis, die in onvoldoende mate voorhandig zijn, waardoor er van daadwerkelijke innovatie geen sprake meer is.

Ondanks dat de drie benaderingen belangrijke tegenstellingen naar voren brengen over de rol van kennisevaluatie binnen innovaties, zien we ook een aantal problemen. Ten eerste zijn de drie benaderingen in hoge mate abstract en empirisch niet of nauwelijks met feiten onderbouwd. Zo is alleen de Managementbenadering op enig empirisch onderzoek berust (onderzoek bij Japanse bedrijven door Nonaka en Takeuchi, 1995), maar de kwaliteit van het verrichte onderzoek valt ernstig in twijfel te trekken. Het heeft weinig nut om de rol van de drie benaderingen binnen innovatie te onderzoeken als onbekend is of de benaderingen wel echt bestaan of überhaupt kunnen bestaan. Ten tweede geloven wij dat kennisevaluatie in de werkelijkheid veel gedetailleerder en veelzijdiger is dan wordt aangenomen in de drie benaderingen. Dit zet extra vraagtekens bij de geldigheid van de beweringen en tegenstellingen zoals die naar voren komen in de drie benaderingen.

Op basis van de vastgestelde problemen kunnen we stellen dat de drie benaderingen samen een "zwarte doos van kennisevaluatie" vormen. Deze zwarte doos dient eerst geopend te worden alvorens de rol van de verschillende benaderingen voor kennisevaluatie binnen innovatie op een adequate wijze kan worden onderzocht. Daarom heeft dit proefschrift als doel om de zwarte doos van kennisevaluatie te openen. Dit doen we op de eerste plaats door in hoofdstuk 3 van dit proefschrift een aanvullende theoretische discipline te introduceren, namelijk informele argumentatieleer. Het beoordelen van de kwaliteit van kennis is namelijk een combinatie van pro- en contra-argumentatie. Vervolgens verrichten we in hoofdstuk 5 tot en met 7 van dit proefschrift drie empirische onderzoeken om een beter begrip van kennisevaluatie ontwikkelen.

Informele argumentatieleer

Informele argumentatieleer is een praktisch-georiënteerde benadering om een op argumenten beruste discussie te analyseren en te begrijpen (Toulmin, 1958; Van Eemeren et al., 2002). Door informele argumentatieleer toe te passen in dit onderzoek beschouwen we het evalueren van kennis over innovatie als een discussie op basis van (soorten) argumenten. Het standaard argumentatieraamwerk binnen de informele argumentatieleer is dat van Toulmin (1958), bestaande uit *claim*, *data* en *grond* (Engels: warrant). Toulmin stelt dat een argument een "sprong" is van geaccepteerde data, via een grond, naar een claim. Toulmin definieert een claim als een bewering die publiekelijk neergelegd wordt voor acceptatie. De intrinsieke waarde van een claim wordt geëvalueerd door kritisch te kijken naar de onderbouwing en het gebruikte bewijs (i.e., de data en de gronden). Omdat we Toulmins definitie van een claim toepassen in de context van innovatie en kennismanagement, hanteren wij in dit proefschrift het woord *kennisclaim*. In het vervolg gebruiken we daarom het begrip *kennisclaimevaluatie* in plaats van kennisevaluatie. Met behulp van informele argumentatietheorie hebben we in hoofdstuk 3 voor elk van de drie bestaande benaderingen een argumentatiestructuur voorgesteld. Met deze specifieke argumentatiestructuren zijn we in staat om empirisch vast te stellen in hoeverre de drie bestaande benaderingen terug te vinden zijn in bestaande innovatieprojecten. Daarnaast bieden deze argumentatiestructuren de basis om nieuwe vormen van kennisclaimevaluatie te identificeren.

Empirisch onderzoek

Het empirisch onderzoek bestaat uit drie studies waarin we ons richten op innovatieprojecten. De drie onderzoeken kunnen worden gekenmerkt als *verkennend (of explorerend) onderzoek* (zie De Groot, 1969) en maken gebruik van zowel kwalitatieve als kwantitatieve methodes, waaronder gestructureerde en semigestructureerde interviews, vragenlijsten, informanten, observaties en documentanalyse. Hoofdstuk 4 van dit proefschrift legt de details van onze methodologie uit. De drie studies bespreken we in hoofdstuk 5 tot en met 7 als de *KodA* studie, de *Siemens BT* studie en de *GEON* studie.

De KodA studie

In de KodA studie onderzoeken we zestien innovatieprojecten binnen het *Kennis op de Akker* (KodA) innovatieprogramma. KodA was een samenwerkingsverband tussen verschillende ondernemingen (van SME's tot grote coöperaties) en belangengroepen in de Nederlandse landbouwsector. Het doel van dit onderzoek is om de grenzen van de drie bestaande benaderingen (exclusief de inzichten uit de informele argumentatieleer) te verkennen. De resultaten tonen aan dat de scherpomlijnde verschillen tussen de drie benaderingen in de KodA projecten niet terug te vinden zijn. We vinden een verscheidenheid aan patronen, waarbij geen enkel patroon een duidelijk beeld geeft hoe men in de KodA projecten kennis evalueerde. Zo kunnen we in geen enkel onderzocht KodA project vaststellen welk type bewijs of welke combinatie van bewijzen de doorslag gaf. Deze bevinding bevestigt dat kennisclaimevaluatie in de werkelijkheid gedetailleerder en veelzijdiger is dan wordt beschreven door de drie bestaande benaderingen. Een bijkomende bevinding is dat verschillende groepen deelnemers (i.e., projectleiders, domeinexperts, wetenschappers) aan dit onderzoek afwijkende noties van innovatie hebben. Waar KodA projectleiders hun projecten bestempelen als in hoge mate innovatief, vinden wetenschappers en domeinexperts dezelfde KodA projecten veel minder innovatief. Het vaststellen van de mate van innovatie van een project is echter van groot belang om de rol van kennisclaimevaluatie binnen innovatie te kunnen onderzoeken. Daarnaast vragen we ons af in hoeverre de afwijkende notie van innovatie in de praktijk leidt tot misverstanden en verkeerde toepassingen van bestaande inzichten over innovatie.

De Siemens BT studie

De Siemens BT studie richt zich op het *Pricing Project* van Siemens Building Technology (BT) in Zwitserland. Het Pricing Project had als doel om een nieuwe bedrijfsbrede methode van verkoopprijsbepaling te implementeren. We bestuderen kennisclaimevaluatie binnen het Pricing Project met behulp van informele argumentatieleer. We gebruiken hiervoor een reconstructie van het project verkregen door interviews en documentanalyses. De resultaten van de Siemens BT studie wijzen gedeeltelijk de Managementbenadering aan als de manier van kennisclaimevaluatie binnen het Pricing Project, want de gevonden argumenten over projectdoelstellingen bevatten voornamelijk autoritaire gronden. Echter, de Managementbenadering vereist dat er feitelijke gronden worden gebruikt als er kennisclaims over verkoopprijsbepaling worden geëvalueerd in het licht van de eerdergenoemde projectdoelstellingen. Dit was binnen het Pricing Project nauwelijks het geval: feitelijke gronden werden zelden gebruikt. Deze bevindingen onderstrepen de kritiek van McElroy en Firestone, de grondleggers van de Open benadering, dat organisaties autoritair (via het management) en dus op een subjectieve wijze kennisclaims evalueren. Met een aantal voorbeelden uit het Pricing Project illustreren we dat deze handelswijze een risico vormt voor het slagen van innovaties. De uitleg van Boisot en MacMillan, de grondleggers en verdedigers van de Ondernemersbenadering, gaat voor het Pricing Project niet op. Zij stellen namelijk dat feitelijke gronden niet voorhanden zijn in innovatieve contexten, en dus ook niet gebruikt worden, maar volgens de geïnterviewde projectleden waren relevante feiten wel degelijk beschikbaar.

De GEON studie

In de GEON studie bestuderen we kennisclaimevaluatie in het *Klantenportaal Project* bij GEON in Groningen. GEON is een Nederlandse onderneming met zestien werknemers en werkzaam op het gebied van geo-informatie management. Het doel van het project was om een klantenportaal te ontwerpen en implementeren waarmee een aantal services van GEON via het Internet kunnen worden aangeboden. Door vergaderingen van het project als passieve observant bij te wonen hebben we data verzameld over kennisclaims en argumenten. De wijze van kennisevaluatie binnen het Klantenportaal Project van GEON omschrijven we in hoofdstuk 7 als oppervlakkig, ongestructureerd en onbetwist. Zo werden er in verhouding tot het aantal besproken kennisclaims bijzonder weinig argumenten naar voren gebracht om deze kennisclaims te onderbouwen of te bekritiseren. Daarnaast laten de resultaten zien dat een groot gedeelte van de discussies gebaseerd was op impliciete data en impliciete gronden. Omdat er geen tot weinig gebruik werd gemaakt van feiten en bestaande kennis in de discussies, stellen we dat de Ondernemersbenadering werd gehanteerd. Dit leidde echter niet tot het gewenste innovatieve resultaat. Door te kijken naar het individuele gedrag van de projectleden concluderen we dat bij de meerderheid van de projectleden ontbrak kennis over en bekendheid met klantenportalen en moderne ICT technieken (bijvoorbeeld Web 2.0), waardoor projectleden uiteindelijk conventionelere oplossingen kozen boven innovatievere oplossingen. Als het projectteam gebruik zou hebben gemaakt van de principes en mechanismes van de Open benadering had het Klantenportaal Project waarschijnlijk een innovatiever resultaat kunnen behalen.

Conclusies en verder onderzoek

In hoofdstuk 8 staan we stil bij de conclusies van dit onderzoek. Onze empirische resultaten bevestigen het vermoeden dat kennisclaimevaluatie in de werkelijkheid in vele vormen voor kan komen. Geen enkele aangetroffen vorm was zo kritisch, rationeel en transparant als de Open benadering voorschrijft noch zo intuïtief, subjectief en onbepaald als de Ondernemersbenadering voorschrijft. Ook de Managementbenadering hebben we in onze onderzoeken niet volledig gevonden. De bestaande theorie verklaart dus in onvoldoende mate hoe organisaties kennisclaims evalueren.

We laten zien dat we door gebruik te maken van informele argumentatieleer een beter begrip kunnen krijgen van kennisclaimevaluatie. Daarnaast laten de empirische onderzoeken zien dat de wijze van kennisclaimevaluatie wel degelijk van belang is voor het slagen van innovaties. Op basis van de bevindingen stellen we vier aan elkaar gerelateerde onderzoeksrichtingen voor om het begrip en de toepassing van kennisclaimevaluatie te versterken en te vergroten.

Ten eerste stellen we voor om de synergie tussen informele argumentatieleer en kennisclaimevaluatie in innovatieprojecten verder te exploiteren. In praktisch opzicht kan het bezitten van enige basiskennis van argumenteren, managers en werknemers een eind op weg helpen om op een betere wijze kennisclaims over innovatie te evalueren. Met behulp van experimenten zou onderzocht kunnen worden of theorie van de vorm en structuur van argumentaties nuttige kennis voor managers en andere werknemers om met innovaties om te kunnen gaan. In theoretisch opzicht legt dit proefschrift de basis om het empirisch onderzoek naar kennisclaimevaluatie te systematiseren en uit te breiden. Zo zou met behulp van informele argumentatietheorie een “multiple case” studie van in gelijke mate innovatieve projecten generaliseerbare inzichten kunnen opleveren over meer succesvolle en minder succesvolle vormen van kennisclaimevaluatie.

Ten tweede moet vervolgonderzoek gericht zijn op het begrijpen van de verscheidenheid van kennisclaimevaluatie in de praktijk. Dit proefschrift laat zien dat projecten en organisaties verschillende manieren van kennisclaimevaluatie hanteren, die lijken op een mengelmoes van de drie bestaande benaderingen. De factoren die de manier van kennisclaimevaluatie beïnvloeden zullen geïdentificeerd moeten worden om de rol van kennisclaimevaluatie binnen innovaties te begrijpen. Dit proefschrift besteedt aandacht aan twee van deze factoren, namelijk 1) het type kennisclaim dat wordt geëvalueerd en 2) de mate waarin relevante feiten en bestaande kennisclaims aanwezig zijn in innovatieve contexten. Daarnaast stellen we in hoofdstuk 8 twee nieuwe factoren voor die in vervolgonderzoek kunnen worden bestudeerd: 3) de relatie tussen tijd en middelen en kennisclaimevaluatie, en 4) de relatie tussen de epistemologische basis van een beroep (i.e., de educatieve achtergrond van werknemers, hun kerncompetenties en de gevestigde routines in een organisatie) en kennisclaimevaluatie.

Ten derde benadrukken we dat er een beter begrip moet komen in welke mate een project (of een soortgelijk initiatief) innovatief is. Dit is in de eerste plaats van belang voor het vervolgonderzoek zoals genoemd bij de eerste onderzoeksrichting (zie hierboven), bijvoorbeeld om projecten te selecteren voor een systematische vergelijking. In de tweede plaats is het van belang voor de praktijk. De organisaties, beleidsbepalers en innovatie-experts die wij in dit onderzoek ondervraagd hebben, hanteren verschillende en soms onverenigbare noties van innovatie. Als een gevolg hiervan passen organisaties en beleidsbepalers inzichten over innovatie uit andere contexten – de wetenschap, andere bedrijfstakken, andere innovatieprogramma's, het buitenland, etc. – op een onjuiste manier toe.

Ten vierde moet er in de toekomst gekeken worden naar de mogelijkheden om met bestaande computertechnieken, zoals information retrieval (IR) en natural language processing (NLP), delen van de argumentatieanalyse te automatiseren met als doel deze analyse minder arbeidsintensief in te maken. In een breder perspectief zou deze kruisbestuiving ook kunnen bijdragen aan de ontwikkeling van werkvelden zoals business intelligence en business process change.

Dankwoord

Dit proefschrift is tot stand gekomen dankzij de volgende personen.

René Jorna introduceerde mij in kennismanagement. Dit is een vakgebied waarin het begrip van de mens en zijn kennis centraal staat om een organisatie te begrijpen. Het was voor mij als derdejaars student technische bedrijfswetenschappen een eyeopener. In dit vakgebied geloofde ik. Sindsdien heb ik op verschillende momenten met René mogen samenwerken: tijdens mijn afstuderen, tijdens verschillende onderzoeksprojecten (Optichem, Tipstar-Agrobiokon, Innovatie Stimulerende Omgevingen), tijdens colleges, en bovenal tijdens mijn promotie met dit proefschrift als resultaat. Ik heb onze samenwerking altijd als heel leerzaam en bijzonder prettig ervaren. Nu ik zelf studenten begeleid bij het afstuderen en veelvuldig in de collegezaal sta merk ik hoeveel ik van René geleerd heb. Ik bewonder in het bijzonder zijn gezonde kijk op het doen van onderzoek en ik ben blij dat hij zijn werk, onder andere in het veld van kennismanagement en (sociale) duurzaamheid, op de Fryske Akademy kan voortzetten.

Laura Maruster leerde ik kennen tijdens mijn afstudeerproject in 2005-2006, als collega van mijn afstudeerbegeleiders René Jorna en Niels Faber. Direct na mijn afstuderen hebben Laura en René mij gevraagd of ik bij hun zou willen promoveren: ik heb geen moment geaarzeld. Naast een uitstekend copromotor, is Laura ook verantwoordelijk voor de afdeling humor en relativering. Het komt zelden voor dat ik niet-lachend Laura's kantoor verlaat – en dat voor iemand die tijdens haar jeugd in Roemenië de hete adem van Dracula constant in haar nek heeft gevoeld. Laura's wiskundige precisie in het becommentariëren heeft ervoor gezorgd dat dit proefschrift vele malen coherenter, consistenter en leesbaarder geworden. Ik hoop ook in de toekomst met Laura en René te blijven samenwerken.

Dankzij de inspanningen van Rob van Haren hebben vele onderzoeksprojecten externe financiering gekregen, waaronder mijn promotieproject. Ik heb niet alleen op de faculteit met Rob samengewerkt. Zo heb ik met Rob in files richting de WUR in

Wageningen gestaan, in de brandende zon op een akker en een rooimachine afgesteld, en een koeienbeautycontest op een landbouwmanifestatie meegemaakt. Ik bewonder Robs oeverloze passie en energie in zijn werk en zijn bijdrages aan een duurzamere samenleving.

Niels Faber was mijn afstudeerbegeleider en leerde mij de eerste kneepjes van het uitoefenen van de wetenschap. Na mijn afstuderen heb ik nog intensief met hem samengewerkt in verschillende projecten, en is hij zo lang hij nog op de faculteit zat een belangrijke sparringpartner in dit onderzoek geweest. Niels luisterde altijd geduldig en aandachtig naar mijn allerlaatste alles verklarende theorie, en dankzij zijn uitstekende kennis en kunde van vrijwel alles kon hij vervolgens zeer gedegen feedback geven als voorbereiding op mijn volgende eureka moment. Ik waardeerde het ontzettend dat zijn deur hier altijd voor open stond. Ik vind het jammer dat Niels en René niet meer (fulltime) op de faculteit werken, zoals vroeger, maar ik ben ook ontzettend blij dat zij weer zonder onnodige hobbels en obstakels onderzoek kunnen doen bij de Fryske Akademy.

Ten slotte, Martin Helmhout. Martin heb ik ook leren kennen tijdens mijn afstuderen en later tijdens met promotie. Hij was mede verantwoordelijk voor de goede sfeer op onze werkkamer aan de Dierenriemstraat en was voor mij een voorbeeld om te gaan promoveren.

De leden van mijn leescommissie, Hans Wortmann, Frans van Eemeren en Stephen Gourlay, wil ik bedanken voor het lezen en beoordelen van mijn proefschrift.

In dit onderzoek was ik afhankelijk van enthousiaste en nieuwsgierige personen die hun bedrijf, project of innovatieprogramma voor mij openstelden. Ik wil Peter Paree van ZLTO (Tilburg) en zijn collega's Henny van Gurp en Gerard Leenaars bedanken voor de goede samenwerking in de KodA studie (hoofdstuk 5). Voor overleg en de verschillende interviews reisde ik altijd met veel plezier naar het zuiden van Nederland af. Ik wil ook alle geïnterviewde KodA projectleiders bedanken voor de medewerking en onze oud-secretaresse Anja van Haperen-Heijkoop voor het plannen van alle interviews.

Dankzij Sander van Slooten van Siemens Building Technology (BT) kon ik onderzoek doen op het Siemens BT hoofdkwartier te Zug in Zwitserland (hoofdstuk 6). Zijn medewerking op afstand gedurende de looptijd van het Pricing Project, en zijn gastvrijheid tijdens mijn verblijf op locatie in het prachtige Zwitserland, zijn cruciaal geweest voor het slagen van het Siemens BT onderzoek.

Ten slotte wil ik iedereen bij GEON (Groningen), en in het bijzonder Bert Gerlofs, Ronald Mulder, Ronald Sluiter en Govert Schoof bedanken voor het openstellen van hun organisatie en het Klantenportaal Project (hoofdstuk 7). Als externe onderzoeker ben je een buitenstaander, maar dat heb ik door hun gastvrijheid en de uitstekende werksfeer bij GEON nooit zo ervaren.

Ik houd een aantal heel dierbare vriendschappen over aan mijn promotietijd. Dankzij Onur, Remco en Justin heb ik een fantastische tijd gehad op het Zernike. De twee hoogtepunten van een werkdag waren pauzeren met een colaatje gekocht bij de Katz'n-Kut, en circuittrainen op de ACLO onder begeleiding van instructeurs die we met een brede grijns de Hippie, de Generaal en Richard Gere noemden. Maar ook 's avonds en in het weekend wisten we elkaar te vinden. Ik hoop dat waar onze carrières ons ook naar toe voeren, we elkaar altijd blijven spreken en zien. Ik wil ook alle andere collega's van de afdelingen Business & ICT, Innovation Management & Strategy en Operations bedanken voor de leuke tijd op de faculteit.

Mijn twee beste vriendinnen zijn Nanda en Verena, tevens mijn paranimfen. Nanda leerde ik kennen in de AIO kamer aan de Dierenriemstraat en later als mijn roomie in het WSN gebouw, en Verena als student-assistent bij de begeleiding van Honours Bachelor Bedrijfskunde studenten.

Nanda, je hebt mij altijd vertrouwen gegeven in wie ik ben en wat ik doe, en op precies de juiste momenten maakte je dat ook expliciet, zelfs al werkte je op een gegeven moment niet meer in Groningen. Dat was ontzettend belangrijk voor mij, en dat is het nog steeds. Ik was ook jouw paranimf, en hoe fantastisch jij bent werd nog eens duidelijk toen ik jouw familie en vrienden over jou hoorde schrijven en spreken tijdens je promotie: je bent niet alleen een steun en toeverlaat voor mij, maar je bent dat voor je hele omgeving en dat vind ik ongelooflijk bijzonder.

Verena, je naam noem ik al in de dankwoorden van de publicaties die dit proefschrift heeft voorgebracht. En ik doe dat hier met veel genoegen nog een keer, en dan niet alleen voor al je hulp tijdens mijn onderzoek. Ik koester onze lunches, alle avonden, en ja, zelfs die ene lange barre wandeltocht over het Zernike. Ik bewonder de wijze waarop jij je ambities nastreeft en wat je daardoor allemaal al bereikt hebt. Dat vind ik zo knap van je. Door je intelligentie en talent voor wetenschap, vraag ik me wel eens af wat ik hier te zoeken heb. Ik hoop met al mijn hart dat je niet lang na het verschijnen van dit proefschrift aangenomen bent als promovendus aan de CBS in Kopenhagen. Nanda en Verena, ik mis jullie elke dag, maar ik ben daarom des te blijer dat ik jullie aan mijn zijde heb tijdens mijn verdediging.

Ik hoop dat ik zowel mijn lieve zus Marloes en haar vriend René als mijn andere vrienden, Jan, Wouter en Cleo, Stephen en Marian, en Michiel, nu het proefschrift eindelijk geschreven en verdedigd is, weer vaker kan gaan zien. Met één vriend bleef ik ondanks de drukte dagelijks in contact, en dat is Reimer.

Reimer, je was al mijn beste vriend voordat ik met mijn promotie begon. Ik denk dat we alles bij elkaar opgeteld maar twee uur over mijn onderzoek hebben gesproken, maak daar drie van. Daarvoor in de plaats zijn er terabytes aan chats en e-mails, onder meer over de allerbeste boeken, films, series en muziek, over een legioen aan frappante YouTubers, over onze vliegkunsten in de MS flightsimulator, en over de Nu.nl berichtgeving over falende Nederlandse tennissers. Tegelijkertijd denk ik ontzettend dankbaar terug aan de momenten dat ik een steuntje in de rug nodig had en ik hiervoor altijd bij je terecht kon. Elke dag fleur ik op van je zeldzaam goede smaak, je sublieme humor en je muzikale en vriendschappelijke talenten.

Ten slotte wil ik mijn ouders bedanken, voor alles. Pap en Mam, dit proefschrift was er niet geweest zonder jullie. Jullie stonden dag en nacht voor mij klaar, en op cruciale momenten hebben jullie mij er doorheen gesleept, van meehelpen in mijn huis toen ik zeven dagen per week aan het werk was tot laat in de avond meedenken over de exacte formulering van de vraagstelling van dit proefschrift toen ik door de bomen het bos niet meer zag. Mijn dank valt niet in woorden uit te drukken. Ik draag daarom dit proefschrift aan jullie op.