Delft University of Technology

The Interplay between Intuition and Rationality in Strategic Decision Making
A Paradox Perspective

Calabretta, Giulia; Gemser, Gerda; Wijnberg, NM

DOI
10.1177/0170840616655483

Publication date
2016

Document Version
Final published version

Published in
Organization Studies

Citation (APA)
Calabretta, G., Gemser, G., & Wijnberg, NM. (2016). The Interplay between Intuition and Rationality in Strategic Decision Making: A Paradox Perspective. *Organization Studies*, 1-37. https://doi.org/10.1177/0170840616655483

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright
Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy
Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

This work is downloaded from Delft University of Technology.
For technical reasons the number of authors shown on this cover page is limited to a maximum of 10.

Article

Organization Studies
1–37
© The Author(s) 2016
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/0170840616655483
www.egosnet.org/os
SAGE

The Interplay between Intuition and Rationality in Strategic Decision Making: A Paradox Perspective

Giulia Calabretta
Delft University of Technology, The Netherlands

Gerda Gemser
RMIT University, Australia

Nachoem M. Wijnberg
University of Amsterdam, The Netherlands and University of Johannesburg, South Africa

Abstract
Both intuition and rationality can play important roles in strategic decision making. However, a framework that specifically accounts for the interplay between intuition and rationality is still missing. This study addresses this gap by using a paradox lens and conceptualizes the intuition–rationality duality as a paradoxical tension. We draw on seven case studies of innovation projects to empirically derive a three-step process for managing this intuition–rationality tension through paradoxical thinking. Our empirical data suggest that management of the tension starts with preparing the ground for paradoxical thinking by creating managerial acceptance for the contradictory elements of rational and intuitive approaches to decision making. The process then continues by developing decision-making outcomes through the integration of intuitive and rational practices. Finally, the outcomes of paradoxical thinking are embedded into the organizational context. For each step of the model, we indicate a set of practices that, by leveraging intuitive or rational characteristics of decision making, practitioners can use to deal with this cognitive tension in the different steps of our model.

Keywords
intuition, paradoxes, paradox management, rationality, strategic decision making

Corresponding author:
Giulia Calabretta, Delft University of Technology, Faculty of Industrial Design Engineering, Landbergstraat15, 2628 CE, Delft, The Netherlands.
Email: g.calabretta@tudelft.nl

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Introduction

Strategic decision making is central to organizational actions and long-term competitiveness (Gavetti, Levinthal, & Ocasio, 2007). In management literature, strategic decision making is regarded as a prevalently rational process: analytical, linear, and step-by-step (Cabantous & Gond, 2011). However, optimal strategic decision making may require both rationality and intuition (Elbanna, 2006; Elbanna & Child, 2007; Hitt & Tyler, 1991; Langley, Mintzberg, Pitcher, Posada, & Saint-Macary, 1995). Intuition is commonly conceptualized as a decision-making mechanism that relies on rapid, non-conscious recognition of patterns and associations to derive affectively charged judgments (Dane & Pratt, 2007). Intuition differs from rational decision making in that it is faster and does not follow a linear, logical reasoning process that can be thoroughly reconstructed and explained *ex post* (Barnard, 1938; Simon, 1987). Although intuitive and rational decision making are both recognized as valuable for strategic decision making, they are fundamentally different (Epstein, 1994). Their conjoint use thus often results in tension: in general, a rational (intuitive) decision maker cannot easily accommodate intuitive (rational) thinking (Hodgkinson & Clarke, 2007; Hodgkinson, Sadler-Smith, Burke, Claxton, & Sparrow, 2009; Salas, Rosen, & DiazGranados, 2010).

This article applies the paradox perspective to study the interplay between intuition and rationality in strategic decision making. Paradoxes imply contradictions that persist over time, require on-going responses, and are not fully solvable by compromise or by adopting both viewpoints simultaneously (Jay, 2013; Lewis, 2000; Smith, 2014; Smith & Lewis, 2011). Even though paradoxes cannot be fully solved, prior research suggests that paradoxical tensions can be managed and turned to advantage (Andriopoulos & Lewis, 2009; Lewis, 2000; Lüscher & Lewis, 2008; Michaud, 2014; Smith & Lewis, 2011). Approaches to managing paradoxes include accepting the contradictions and learning to cope with them (e.g., Lüscher & Lewis, 2008), adopting paradoxical thinking by continuously integrating and differentiating between the alternatives (e.g., Andriopoulos & Lewis, 2009), or a combination of the above (e.g., Smith & Lewis, 2011). However, little is known about how to manage the tension between intuition and rationality and whether a paradox perspective can enable individuals to combine the benefits of intuition and rationality in strategic decision making.

To investigate this question, we study the tension between intuition and rationality in the particular setting of seven innovation projects involving an innovating company and design professionals from design consultancies hired to assist in the innovation process. Design professionals tend to adopt an approach to innovation in which intuitive decision making is intrinsic and prevalent (Andriopoulos & Lewis, 2009; Michlewski, 2008; Stigliani & Ravasi, 2012). Tensions may arise from the differences between design professionals' primarily intuitive approach and the rational decision making generally adopted by the managers of the companies hiring these design professionals (Cabantous & Gond, 2011). We argue that precisely by accepting and embracing these tensions – instead of attempting to resolve them or choosing one of the sides – strategic decision making can improve.

Our resulting framework illustrates how the intuition–rationality tension occurring in the sampled projects is managed by adopting paradoxical thinking. Paradoxical thinking is a strategy for managing paradoxical tensions through cognitive and behavioral processes that integrate the contradictory poles of the tension while maintaining and leveraging their differences (Andriopoulos & Lewis, 2009; Smith & Tushman, 2005). We propose a three-step process that includes preparing the ground for paradoxical thinking, developing outcomes through paradoxical thinking, and embedding outcomes of paradoxical thinking. By adopting a paradox perspective, our work differs from prior studies that attempt to integrate intuition and rationality by looking at them as alternative decision-making approaches (Dayan & Di Benedetto, 2011; Dayan & Elbanna, 2011; Elbanna

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

& Child, 2007). Instead, this study shows how individuals can use both intuition and rationality, and frame their interplay as a sustainable and virtuous tension that can be managed through paradoxical thinking.

In the next section, we review the relevant research on rationality, intuition, and paradoxical tensions. We then describe our methodology and explain data collection and analysis. After presenting our findings and the resulting integrative framework, we conclude by discussing managerial implications, limitations, and directions for future research.

Literature Review

Intuition and rationality in strategic decision making

In management literature and management practice, the rational model of decision making is implicitly or explicitly considered the model to strive for, even if circumstances prevent a completely rational approach (Cabantous & Gond, 2011; Callon, 2009). Rationality refers to an analytic, systematic, rule-based, and explicit mechanism for decision making (Hodgkinson & Healey, 2011). Individuals preferring rationality follow a step-by-step decision-making process, which includes identifying and formulating the problem, thoroughly assessing pertinent information, generating a set of alternatives, evaluating the costs and benefits of these alternatives, and ultimately making a logical choice based on conscious deliberation (Elbanna, 2006; Janis & Mann, 1977; Schwenk, 1984). Given its systematic and structured nature, rational decision making can be slow, time-consuming, and effortful, and thus not always appropriate to deal with the time pressure, complexity, and uncertainty of innovation decision making (Dane & Pratt, 2007).

In such circumstances managers can use an intuitive decision-making process (Dane & Pratt, 2007; Gore & Sadler-Smith, 2011). Intuition not only helps decision makers deal with uncertainty but also stimulates those creative cognitions that are essential to the generation and exploration of novel problem solutions, ideas, and related business opportunities (Claxton, 1998; Hodgkinson et al., 2009; Miller & Ireland, 2005). In an intuitive decision-making process, decision makers consciously recognize a problem through the perception of relevant cues and patterns, non-consciously activate all the cognitive schemas associated with the problem, non-consciously make holistic associations across cognitive schemas, and consciously generate a solution (Dane & Pratt, 2007). Thus, like rational information processing, the intuitive process includes problem definition, analysis, and synthesis, but these stages occur faster and are mostly non-conscious and deeply intertwined. Additionally, intuitive judgment is affectively charged and accompanied by a feeling of certitude and the perception that one's intuitions are correct, despite the lack of rational analysis (Shirley & Langan-Fox, 1996). This feeling of certitude becomes progressively less random as the decision maker's domain-specific expertise increases. Indeed, literature on managerial intuition focuses on a distinctive type of intuition – *expert intuition* or *problem-solving intuition* – in which the intuitive process is not random or irrational but is based on experience and a solid and complete grasp of a problem's details (Dane & Pratt, 2007; Gore & Sadler-Smith, 2011; Khatri & Ng, 2000; Simon, 1987).

Though much research has focused on detailing the properties of either rationality or intuition as core decision-making mechanisms, there is widespread acceptance that strategic decision making may require both (e.g., Elbanna & Child, 2007; Hodgkinson et al., 2009). Understanding better how rationality and intuition interact during decision making has, however, remained a major challenge (Gray, 2004; Lieberman, 2007). Within the cognitive psychology literature, it has been suggested that rationality and intuition are two coexisting information-processing systems that interact but remain independent in the human brain (Epstein, 1994; Evans, 2003). Some researchers suggest that intuition is the main mechanism through which choices are made, and the role of rational

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

thinking is to evaluate the product of intuitive processing (Kahneman, Slovic, & Tversky, 1982). In this approach, the role of rational reasoning is to generate *post hoc* rationalizations for why a specific judgment was made, but these rationalizations rarely result in a change in the initial judgment. Other researchers maintain that intuition precedes rationality, but downplay the role of intuition as subservient to deliberative processes (Salas et al., 2010). Intuition simply provides new information that the decision maker will then process through the steps of rational thinking.

The presence of rather different views on whether and when individuals switch from relying on intuition to rationality and vice-versa could be related to the methodological difficulty of observing when and how such switches actually occur, especially during strategic decision-making processes (Hodgkinson, Langan-Fox, & Sadler-Smith, 2008). Additionally, there is strong support for the idea that, if such switches occur, they will be challenging to most individuals, given the strong preference that each decision maker develops for intuition or rationality as a result of his/her experiences and inclinations (Hodgkinson et al., 2009; Salas et al., 2010). To handle the difficulties of switching at the individual level, some researchers propose a different, group-level solution and suggest that a viable way to manage the intuition–rationality tension is to create cognitive diversity, namely by mixing individuals with different information-processing preferences (more intuitive versus more rational) in decision-making teams (Hodgkinson & Healey, 2011; Volkema and Gorman, 1998). However, research examining empirically the influence of mixing individuals with different decision-making styles remains scant and inconclusive (Salas et al., 2010).

The intuition–rationality tension

The fact that intuition and rationality are two fundamentally different languages of thought, but at the same time are both needed for effective strategic decision making, generates a paradox (Lewis, 2000) – a duality involving "contradictory yet interrelated elements that exist simultaneously and persist over time" (Smith & Lewis, 2011, p. 382). Paradoxical tension arises when two practices that seem logical individually are "inconsistent or even absurd when juxtaposed" (Smith & Lewis, 2011, p. 382). Therefore, while practices of intuitive and rational decision making are equally effective for addressing a task, their conjoint use results in tensions, because the actors tend to focus on the contradictions between the two poles of a paradox (Lewis, 2000). For instance, the rationality–intuition tension can stem from the one-sided focus on rationality and analytical thinking among organizational decision makers (Cabantous & Gond, 2011; Callon, 2009). Thus, mainly rational managers (Cabantous & Gond, 2011) will focus on the shortcomings and biases of relying on intuition, disregard the benefits of integrating intuition, and solve the tension by rejecting intuition in strategic decision making.

Emphasizing one element of the paradox (i.e., rationality) and rejecting the other (i.e., intuition) triggers an either/or negative dynamic where tension is repressed and a suboptimal outcome results (Smith & Lewis, 2011). The paradox perspective offers a different resolution (Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011), and allows consideration of rationality and intuition as something other than two opposite approaches between which a choice has to be made, or two complementary approaches that need to be fully integrated in a satisfying synthesis. Instead the paradox perspective values unresolvable contradictions and points toward maintaining and properly managing the tension between intuition and rationality – that is, adopting paradoxical thinking (Lewis, 2000) – as a driver for effective strategic decision making.

Managing paradoxical tensions

Even though paradoxes cannot be fully resolved, prior research suggests that paradoxical tensions can be managed by strategies of acceptance and resolution (e.g., Andriopoulos & Lewis, 2009;

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Lewis, 2000; Lüscher & Lewis, 2008; Michaud, 2014; Smith & Lewis, 2011). In strategies of acceptance, actors embrace the paradox as a persistent and unsolvable puzzle and learn to work through it (Clegg, da Cuhna, & e Cuhna, 2002; Lewis, 2000; Lüscher & Lewis, 2008). Acceptance implies that rather than trying to solve the paradox, decision makers embrace it as an opportunity for better outcomes and reframe the tension from an either/or option to a both/and possibility (Smith & Lewis, 2011). Thus, when actors accept that while tension between intuition and rationality can and should coexist, they can consciously explore the dynamic relationship between these two opposing mechanisms. Acceptance thus "describes approaching paradoxical tensions by engaging but not resolving the tensions" (Smith, 2014, p. 39).

Strategies of resolution seek to resolve the underlying tensions not by eliminating them but by finding ways to meet the competing demands – that is, by engaging in paradoxical thinking (Lewis, 2000). Differentiating (or splitting) and synergistic integrating are the resolution strategies that have received most attention in the literature (Andriopoulos & Lewis, 2009; Smith, 2014; Smith & Lewis, 2011; Smith & Tushman, 2005). Differentiating focuses on recognizing and appreciating the distinctive benefits of the two poles and on leveraging both separately, for instance over time (Jay, 2013). Conversely, integrating involves finding synergies and linkages that accommodate both poles (Smith, 2014). The more recent dynamic perspective on paradox management postulates (Smith & Lewis, 2011) and provides empirical evidence (Andriopoulos & Lewis, 2009; Jay, 2013; Smith, 2014) that the differentiating and integrating strategies can be used together, in purposeful and cyclical alternation over time.

In this article, we propose resolution strategies based on paradoxical thinking as a means to enable the combination of intuition and rationality in strategic decision making. More specific, we examine how managing the tensions that arise from collaboration between individuals more reliant on either intuition or rationality by adopting paradoxical thinking can benefit strategic decision making.

Method

Research context

We adopted a multiple case study design for investigating individuals' intuition–rationality tension and its management through paradoxical thinking (Eisenhardt, 1989; Yin, 2003). Qualitative research is particularly well suited for studying dynamic, interactive processes (Lee, 1999), and the use of multiple cases increases the validity and generalizability of the findings by grounding the analysis in diverse empirical evidence (Eisenhardt, 1989; Yin, 2003).

We selected cases of innovation projects involving an innovating company and design professionals from design consultancies hired to assist in the innovation process. Previous empirical studies have demonstrated the suitability of such projects for studying innovation challenges (Hargadon & Sutton, 1997; Robertson & Swan; 2003; Stigliani & Ravasi, 2012) and their management with a paradoxical approach (Andriopoulos & Lewis, 2009). Given their educational background and tool kit, design professionals tend to be predisposed toward intuitive decision making (Michlewski, 2008). At the same time, they may also use rational methods, as their consultancy activity demands structured procedures and methodologies for reducing the transactional ambiguity of their practices (Sturdy, 2011). Thus, in line with the cognitive perspective on decision making, design professionals might have an innate intuitive cognitive style, but at the same time be able to develop and use a rational cognitive ability (Hodgkinson et al., 2009).

The first and the second author together corroborated this theoretical assumption with 10 preliminary interviews with expert design professionals during which their profession and ways of

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

working were discussed. We observed that, although design professionals might have a cognitive preference for intuition as a decision-making mechanism (Hodgkinson et al., 2009), the need to adapt their ways of working to predominantly rational clients gives them a "paradoxical cognition" (Smith & Tushman, 2005) that helps them integrate the two mechanisms. Thus, examining innovation projects where design professionals and their clients collaborate may offer an excellent opportunity to observe (1) tensions between intuitive and rational approaches to individual decision making in innovation and (2) how expert paradoxical thinkers (i.e., the design professionals) can help less expert actors (i.e., the clients) in managing such tensions. Thus, in our projects, we study rationality and intuition at the individual level, but at the same time take into account how collaboration across individuals with different preferences for rationality or intuition can affect their individual ability of combining both approaches in innovation decision making.

We theoretically sampled innovation projects to fit our research objective of studying the intuition–rationality tension in strategic decision making (Eisenhardt, 1989). We selected innovation projects focused either on opportunity identification and idea generation (e.g., definition of an innovation direction for the client) or on translating these opportunities and ideas into new products or services (e.g., development and management of a portfolio of new products/services for the client), or on both. In all selected projects, the design consultancy firms were not hired to purely execute creative work, but were retained to contribute to strategic decision making that eventually led to creative work. All projects involved innovations that were relatively radical for the company hiring the design consultancy and were characterized by uncertainty, complexity, lack of information, and time pressure, indicating that combining intuition and rational decision making might be more effective than following a strictly rational/analytical approach (Akinci & Sadler-Smith, 2012; Hodgkinson et al., 2009).

Table 1 provides an overview of the design consultancies, the selected innovation projects, and the hiring clients. By varying the cases in terms of design specialization, company size, and industry context, we tried to ensure a good balance between similarity (for comparison and replications) and variety (for validity and generalizability) in paradoxical thinking across the projects (Yin, 2003).

Data collection

For each case we collected data from three sources: (1) interviews with design professionals involved in the selected cases; (2) interviews with key company informants that interacted with the design professionals; and (3) secondary sources such as project documentation (briefs, reports, presentations, supporting visual material), websites, and informal observations. The first author conducted most of the interviews, with the second author interviewing at least one design professional per project to gain a deeper understanding of the context. The interviews were semi-structured and open-ended. The interview guide comprised four sections: (1) the informant's background and his/her role in the project; (2) the project's content, including objectives; (3) the steps, practices, and tools used for supporting innovation decision making during the project; and (4) an overall assessment of the innovation decision making, including its quality, outcome, and pitfalls.

Each case started with interviewing the project leader(s) from the design consultancy firm and the client. Beginning this way allowed us to gain an overview of each project's main phases, activities, and people involved (to identify key respondents). Subsequently we alternated informants from the two organizations to triangulate information, clarify inconsistencies, and fill gaps. This approach is also particularly effective for reducing the informants' retrospective sense-making bias (Eisenhardt & Graebner, 2007). We taped and transcribed the interviews, which lasted from 60 to 90 minutes each. During and after each interview, the interviewer made field notes that included impressions to be taken into account in the follow-up interviews (Eisenhardt, 1989). To avoid

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Table 1. Case selection and data collected.

Project	Content	Design consultancy (DC)	Client (CL)	Data sources
DigitalServices	Innovation strategy – Innovation direction – Portfolio of new digital services	Multidisciplinary design consultancy; Medium-sized (50–250 employees)	Sector: Digital services for public transportation Small-sized (10–50 employees)	9 interviews – DC: project manager (1), brand strategist (2), account manager (1), creative director (1), interaction designer (1), service designer (1); CL: operation manager (1), marketing director (1) Archival material: presentations, milestone reports, minutes, brand book, marketing material
CulturalInnovation	Innovation direction – New products/services portfolio management	Multidisciplinary design consultancy; Medium-sized (50–250 employees)	Sector: Cultural institution Medium-sized (50–250 employees)	7 interviews – DC: project manager (1), brand strategist (2), account manager (1); CL: marketing director (1), brand manager (1), service manager (1) Archival material: presentations, milestone reports, brand book, marketing material
BikeAccessories	Portfolio of new products – Portfolio management	Industrial design consultancy; Small-sized (10–50 employees)	Sector: Bicycle accessories Medium-sized (50–250 employees)	7 interviews – DC: project manager (1), senior designer (1), product designer (1); CL: NPD manager (1), R&D manager (1), product designer (2) Archival material: presentations, milestone reports, marketing material
HealthServices	Portfolio of new services	Specialization: Service design Micro-sized (< 10 employees)	Sector: Healthcare product-service systems Medium-sized (50–250 employees)	8 interviews – DC: strategic designer (3); CL: project manager (2), product manager (2), marketing manager (1) Archival material: presentations, marketing material
Sustainable Product	Portfolio of new products	Industrial design consultancy; Small-sized (10–50 employees)	Sector: Social entrepreneurship Micro-sized (< 10 employees)	5 interviews – DC: strategic designers (3); CL: general manager (2) Archival material: presentations, marketing material
InnovationVision	Innovation direction for a SBU	Strategic design consultancy Small-sized (10–50 employees)	Sector: Technology company Large-sized (>250 employees)	7 interviews – DC: project manager (3), strategic designer (1); CL: project manager (1), innovation manager (2) Archival material: presentations, milestone reports, marketing material
Information Services	Innovation direction – Portfolio of new services	Strategic design consultancy Small-sized (10–50 employees)	Sector: Public transportation Large-sized (>250 employees)	5 interviews – DC: project manager (2), senior designer (1); CL: marketing manager (1); operation manager (1) Archival material: presentations, milestone reports, minutes, marketing material

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

informant-biased and unintended social behaviors (e.g., informants altering the truth and withholding important information), we followed the guidelines of Miles and Huberman (1994) by informing the interviewees of our study objectives and data collection process, and by ensuring the confidentiality of conversations and results.

Since our data collection relied heavily on retrospective interviews, we followed the suggestions of prior researchers (Eisenhardt & Graebner, 2007; Miles & Huberman, 1994; Miller, Cardinal, & Glick, 1997) and took precautionary and corrective actions. First, we selected projects that are on-going or that concluded less than one year before the data collection. Second, we encouraged free reporting, allowing informants to not answer a question if they did not remember clearly. Third, since information processing mechanisms occur at a subconscious level and informants might be unable to discern unequivocally whether they are using intuition or rationality in their decision making, we never asked our informants directly which information processing mechanism they were using. Instead, we recurred to indirect questions, triggers, and probes, or inferred it from how they described their decision-making process. Fourth, we triangulated interview data by posing the same questions to multiple participants. Fifth, we integrated the interview data with secondary data, both during and after the interview. For instance, during the interviews we used project presentations and other deliverables, such as stylebooks and reports, to help informants recall the innovation process and to analyze the usefulness of the deliverables in supporting the innovation process.

Data analysis

Our data analysis followed a qualitative, iterative and inductive content analysis approach (Corbin & Strauss, 1990; Corley & Gioia, 2004; Gioia, Corley, & Hamilton, 2013; Miles & Huberman, 1994; Pratt, Rockmann, & Kaufmann, 2006). We interpreted our textual data through a systematic process of coding and identifying themes and patterns. Subsequently we developed a list of constructs and an integrative theoretical framework through several iterations between the two coders and between the data and prior literature.

Step 1. Identifying competing decision-making mechanisms within each case. We started by immersing ourselves in the empirical data, reading the transcribed interviews carefully, and combining them with field notes and secondary data into thick case descriptions (Miles & Huberman, 1994). This first reading of the data was also aimed at producing evidence of the use of both intuitive and rational decision making in the sampled innovation projects (Pache & Santos, 2013). We relied on existing definitions to detect the use of intuitive and rational decision making by our informants.

On the basis of existing literature, we regarded respondents' decision making as intuitive when it showed one or more of the following characteristics:

- The act of making a decision is prevalently *non-conscious* (Dane & Pratt, 2007).
- The act of making a decision happens *rapidly*, especially when compared with rational thinking (Dane & Pratt, 2007; Gore & Sadler-Smith, 2011).
- The act of making a decision involves the use of *action scripts*: the recognition of cues triggers action scripts held in long-term memory, which then leads to action, namely the implementation of intuition (Gore & Sadler-Smith, 2011).
- The act of making a decision uses *mental simulation*, in that the decision maker mentally simulates the deployment of a given script before acting (Gore & Sadler-Smith, 2011; Kahneman et al., 1982).

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

- The act of making a decision relies on *holistic associations* (also called pattern recognition and matching): stimuli are matched with some deeply held (non-conscious) categorizations and patterns based on perception of coherence (Dane & Pratt, 2007; Gore & Sadler-Smith, 2011).
- The act of making a decision relies on *feelings and emotions* rather than logic; the process of intuiting is generally accompanied by affect or emotions, like excitement or harmony (Dane & Pratt, 2007).

Conversely, we regarded respondents' decision making as rational when it showed one or more of the following characteristics:

- The act of making a decision involves collecting (as much as possible) *relevant information* (Dean & Sharfman, 1996).
- The act of making a decision relies on *formal and systematic analysis* of the available information (Dean & Sharfman, 1996; Langley, 1989).
- The act of making a decision aims at *comprehensiveness* in the collected information and formal analysis (Fredrickson, 1984; Papadakis, Lioukas, & Chambers, 1998).
- The act of making a decision follows a *step-by-step process* (Dean & Sharfman, 1996).
- The act of making a decision relies upon *logic*: choices are based on rules and cause–effect relationships (Evans, 2003; Hodgkinson et al., 2009).
- The act of making a decision involves *cognitive capacity intentionality*: the decision maker intentionally commits time and cognitive capacity to making the choice (Dean & Sharfman, 1996).

Step 2. Identifying paradoxical tensions within each case. We started coding the interview transcripts systematically to identify specific paradoxical tensions between intuitive and rational decision making in each case. To regard statements as paradoxical tensions, we used the following criteria (Smith, 2014): (1) the tensions should be related to the innovation projects under study; (2) the tensions should arise from the contradiction between the characteristics of intuitive and rational decision making indicated in Step 1; (3) the tensions should arise from the interaction between the design professionals and the client organizations (thus we excluded intuition–rationality tensions experienced by the informants in their own independent work activities); (4) the tensions should be salient to the informants, thus generating feelings of uncertainty ("we feel we are on shaky ground," "I had my doubts"), rejection ("I thought, 'That's not right, I didn't see any method'"), and inaction ("we don't really have an answer for that"; "they see the problem, but they don't have the courage to take such strategic decisions"); (5) the tensions should be understood as paradoxical, as indicated in subsequent sentences by key words such as yet, but, despite, both/and, combine (Andriopoulos & Lewis, 2009; Smith, 2014).

Step 3. Identifying categories of tension management practices within each case. We conducted another round of coding to identify practices of tension management in each case. We understand practices as recurrent and situated patterns of behaviors in which informants use their professional expertise (e.g., tools, methods, way of working) to address the intuition–rationality tension (Orlikowski, 2002; Stigliani & Ravasi, 2012). We again used the characteristics of intuitive and rational decision making to ensure that the selected statements referred to practices of management of the intuition–rationality tension rather than to more general innovation or project management practices. Furthermore, the first author used emerging similarities between statements to derive categories that could be useful in describing practices for managing the intuition–rationality tensions.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Subsequently, she developed first-order codes for the emerging categories on the basis of their content and the language used by the informants (e.g. "gut feelings," "translating") (Corbin & Strauss, 1990; Gioia et al., 2013). To achieve reliability in the coding process, the second author used the coding instructions provided by the first author to examine all interviews and compare codings. The two authors agreed on most of the statements, and disagreements were addressed through discussion and occasional recoding of the data. In a subsequent round of coding, we iteratively grouped first-order categories into second-order themes representing specific practices for managing the intuition–rationality tension.

We then began cross-case analysis, looking for the extent to which first-order categories and second-order themes recurred in the cases. To preserve the integrity of replication logics across cases, we started the cross-case analysis after most data had been collected (Eisenhardt, 1989; Yin, 2003). We used tables and other cell designs to compare several possible data structures at once (Miles & Huberman, 1994). The cross-case analysis refined the codes elaborated in previous steps by adding new entries or by collapsing existing entries into others. Following past research adopting a similar analytical approach (e.g., Corley & Gioia, 2004; Stigliani & Ravasi, 2012), we visualized our resulting data structure. This visualization (Figure 1) acts as a reference in the presentation of our data.

To corroborate the persistence of both mechanisms in the management of the tension as postulated by paradox literature, we used the definitions provided in Step 1 to classify each second-order theme as primarily related to rational or intuitive decision making (Lewis, 2000; Smith & Lewis, 2011).

Step 4. Building a theoretical framework. From the emerging data structure, we established tentative relationships across second-order themes (i.e., practices for tension management). We then refined these initial relationships through discussion, replication logic, and comparison with prior literature (Locke, 2001). The iteration between data, literature, and analysis was repeated until we agreed on an overarching model that fits our evidence. To increase reliability of our interpretation, at various stages of the analysis we routinely sought feedback from external informants regarding provisional emerging frameworks. These individuals included selected case informants, external design professionals, and expert researchers in the field of innovation, design management and decision making. This process resulted in a three-step model for using paradoxical thinking to manage the tension between intuition and rationality, which we present and discuss next.

Findings

Intuition–rationality tensions

Before discussing our three-step model and related practices, we provide examples and quotes illustrating the tensions generated by the use of intuition and rationality in innovation strategic decision making.

Tensions can originate from the different ways in which decision outcomes are reached through a rational or intuitive approach. As we indicated earlier, in rational decision making the decision outcome is derived from a logical sequence of cause–effect relationships, while in intuitive decision making the decision outcome is based on pattern recognition and holistic associations. Rational decision makers tend to be uncomfortable when the cause–effect logic is unclear, and reject the outcome. For example, in the DigitalServices project, the design professional organized a creative workshop with some employees of the client company for inspiration about the contents and features to include in the new company website. A manager from the client company recalled that "everybody was able to write down their thoughts [on the new website] on Post-it® notes and put

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

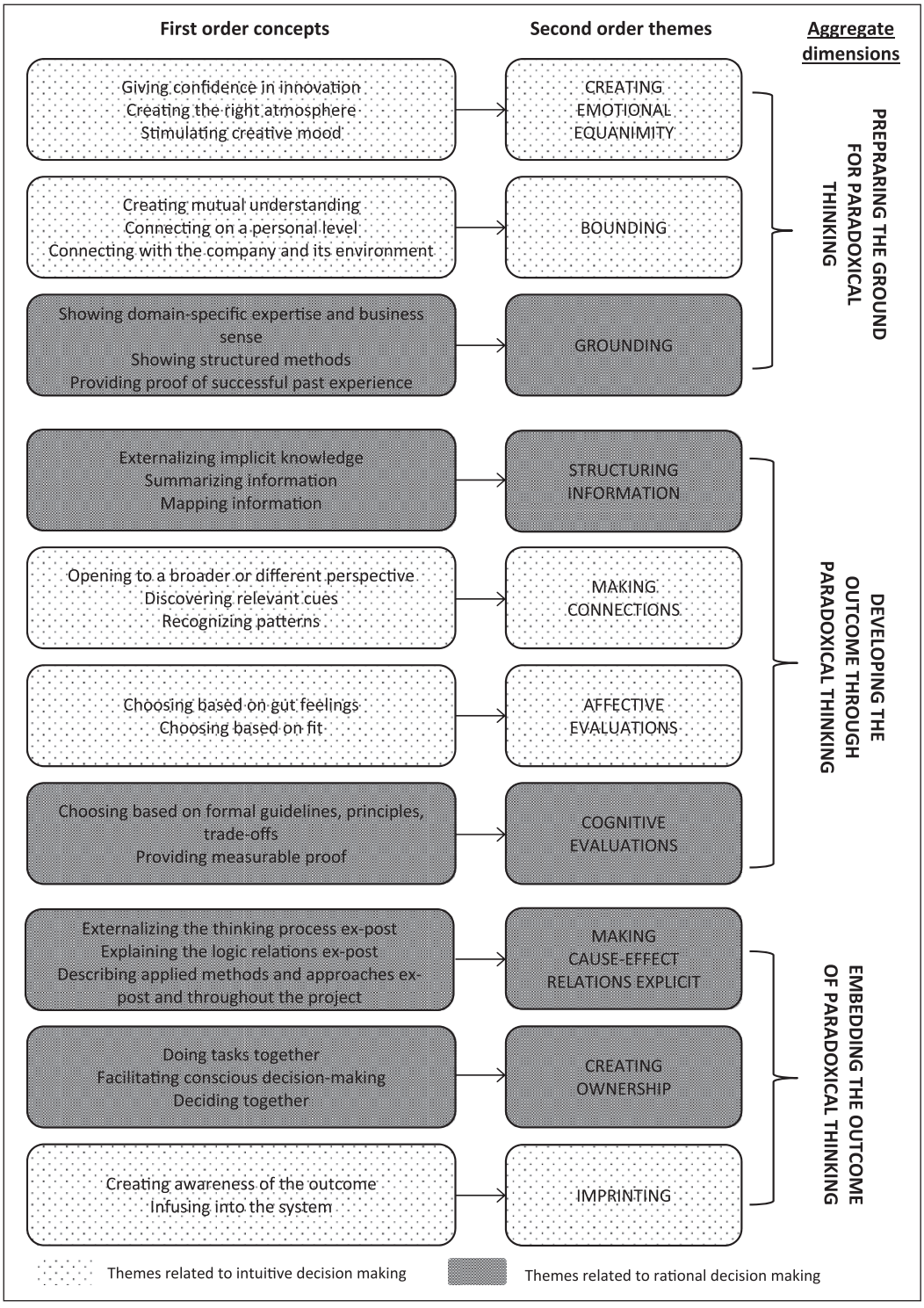

Figure 1. Data structure.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

[them] on the wall." However, this manager expressed concern regarding the value of the activity and the logical connection between this activity and the website as actually developed by the designer:

> I couldn't see the link between this activity and what was actually done by the designer [in terms of the website delivered]. If you do those workshops, you have to make the link more specific and clearer and really use [the input given during the workshop].

While the designer was inspired by the outcome of the workshop and "obtained a good feeling" of what type of website would be fitting for this specific company, the outcome did not directly correspond with the input delivered. Because the cause–effect relationship was not clear, this manager questioned the value of the workshop and the ultimate outcome.

A related tension occurs between the formality of rational decision making and the sub-consciousness of intuitive decision making. The project manager of the DigitalServices project, for example, was frustrated by the lack of "a formal method and a formal way of documenting and combining [information]" in the workshops as organized by the design professionals – even though the ultimate outcome of these workshops (i.e., the new website) was a huge success, as this manager acknowledged. In the HealthServices project, the product manager admitted his discomfort with the sub-consciousness of the design professional's decision making early in the process:

> [The design professional] first kind of confused me, because I could not understand where he was going and it took some time to understand the way his mind works and the way designing a service works from his point of view. It took me several weeks … I didn't really get the way it works. I didn't understand how that would bring us more than the traditional approach.

Design professionals also experienced the contradictory elements of intuitive and rational decision making as a source of tension. Design professionals often rely on gut feelings to make their choices and find formal analysis challenging. For example, as the senior designer involved in the BikeAccessories project indicated, he and his colleagues feel comfortable explaining their innovation advice on the basis of intuitive fit with user needs, "but if we try to include for instance financial criteria, like profits for instance … yeah we have our feelings and opinions but then we feel to be on shaky ground." In the InnovationServices project, the design professional admitted that it was difficult to ground his proposed solution in rational figures, as the client had requested: "We can, for instance, say: 'If you operate more trains you will be more profitable,' but it depends on so many things … I just don't know. But what I do know [is] that it makes sense to put the rail passenger first." The craving for formality, "proof," and specified cause–effect relationships by clients was also apparent in the InnovationVision case, in which the client's project manager criticized the design professionals' presentation of only a future-oriented value proposition as their end result, rather than complementing it with a quantification of the business opportunity and a roadmap of the investments necessary to implement such a value proposition.

Despite the seemingly irreconcilable nature of the described tensions and the accompanying feelings of discomfort, our cases show that precisely by accepting the paradoxical nature of the intuition–rationality tension, the decision makers can benefit from it. Specifically, the intuition–rationality tension can be managed through a three-step process that uses paradoxical thinking to leverage both types of decision making, makes the paradoxical tension sustainable, and turns the situation into an opportunity for more innovative solutions. In the following paragraphs we introduce the three steps of the process and describe in detail the management practices within each step (as they emerged from the data structure in Figure 1). We then illustrate how the three steps and

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

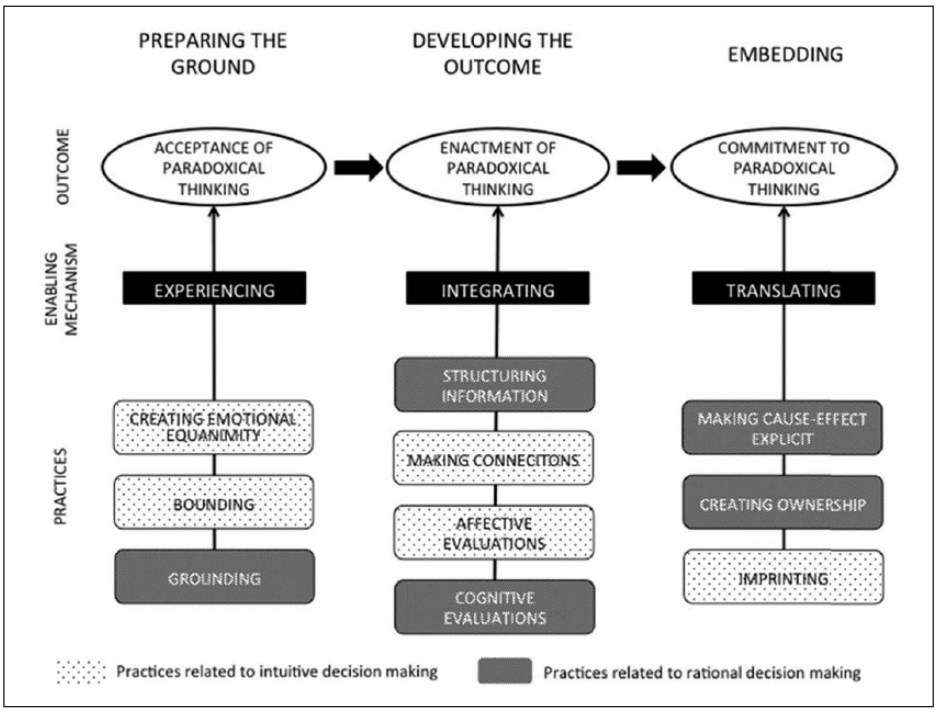

Figure 2. A three-step process for managing the intuition–rationality tension.

related practices occur differently in the cases and integrate these findings with the literature to derive an overall process framework for managing the intuition–rationality tension (Figure 2).

Practices for managing the intuition–rationality tension

Our case study analysis suggests that the management of the intuition–rationality tension through paradoxical thinking occurs in three steps: (1) *preparing* the ground for paradoxical thinking; (2) *developing* outcomes through paradoxical thinking; and (3) *embedding* paradoxical thinking and its outcome. We used a comparative analysis of all the seven sampled projects to identify a set of practices for leveraging paradoxical thinking in each step. The model puts different emphases on the two poles of the tension in each step: the practices in the first step (preparing) mainly aim at creating acceptance of intuitive decision making as a source of tension for rational decision makers; the practices in the second step (developing) focus on combining intuitive and rational decision making in a paradoxical fashion; and the practices in the third step (embedding) mainly emphasize the importance of rational decision making for maintaining acceptance of the paradoxical tension in the long term. In our narrative, we use "power quotes" from all seven cases to illustrate the practices (Pratt et al., 2006).

Preparing the ground for paradoxical thinking. By *preparing the ground*, we refer to practices that help actors who are *experiencing* the tension between intuition and rationality to accept a paradoxical resolution of the tension (i.e., paradoxical thinking). Given managers' intrinsic preference for rational decision making, practices in this phase aim predominantly at encouraging intuitive thinking and creating acceptance for the tension deriving from its difference from rational decision

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

making (*creating emotional equanimity* and *bonding*). At the same time, design professionals attempt to cultivate openness to paradoxical thinking by making the rational side of the tension explicit (*grounding*). Table 2a provides a short summary of how and when these practices are used in the projects in our sample. We explain the practices in more detail below, providing illustrative quotes and examples from the projects.

Our data show that in the initial stages of the sampled projects, design professionals employ a set of practices for *creating emotional equanimity* regarding the paradoxical tension. These practices aim at making clients experience intuitive decision making, minimize their potential resistance to its contrast to rational decision making, and thus make them open to paradoxical thinking. The HealthServices project is representative of these practices, since the design professionals planned several activities for clients to experience intuitive approaches to innovation before engaging in the core project task of developing new services. For instance, owing to the innovation team's difficulty in disconnecting from work routines and the rationality-driven office environment, the design professionals took the team to a separate, inspiring location. They triggered team members' imagistic simulation (a key element of intuitive decision making in our characterization) by asking them to imagine what they would expect to see if they were alone on a desert beach. As the project leader of the client company explains, these activities allowed each team member to experience key aspects of intuitive decision making:

> But because our group was in that mind-set it was easy to find creative concepts … He brought us into a creative mind-set. And also because of the ways that [the design professional] was teaching us, he opened other parts in our mind. I have more ideas and fantasies that I thought.[1]

Similar practices occurred in the BikeAccessories project, where design professionals asked everyone in the innovation team to "bring something personal from their home … something that for them describes [their company] as a brand" in order to experience the intuitive process of making brand-related mental associations. The design professionals also created cards with images and text that the innovation team had to sort according to preference. According to the project manager of the design consultancy, these activities "really helped [each team member] to tell how they feel the brand should be like" and to understand the importance of using that brand feeling later in the project, in conjunction with more rational evaluations.

Bonding emerged as an additional category of practices for lowering defensiveness toward the intuition–rationality tension. Our data suggest that the design professionals have great ability to empathize and create mutual understanding with clients. This capacity fosters clients' willingness to experience intuitive approaches and be open to use both intuition and rationality in innovation decision making (i.e., engage in paradoxical thinking to manage the intuition–rationality tension). Empathy helps designers to connect with clients' values, objectives, and environment. As one of our informants pointed out:

> I sense that [my client] may want something. For instance, [for] one of the key players we interviewed, I sensed that he really wanted to transform stations in the Netherlands from mono-functional designs, clean, safe transport machines into fun things. (Designer/Design Consultancy – InformationServices)

The design professional just quoted built empathy by asking different kinds of "interventive" questions (Lüscher & Lewis, 2008), such as encouraging in-depth explanations of the reasons behind the project, exploring the client's different but latent perspectives on the project, and asking for implications. His "sense" proved to be correct and was important for giving the client confidence in steering the project toward a less conservative direction established by combining

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Table 2a. Cross-case overview of the practices for preparing the ground for paradoxical thinking.

Project Practices	Creating emotional equanimity		Bonding		Grounding	
	Enactment of the practice	Project phase	Enactment of the practice	Project phase	Enactment of the practice	Project phase
DigitalServices	Imagistic simulation with client (presentations) to experience user perspective	Early stages execution	Interventive questioning to experience and empathize with client's needs	Initiation/ Planning	Using research-based methods Showing successful past projects	Initiation/Planning When needed throughout the project
CulturalInnovation	–	–	Interventive questioning to experience and empathize with client's needs	Initiation/ Planning	Showing successful past projects Showing business sense	Initiation/Planning
BikeAccesories	Imagistic simulation with client (workshops) to experience working with brand values	Early stages execution	Interventive questioning and visualization tools to experience and empathize with the client's target segments	Initiation/ Planning	Showing a structured approach Proving domain-specific knowledge	Initiation/Planning
HealthServices	Imagistic simulation with client (creative sessions) to experience creative processes	Early stages execution	Becoming part of the client's team by empathizing with client's values	Initiation/ planning	Showing a structured approach Showing business sense	Project planning/ Early stages of project execution
SustainableProduct	–	–	–	–	Proving domain-specific knowledge	Planning
InnovationVision	–	–	Informal conversations	Early stages execution	Showing successful past projects Using well established methods Proving domain-specific knowledge	Planning
InformationServices	–	–	Interventive questioning to experience and empathize with client's needs	Early stages of execution	Showing successful past projects Using well established methods	Planning

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

intuition and rationality. A similar result was achieved in the BikeAccessories project, where design professionals used their visual tools to achieve reciprocal understanding and to help clients embrace more intuitive approaches to innovation decision making. Thus, before starting the core of the assignment (developing new bicycle accessories), the design professionals built personas – fictional representations of current or potential customers/user types (Pruitt & Adlin, 2010) – to describe and visualize individual behaviors, values, and needs, and develop, together with the client, a common, deep understanding of the target segments. In this case, personas forced design professionals and clients to use imagistic simulation to create a common understanding of different cyclists' core needs and wants. This step was important for convincing the client to depart from a rational approach of developing new bicycle accessories based on previous sales, and rely instead on target segments' "authentic" needs as more intuitive drivers for innovation decision making.

Design professionals' practice of *grounding* controls for rational decision makers' resistance to intuitive decision making and prevents rejection of the tension and its paradoxical resolution. Showing the rational grounding of the design approach while experiencing its intuitive side is essential, since awareness of both sides of the tension is needed to enable paradoxical thinking and subsequently to combine intuitive and rational decision making.

Design professionals show the grounding of their approach in various ways. Some design professionals explicitly document and discuss the effectiveness of their tools and methods in prior innovation projects successfully executed through their integrated use of intuition and rationality. In the DigitalServices project, during the initial creative workshops undertaken by the design professionals to create emotional equanimity regarding intuitive decision making, clients developed resistance and defensiveness stemming from their persistent skepticism toward more intuitive approaches to innovation. As the design professional recalls,

> So many times when I get a feel that they are concerned or they are getting a bit defensive, I refresh to them these basic starting points [i.e. the effective use of our approach in previous projects], to make sure that they don't think that I'm just making up something that is very nice, but not trustable. (Brand strategist/Design Consultancy – DigitalServices)

Similarly, in the early stages design professionals establish the grounding of their ways of working and tools by explaining them to clients in detail. These tools can be relatively well-known design methods such as Scrum or the Business Model Canvas, or "signature" methods developed by the design agency itself. For instance, in the BikeAccessories and Healthcare projects, design professionals illustrated in great detail all the steps of their approach, the outcome of each step, and the reason each step was needed. In the Healthcare project, this explanation was done by the same design professional who enacted the practices for creating emotional equanimity, in a coordinated effort to create acceptance for the paradoxical tension:

> [The designer] is a very structured person. He has this idea that you have to do it step by step … The way [the designer] was doing it … I can show it to you … where in very short points you can see the complete process: what you have to do. It makes it clear in our mind what we have to do, what we have to develop. His way of working is so creative, but structured. That's a good combination. Because you need structure to understand what the process will be and how long it will take. (Project leader/Client – HealthServices)

In some cases design professionals focused on proving domain-specific knowledge in their client's industry or market. These practices serve to ground the more intuitive design approach by appealing to another aspect of rational decision making – the tendency to collect as much knowledge as possible relevant to the problem at hand. In the BikeAccessories project this collection was achieved by including in the team a design professional who was a cycling expert and a cyclist

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

himself. In the SustainableProduct project, the design professional showcased his consultancy's and his own expertise in product sustainability, recycling, and recycled material when making his pitch to the client. In the InnovationVision project, the design consultancy was hired because one design professional held a professorship in the core domain of the project.

Finally, in some other cases design professionals lowered clients' defensiveness toward the intuition–rationality tension by explicitly appealing to a client's business interests (i.e., making a rational argument). In the CulturalInnovation project, for example, the client's marketing manager recognized the design professional's ability "to connect to the business very fast," "to really understand how the organization makes money, or can make more money, or better money" and to "connect [her] thoughts to that [business model]." The design professionals successfully applied a similar approach in the HealthServices case, as one informant pointed out:

> I have tried very much – and you can read that too in the first quotation I made – to adopt a business orientation … Can we make [everything] measurable and give much attention to the business case? … I tried very hard, from the beginning, to ground [the project] in a financial way … they actually liked that, it made a good impression on them. (Designer/Design Consultancy – HealthServices)

Developing the outcome through paradoxical thinking. Besides revealing practices that prepare the ground for paradoxical thinking, our data disclosed a set of practices that help clients and design professionals reach the desired innovation outcome (e.g., new services, new goods, or new innovation directions) through paradoxical thinking. Design professionals' practices in this step aim at enacting paradoxical thinking by the core strategy of *integrating* elements of intuitive and rational decision making, which are used either concurrently (and in a synergetic fashion) or sequentially. Thus, design professionals' practices do not eliminate the intuition–rationality tension but rather find a means of considering divergent approaches simultaneously (*structuring information* and *making connections*) and integrating the competing demands of intuitive and rational decision making (*affective evaluations* and *cognitive evaluations*). Table 2b summarizes how these practices are enacted in the different projects in our sample.

The practice of *structuring information* emphasizes rationality and responds to the call for information comprehensiveness as a fundamental condition for rational decision making. Collecting and structuring relevant information helps designers to create a body of knowledge from which patterns, associations, and ultimately innovative solutions can more easily emerge (the intuition-related process of *making connections*). Thus, in line with the dynamics of paradoxical thinking, the practices of structuring information and making connections often become deeply intertwined. As the design professional in the HeathServices project indicates:

> It's like a structure emerging. It's not that I get all the information and then I try to make sense of it. It's something that emerges from going back and forth, talking with [the client] … There's not one moment when I make the synthesis. It's continuously trying to funnel it from lots of ideas into concrete decisions. I have a lot of those [decision making] cycles.

In the DigitalServices, SustainableProduct, and CulturalInnovation projects, structuring information started with design professionals externalizing the implicit knowledge held by clients' key actors. For these projects core brand and organizational values had to be identified and codified, and design professionals attempted to make this knowledge explicit and sharable:

> We had various workshops where [the design consultancy firm] facilitated us in thinking about what we thought was important for the organization. And basically to take our broad ideas and put them together in a structured and consistent form. (General manager/Client – SustainableProduct)

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Table 2b. Cross-case overview of the practices for developing the outcome through paradoxical thinking.

Project Practice	Structuring information		Making connections		Affective criteria		Cognitive criteria	
	Enactment of the practice	Project phase	Enactment of the practice	Project phase	Enactment of the practice	Project phase	Enactment of the practice	Project phase
DigitalServices	Externalizing and visualizing tacit knowledge Collecting and visualizing codified knowledge	Execution	Broadening the perspective on market	Execution	Likeability Fit with brand values	Late stages of execution/ Closure	Clients' commercial goals	Late stages of execution/ Closure
CulturalInnovation	Externalizing and visualizing tacit knowledge Collecting and visualizing codified knowledge	Execution	Changing the perspective on key competences	Execution	Likeability Fit with brand values	Late stages of execution/ Closure	Explicit execution guidelines	Late stages of execution/ Closure
BikeAccesories	Collecting and visualizing codified knowledge	Execution	Broadening the perspective on market	Execution	Fit with the target segments	Late stages of execution/ Closure	–	–
HealthServices	Externalizing and visualizing tacit knowledge	Execution	Broadening the perspective on the industry and market	Execution	Likeability Fit with the target segments	Late stages of execution/ Closure	Revenue/cost evaluations; Market potential	Late stages of execution/ Closure
SustainableProduct	Externalizing tacit knowledge	Execution	Broadening the perspective on innovation	Execution	Likeability	Late stages of execution/ Closure	–	–
InnovationVision	Collecting and visualizing codified knowledge	Execution	Broadening technological understanding	Execution	Fit with company vision	Late stages of execution/ Closure	Client's strategic goals	Late stages of execution/ Closure
InformationServices	Collecting and visualizing codified knowledge	Execution	Broadening the perspective on market Showing a future oriented perspective	Execution	Fit with company vision	Late stages of execution/ Closure	Explicit execution guidelines	Late stages of execution/ Closure

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

As our data suggest, design professionals use visualizations for supporting knowledge externalization and information structuring in general. Visualizations are an important link between the rational practice of structuring information and the intuitive practice of making connections. By structuring sometimes complex and extensive information in simple and engaging ways, visualizations facilitate information absorption and affective reactions[2] that trigger new intuitive connections. For example, in the HealthServices project, the design professionals drew an extensive stakeholder map to identify the most important actors who needed to be understood better. In the InnovationVision and InformationServices projects, design professionals used visual maps to summarize all environmental factors relevant for the projects and employed two-dimensional matrices to group these factors.

Design professionals' practices related to structuring information and making connections help to guide their clients toward perspectives, cues, and patterns that a rule-based decision-making process might neglect or ignore. For instance, in the CulturalInnovation project, design professionals collected information by interviewing the management of the client organization on the perceived core competence of the organization. The designers subsequently used a creative workshop and dialectical inquiry to discuss the collected information with the client and lead the client to a broader and more holistic perspective on its core competence. As a result, the client realized that its core competence was not "having a rich archive" (as initially believed) but the ability to develop services that would leverage the contents of this rich archive. In the DigitalService project, the design professional first collected and read a comprehensive set of company materials and interviewed many internal and external stakeholders to gather information relevant to understanding and codifying the client's brand values. According to the client's operations manager, the design professional then structured and summarized this information in a way that allowed people within the organization to start thinking about the company and its service in a totally different way:

> That was never asked before. And I think the way [the designer] organized it, out into perspective, try to connect things – if you don't know that you can do that – it helped people to think about that [in a different way].

Developing outcomes through paradoxical thinking also combines practices for cognitive and affective evaluation. *Cognitive evaluation* is evaluation of (interim) outcomes based on more rational and logical criteria. It requires using cognitive ability intentionally, as prescribed by our characterization of rational decision making. *Affective evaluation* is evaluation based on qualitative, intangible, feeling-related criteria, and is thus more aligned with intuitive decision making. During evaluations, rational decision makers can easily disregard paradoxical thinking and rely exclusively on rational criteria. However, relying only on logical, quantifiable criteria could be particularly risky in innovation decision making, where many alternative decision outcomes are only partially quantifiable. Design professionals leverage paradoxical thinking to integrate affective and cognitive evaluation practices (using both simultaneously) in key decision moments during innovation projects. The DigitalServices project is an example of using the integrating strategy when deciding what new service the client organization should offer through its website. The design professionals guided the client in concurrently evaluating the extent to which the new service would fulfill cognitive criteria, such as commercial goals, and more intuitive criteria, such as "likeability" of the service and whether the service "feels good" and "fits" with the company's (intangible) brand values, including, for example, "pro-activeness." Visual or material artifacts (e.g., sketches, prototypes, art books for visual identities) facilitate the imagistic simulation needed for triggering affective evaluations, as illustrated by the following quote:

> We used visuals to make [the outcome] alive, so that [managers of the client organization] could indicate whether they like it or not … [the website] should be proactive, so [we] used a picture of a girl who is

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

> behind her laptop on her couch and then the website says "Hey Alice, tomorrow your train will leave from Platform 5." (Project manager/Design Consultancy – DigitalServices).

Similarly, in the HealthServices project the design professionals used an integrating strategy by means of a method – the business model canvas – that combines both cognitive and affective criteria for evaluating the new services to be developed. As the client's project manager explained, "The business model canvas is a reasonably soft tool, [which] also contains some hard elements because it also includes how much [the new service] will cost and how much it will deliver."

Our cases also offer examples of evaluations using only affective criteria. For instance, the design professionals working for BikeAccessories led the client to rely on affective criteria when evaluating concepts for new bike accessories, in particular by focusing on whether the new concepts would "fit the lifestyle of current and future customers." Emphasizing the affective criteria helped the client to move away from the short term, rational logic of using prior sales data to select new concepts for further development, and resulted in more innovative outcomes. However, these outcomes did not always translate into better sales. For example, in the SustainableProduct project, the design professionals pushed for affective evaluation of proposed concepts (i.e., the extent to which the concepts were "well designed" and "aesthetically appealing") without considering cognitive criteria like manufacturability and availability of appropriate distribution channels. The ultimate outcome proved to be a commercial failure.

Embedding paradoxical thinking and its outcome. Our empirical data suggest that design professionals use specific practices for embedding the outcome of paradoxical thinking (and concurrently paradoxical thinking itself) in the client organizations. While the benefits of paradoxical thinking might be clear during its enactment (the previous step in our model), our data show that the acceptance of paradoxical thinking and its outcome can be precarious, since actors tend to return to previous, more rational decision-making approaches. The practices in this step aim at embedding paradoxical thinking (and its outcome) by fostering commitment to it not only as the solution for the current innovation project (*making cause–effect relationships explicit* and *creating ownership*), but as a long-term strategy for managing the intuition–rationality tension in innovation (*imprinting*). Since most client organizations are rational decision makers by nature, the common mechanism underlying the embedding practices is *translating* the intuitive aspects of paradoxical thinking and its outcome into more rational terms to make the outcome more acceptable and the complementarity between intuition and rationality more evident. Table 2c provides a summary of the embedding practices in the projects in our sample.

Making cause–effect relations explicit is one of the embedding practices emerging from our data. Innovation outcomes derived with paradoxical thinking involve the integration of intuition and rationality. Since rational decision makers generally make choices based on a clear understanding of cause–effect relationships and subsequent actions, the lack of understanding of the more intuitive choices during innovation projects might challenge actors' commitment to their outcome. Design professionals usually invest time and effort in reducing the chances of rejection by re-constructing backward the logical reasoning and the sequence of steps leading to the project's outcomes involving intuitive choices. For instance, as explained by the client's project manager, in the DigitalServices project the design professional that co-defined the client's brand positioning

> … wrote a half page document with an explanation for the employees … to help people to go through [her] thinking process, and to facilitate that they understand the connection why [she] picked certain customer insights, and [subsequently] a certain positioning.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Table 2c. Cross-case overview of the practices for embedding paradoxical thinking and its outcome.

Project Practices	Making cause–effect relations explicit		Creating ownership		Imprinting	
	Enactment of the practice	Project phase	Enactment of the practice	Project phase	Enactment of the practice	Project phase
DigitalServices	Re-constructing the intuitive thinking process *ex post* and making it explicit	Closure	Deciding together Creating a common language	Throughout the project	Training and coaching	Closure
CulturalInnovation	Re-constructing the intuitive thinking process *ex post* Explaining the approach step-by-step	Closure	Deciding together Creating a common language	Throughout the project	–	–
BikeAccesories	Making the thinking process explicit	Closure	Deciding together	Throughout the project	Training and coaching	Closure
HealthServices	Explaining the approach step-by-step	Throughout the project	Deciding together	Throughout the project	Training, facilitating and coaching	Throughout the project/ After project closure
SustainableProduct	–	–	–	–	–	–
InnovationVision	Re-constructing the intuitive thinking process *ex post* Explaining the method step-by-step	Late stages of execution/Throughout the project	–	–	Communicating and creating engagement with the project outcome Coaching	Closure/After project closure
InformationServices	Re-constructing the intuitive thinking process *ex post* Explaining the method step-by-step	Late stages of execution/Throughout the project	–	–	Communicating and creating engagement with the project outcome	Closure

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

However, as acknowledged by the design professional involved in this project, given the intrinsic sub-consciousness of an intuitive choice, its complete translation into a sequence of steps is not possible ("my thinking process is not one plus one is two"). Thus the intuition–rationality tension persists, but the translation effort creates understanding for paradoxical thinking, as well as commitment to its outcome.

The practice of making cause–effect relationships explicit is particularly important for the intuitive innovation task of translating verbal or written descriptions of new concepts into visual or material artifacts. In the BikeAccessories project, when the design professionals presented the sketches of new bicycle accessories, they explained explicitly how the previously defined visual and brand guidelines for specific target segments were applied. For instance, when discussing a new accessory for racing bikes, they would compare it with the style guidelines developed for this segment and indicate how the aesthetic characteristics of the new product (e.g., curved shapes, materials, colors) expressed the segment-specific style. Thus, translating the mental associations into more rational evaluation criteria facilitated commitment to an intuitive outcome.

Even though the practice of making cause–effect relationships explicit usually receives specific attention during the closure stages of a project (when clients need to approve and implement the innovation outcome), it can be enacted throughout the innovation projects. This helps to maintain and reinforce rational decision makers' engagement with paradoxical thinking throughout the project and subsequently facilitates the commitment to its outcome, especially when the innovation projects require high levels of intuitive decision making. As the account manager of the design consultancy involved in the InnovationVision project (in which an innovation direction was envisioned) explains:

> And in executing the process the client sometimes asks questions. How does this process relate to our process? Or what are you doing now? Why are you doing the things you are doing now? Thus, the reasons behind the process, it's my role to explain it. (Account manager/Design consultancy – InnovationVision)

Similarly, commitment to paradoxical thinking throughout the project results from the design professionals' practice of *creating ownership*, which implies actively involving rational decision makers in intuition-intense steps and decision moments during the innovation project. In many of the sampled projects, design professionals encourage their clients to consciously devote cognitive effort to a task – a characteristic of rational decision making – to ensure that they develop ownership of the task itself and of its outcome. A client's manager from the HealthServices project explained this process of creating ownership as follows:

> In the second part of the project, [the design professionals] said to us: "Well, we've seen this, this, this, and this" and took the time to discuss all these aspects in the group, with [the marketing manager], with me, with the others. And I think that way of working made that it was … we all understood what had happened so it wasn't so that they said: "Well okay, thank you for all your documents, now we're going into our office and come back in a half a year and this is our vision." So I have the feeling that we created it by ourselves, at least that we could have all the possibilities to put accents on it and discuss what we felt was important. (Marketing manager/Client – HealthServices)

The result is a more durable commitment to paradoxical thinking and its outcome, also after the project. In the DigitalServices and CulturalInnovation projects, design professionals emphasized the importance of language for creating ownership. In both cases, when developing the innovation vision for driving the development of new products and services, the design professionals and the client organization together re-wrote the vision several times to find the most appropriate words (according to the company vocabulary) to convey the intended values ("[The client] chose the

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

words carefully. They chose some words that they regarded as very important to them"). Words and language are an expression of rational cognition (Hodgkinson et al., 2009). Translating together intuitive ideas into a formal language cognitively engages rational decision makers with paradoxical thinking, thus creating understanding and commitment to the paradoxical outcome.

An important practice with a longer and broader effect on embedding the outcome of paradoxical thinking in an organization is *imprinting*. Imprinting stimulates commitment to paradoxical thinking by creating awareness across the client organization of the project outcome (achieved through paradoxical thinking) and integrating this outcome (and paradoxical thinking itself) into the behaviors, routines, and work practices of the client organization. In the InnovationVision and InformationServices projects, the imprinting efforts were mainly aimed at communicating the project outcome to a broader audience by using visual tools that make the outcome understandable and appealing to people not involved in the project. For the InnovationVision project, in agreement with the client organization the design professionals opted to hang on a high-traffic wall a four-meter poster displaying the project's objectives, context, and final outcome (i.e., an innovation direction and some related new product concepts). Since people from any department (including top management) would pass by, the poster became "a way to get the project out into the open and to have people discussing it and to see what the next steps are" (Project manager/Client – InnovationVision). In project InformationServices a similar effect was achieved by producing videos illustrating the project and its outcome in an engaging manner.

While in these examples the imprinting efforts are concentrated in the projects' closure phase, other cases offer examples of imprinting throughout the project. In the HealthServices project, the design professionals started the project with teaching some of the fundamentals of service design methods to the client team (e.g., making personas, engaging in storytelling, visualizing the service customer journey) and let them actively apply these methods when co-developing the new services throughout the project. This approach not only helped create ownership of the ultimate outcome but also ensured that in later innovation projects, developed without professional designers, clients would still be able and committed to integrate these intuition-based tools and techniques with more traditional, rationality-based tools. As the product manager from the client organization commented:

> I am trying to use all the tools that I received in every situation possible. I try to use them even in my personal life. Because I've seen that they work, I've seen the results. And they also keep me sharp for running [my own] co-creation sessions, for … being a facilitator in a meeting.

The client organization further facilitated "permanent imprinting" by asking the design professionals to pay monthly visits for one year after the project's closure to help them with the implementation of the new services and to further develop their skills in service design methods.

In the DigitalServices and BikeAccessories projects, imprinting was achieved by engaging the client organization in specific activities that helped to embrace the most intuitive aspects of the project outcome – that is, the brand values that should be embedded in all corporate behavior:

> I think now the brand is really in [the innovation team's] veins, while before they didn't care about it. Now they have this DNA. So it's easier for them to decide what to do, which price, which target group. (Senior designer/Design consultancy – BikeAccessories)

For instance, to translate the relatively abstract concept of friendliness into concrete actions the design professionals set up specific workshops and let employees experiment with the behavioral implications of being a friendly brand (e.g., "How would friendliness manifest itself when answering a customer complaint? What would a friendly press release look like?"). Furthermore, in the Bike Accessories and InnovationVision projects, at the invitation of the client, the design

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

professionals also provided workshops after completion of the project to make sure the client "is still going into the right direction."

A cross-case comparison of paradox management practices

In Table 3, we summarize how the various practices occur in the sampled cases. We also include an assessment of whether client organizations truly embrace and capitalize on the paradoxical approach to manage the intuition–rationality tension (i.e., the sustainability of paradoxical thinking) by examining the extent to which client organizations employ the practices introduced by the professional designers in subsequent projects. Furthermore, we indicate some relevant context factors that might have influenced the effectiveness of the various practices and of the overall model in the different cases.

The DigitalServices and HealthServices projects are the two cases that most embraced paradoxical thinking. After the collaboration with the design professionals, in subsequent projects both client organizations integrated intuition-driven design methodologies into their consolidated rationality-driven business-oriented methods, thus demonstrating long-term acceptance of paradoxical tension and commitment to paradoxical thinking. These cases differ from the others in three ways. First, all or most of the paradox management practices occurred, suggesting that all three steps in our framework are important and complementary for the sustainability of paradoxical thinking. Second, both projects paid significant attention to the embedding practices and in particular to the on-going imprinting of the project outcome. Specifically, in both projects the client made a dedicated and sustained effort not only to embed paradoxical thinking in the behaviors and work routines of the innovation project team, but also to extend this thinking to larger numbers of employees in the organization. Furthermore, the imprinting efforts continued long after the conclusion of the projects. Third, in both projects the design professionals supported the paradox management strategy of integrating intuition and rationality in the critical evaluation stage, when the innovation outcome is selected and approved for implementation.

Some context factors might also have affected the effectiveness of the practices. Particularly, both projects were characterized by clear support from the client's top management, which facilitated commitment to paradoxical thinking and its outcome throughout the entire organization. With regard to the DigitalServices project, the operations manager who hired the design professionals was part of the Executive Management Board and used her strong leadership skills to ensure (and sometimes enforce) commitment to and implementation of the project outcomes. In the HealthServices project, a top manager was not only the initiator of the project but also an active participant in key moments. Other circumstances that might have influenced the effectiveness of our model were the intense competitive threat of new entrants for DigitalServices and that of market saturation for HealthServices. High competitive pressure creates urgency for change, reduces risk adversity, and ultimately fosters openness to more daring (i.e., intuitive) approaches to innovation.

The key practices and context factors enabling the long-term paradoxical resolution in the DigitalServices and HealthServices projects were not present in the BikeAccessories project, where long-term commitment to paradoxical thinking was achieved within the innovation team but not at an organizational level. Specifically, the embedding phase focused primarily on the practice of "creating ownership" for achieving long-term results. Little effort was dedicated to imprinting activities, which were limited in time and aimed only at key actors directly involved in the project. Additionally, design professionals focused primarily on affective criteria (e.g., fit with user needs, future scenarios in the bicycle market) when deciding which new concepts to develop, thus opting for a split strategy (rather than an integrating strategy) for managing the intuition–rationality tension.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Table 3. Synthesis of practices and sustainability of paradoxical thinking across cases.

Practice Project	DigitalServices	Cultural Innovation	BikeAccesories	HealthServices	Sustainable Product	Innovation Vision	Information Services
Preparing the ground							
Creating emotional equanimity	√		√	√			
Bonding	√	√	√			√	√
Grounding	√	√	√	√	√	√	√
Developing the outcome							
Structuring information	√	√	√	√	√	√	√
Making connections	√	√	√	√	√	√	√
Affective evaluation	√	√	√	√	√	√	√
Cognitive evaluation	√	√		√		√	√
Embedding the outcome							
Making cause–effect relationships explicit	√	√	√	√		√	√
Creating ownership	√	√	√				
Imprinting	√		√	√		√	√
Sustainability of paradoxical thinking	Long term for the innovation team and the organization	Short term	Long term for the innovation team/ Short term for the organization	Long term for the innovation team and the organization	No paradoxical thinking	Long term for the innovation team	Short term
Relevant context factors	Top management support and commitment	No resources for imprinting/ Departure of project champion	Limited interaction with top management/ Manufacturing oriented culture	Top management support and commitment	Client's limited time commitment Design professionals' inexperience	Innovative organizational culture Long-term relationship	Organizational complexity with public and private stakeholders and political dynamics

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Disregarding rational arguments in a manufacturing company – used to the rational logic of selecting new products based on previous sales- increased the chances of rejection of the project outcome and of paradoxical thinking in general. Additionally, top management was not explicitly involved in the project, thus limiting the opportunities for persuading the entire organization of the benefits of paradoxical thinking.

The InnovationVision project also resulted in a long-term resolution of the paradoxical tension for the innovation team. Since the project is on-going and the innovation team is currently attempting to persuade the entire organization to adopt the innovation direction resulting from the project, drawing conclusions on the sustainability of paradoxical thinking at the organizational level is not possible. This client organization emerged as the most open to paradoxical thinking in our sample, probably due to its long tradition of successful innovation and to internal design professionals regularly joining the innovation team. This characteristic might explain why the long-term embedding of the innovation outcome and paradoxical thinking occurs despite the limited attention to preparing the ground practices in general and creating emotional equanimity in particular. In addition, a long-term relationship existed between the client's innovation team members and the external design professionals, which reduced the need to create acceptance of the paradoxical tension between the design professionals' intuition-intense method and the more rational corporate approaches.

A less thorough "preparing the ground" and no effort toward creating emotional equanimity also characterized the CultureInnovation and InformationServices projects. Additionally, these projects are similar in giving limited attention to the embedding of the project outcome and of paradoxical thinking. In the CultureInnovation project, no practice aimed at long-term imprinting seems to have occurred, while in the InformationServices project imprinting was limited to creating awareness of the project outcome but without any coaching or training. As a result, these two projects exhibit only short-term sustainability of the paradoxical resolution. Some context factors also might have had an effect. Particularly in the CultureInnovation project, scarce monetary resources prevented the design professionals from starting *ex post* imprinting activities, and the departure of the marketing manager (also project leader) reduced the client's commitment to the project outcome and to paradoxical thinking. In the InformationServices project, the difficulty of embedding the project outcome and paradoxical thinking might also be ascribed to organizational complexity (the client was a network of public institutions, private companies, and governmental agencies) and the related political dynamics steering the client's actions away from even rational logics.

In the SustainableProduct project, the limited use of paradox management practices coincided with the rejection of the project outcome and of paradoxical thinking in general. In this case, distinguishing a clear stage of "preparing the ground" was difficult, with no explicit effort in reducing resistance to paradoxical thinking. Despite this lack of preparing the ground, the design professionals relied heavily on intuition during the "developing the outcome" stage, with the evaluation stage of the project based almost entirely on gut feelings (affective evaluation). No active embedding of the outcome occurred. The sustainable new product from the project was commercialized for only a very brief period and was withdrawn from the market owing to poor sales. Some context factors might have contributed to the rejection of paradoxical thinking and might have prevented enactment of the practices. Time commitment by the client's project leader was limited, which prevented the design professionals from engaging in the preparing-the-ground activities of creating emotional equanimity and bonding with him and other members of the team. These time constraints also precluded embedding practices. Another cause of the difficulties in implementing paradoxical thinking might have been the design consultancy's limited experience with strategic innovation projects, where rational decision making generally prevails. Thus, the design professionals may have underestimated the importance of preparing the ground, balancing affective with

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

cognitive criteria in the evaluation moments and, in general, translating the project outcomes in more rational terms to make them more acceptable for the rational company owner.

A three-step process for managing the intuition–rationality paradoxical tension

Resolving a paradoxical tension through management (as opposed to evoking defensiveness and rejection) implies creative leveraging of both poles of the tension (Di Domenico, Tracey, & Haugh, 2009; Lewis, 2000). We have described a sequence of practices for managing the intuition–rationality tension by leveraging both poles in innovation projects. We now combine these insights with prior literature and derive a three-step process using paradoxical thinking for managing and sustaining the intuition–rationality tension over time. This process is dynamic (Smith & Lewis, 2011) in that it maintains and leverages both rationality and intuition and implies a temporal alternation of response strategies (i.e., the three steps) over time.

The first step is *preparing the ground*. It encompasses practices aimed at creating acceptance of paradoxical thinking by making the actors *experience* both poles of the paradox (i.e., intuition and rationality) and become comfortable with the tension triggered by their contradictory nature. In paradox literature, acceptance is regarded as the fundamental step for learning to live with a paradox and enabling a virtuous cycle of paradoxical resolution (Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011). Since acceptance needs to be developed primarily for intuitive decision making, *experiencing* – an implicit learning strategy – is more effective than more explicit mechanisms such as verbal communication and observation for creating the appropriate cognitive frames. Since intuition is based on non-conscious, experiential processing of information, experiencing refers to a similar, non-conscious process of cognitive frames' creation (Dane & Pratt, 2007).

By interacting with and reflecting on the sources of tensions, actors can experience the simultaneous existence of contradictory forces and accept that both are needed for successful outcomes (Smith & Tushman, 2005). The practices in this step aim at facilitating such interaction and reflection. Practices like creating emotional equanimity and bonding immerse predominantly rational decision makers in intuitive approaches to innovation (Cabantous & Gond, 2011), thus confronting them with the inherent tension. Interacting with the source of tension and bonding with actors more open to intuitive thinking can reduce actors' anxiety about intuitive decision making and establish a lasting state of emotional calm and confidence in paradoxical thinking (Sundaramurthy & Lewis, 2003). These practices should be combined with practices aimed at grounding, during which decision makers are encouraged to notice the coexistence of rational elements within intuitive approaches in order to deepen their acceptance of the intuition–rationality tension and of paradoxical thinking as a resolution strategy.

These practices for experiencing paradoxical tensions are important in the initial stage of our process, since paradoxical thinking is new for many actors and defensive mechanisms can lead to rejection (Lewis, 2000; Smith & Lewis, 2011). Thus, in terms of outcomes, the practices of *creating emotional equanimity, bonding*, and *grounding* create acceptance for paradoxical thinking as a mechanism for resolving the intuition–rationality tension, and prepare the ground for actually enacting paradoxical thinking in the subsequent step of our model.

The second step in our model, *developing the outcome* through paradoxical thinking, builds on the outcome of the previous step, since only when actors accept that tensions can and should exist can they pursue the integration of the tension's opposite poles (Smith & Tushman, 2005). The practices adopted in this second step facilitate the completion of the innovation tasks through paradoxical thinking, and particularly through the core mechanism of *integrating* – that is, by enabling the dynamic interplay between intuition and rationality to create synergies while maintaining and concurrently leveraging their differences. When information is collected and translated into alternative

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

innovative solutions (e.g., different new product/service concepts, different innovation directions), the practice of *structuring information* (typical of the rational decision-making process) is adapted to and intertwined with the intuitive practice of *making connections* in a synergistic interaction. Similarly, when the innovation team compares alternative solutions and makes a selection, integrating both affective and cognitive criteria is the most effective approach for managing the tension and achieving the desired innovation outcome. Thus, in terms of outcomes, integrating the practice of structuring information with making connections, and that of cognitive evaluation with affective evaluation, leads to an effective enactment of paradoxical thinking for addressing the intuition–rationality tension. Our cases show that departing from paradoxical thinking and basing evaluations on practices of only one kind – that is, splitting (Jay, 2013; Lewis, 2000) – proves to be less effective. These findings are in line with related research on integrative thinking (Martin, 2007) and strategic decision making with its recent emphasis on integrating intuition and rationality for optimal decision outcome (Elbanna, 2006; Elbanna & Child, 2007; Hitt & Tyler, 1991; Langley et al., 1995).

The third step of the process is *embedding* the outcome of paradoxical thinking and, at the same time, paradoxical thinking itself. Paradox resolutions can be precarious, since when confronted with paradoxical tensions over time, actors are likely to return to past practices and disregard paradoxical thinking and its outcomes (Lüscher & Lewis, 2008). Practices for embedding aim to avoid such regressive phenomena, and attempt to create a more lasting capability for the cognitive and behavioral complexity paradoxical thinking requires (Denison, Hooijberg, & Quinn, 1995; Jay, 2013).

The underlying mechanism through which embedding occurs is *translating*, where the outcome of paradoxical thinking and the process for getting to it are translated into a "language" the involved actors are familiar with and have confidence in. In prior literature, translation is conceptualized as an "active process of establishing relationships that induce multiple entities to coexist" (Nicolini, 2011, p. 605). Translation is necessary, since, according to the related literature on knowledge management, embedding new ideas, cognitive frames, and ways of thinking in organizations requires adaptation (i.e., translation) to the specific practices and socio-cultural context of the target organization (Bresnen, Goussevskaia, & Swan, 2004; Brown & Duguid, 2001).

In the context of this study, paradoxical thinking and its outcome are translated into the rational language of corporate decision makers by explaining the logic behind the main choices and the step-by-step process leading to those choices (*making cause–effect relationships explicit*), and into company-specific action scripts and mental models through *creating ownership* and *imprinting*. The outcome of these practices and of their underlying translation mechanism is a more persistent commitment to paradoxical thinking as an effective strategy for managing the intuition–rationality tension.

At the end of the process depicted by our model, the intuition–rationality tension is not eliminated but is embedded in the cognitive frames of decision makers as a trigger for new innovation projects. Creating ownership and in particular imprinting can have a more long-term effect on embedding paradoxical thinking, since these practices act on the behavior of relevant actors (e.g., by training and coaching both the project decision makers and employees not directly involved in the project in paradoxical thinking) and plant the seeds for the above-mentioned capacity for behavioral complexity. When actors actively experience and/or intentionally contribute to the paradoxical resolution of a tension, their commitment to paradoxical thinking increases (Smith & Lewis, 2011).

A final relevant characteristic of our process is the timing and sequence of the three steps. While we portray and discuss the three steps in a temporal order, overlap can occur. Indeed, our data suggest that some practices need to extend beyond the step to which they belong in order to realize their full potential. For instance, creating emotional equanimity should start when preparing the ground, but should continue (in different forms) throughout the process to reduce the risk of rejection of paradoxical thinking during later stages of the project (e.g., the design professionals in the HealthServices project employed practices aimed at activating emotions every time a new actor

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

joined the project). Similarly, while creating ownership aims at embedding paradoxical thinking (the last step in our process), most of the design professionals using this practice start the joint execution of tasks with their clients in earlier stages of the project.

The process is summarized in Figure 2.

Discussion and Conclusions

Building on the findings of our multiple case study on innovation projects, we developed a three-step process (and a set of practices) proposing paradoxical thinking as a means for enabling the interplay between intuition and rationality in strategic decision making. By conceptualizing this interplay as a paradoxical tension and by applying a paradox lens to its management, we make several theoretical contributions.

First, we contribute to paradox research by extending it to a phenomenon – that is, the intuition–rationality tension in strategic decision making – that previous work has not conceptualized as a paradox. In line with the paradox definition proposed by Smith and Lewis (2011), intuition and rationality are truly different approaches to cognitive processing and the contradictions between them (e.g., sub-consciousness vs. formal analysis; holistic associations vs. cause–effect logic) can never be fully eliminated (Epstein, 1994; Evans, 2003). However, as acknowledged in prior literature, decision makers would benefit from making use of both intuition and rationality (Elbanna, 2006; Elbanna & Child, 2007; Hitt & Tyler, 1991; Langley et al., 1995). Indeed, the intuition–rationality tension also appears to be the underlying mechanism for other organizational paradoxes, such as the tension between financial (cognitive, rational) and non-financial (affective, intuitive) goals (*paradox of performing*) (Jarzabkowski & Sillince, 2007), and between creativity (intuitive) and efficiency (rational) (*paradox of organizing*) (Lewis, 2000).

This inference suggests that creating a paradoxical frame for the intuition–rationality tension – that is, mental templates in which managers accept and embrace the simultaneous existence of contradictory forces (Smith & Tushman, 2005) – might be an enabling condition for creating paradoxical frames for addressing other organizational tensions. For instance, our cases show that when paradoxically combining intuitive and rational approaches in the development of the innovation outcome, decision makers integrate the competing demands of affective criteria (e.g., aesthetic appeal, fit with intangible brand values) and cognitive criteria (e.g., sales, productivity) for innovation evaluation, thus contributing to the paradoxical management of combining financial and non-financial goals (*paradox of performing*).

Our research on the intuition–rationality tension not only answers the call for further exploration of the applicability of the paradox lens (Smith & Lewis, 2011), but also contributes to the literature on the management of paradoxical tensions (Jarzabkowski & Sillince, 2007; Smith, 2014; Wareham, Fox, & Cano Giner, 2014) by means of our three-step process. In line with the emerging dynamic perspective on paradox resolution (Andriopoulos & Lewis, 2009; Jay, 2013; Smith, 2014; Smith & Lewis, 2011), we propose a dynamic model for managing a tension, namely a model that allows for the persistence of the conflicting forces of intuition and rationality and for purposeful, cyclical, and differentiated responses over time (i.e., the three steps in our model). However, we add to existing studies by broadening the set of responses to be included in a dynamic model, and by suggesting a possible way of organizing them into a sequence. Specifically, existing empirical studies report dynamic alternation of what Smith and Lewis (2011) characterize as resolution strategies. For instance, Smith (2014) describes how senior leaders address the strategic paradox of exploring and exploiting by alternating differentiating and integrating strategies in a consistently inconsistent manner. Jay (2013) illustrates how a hybrid public-private organization achieved institutional change through a sequence of splitting, temporal splitting, and stasis responses to the inherent paradoxical tensions.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

In our three-step process we show that the dynamic alternation should also include strategies aimed at acceptance and embedding (in addition to the resolution strategies that take place in the intermediate step of our model). Smith and Lewis (2011) theorized that acceptance should not be regarded as an alternative to paradox resolution management, but rather as necessary groundwork for initiating virtuous cycles of paradox resolution. Through our cross-case analysis and especially by looking at the projects that were the most successful in adopting paradoxical thinking (Table 3), we provide empirical evidence of acceptance as a pre-requisite for resolution. Furthermore, the specific practices identified for this step provide some additional insights on how effective acceptance could be achieved. Sparring (i.e., a collaborative process based on interventive questioning) offers an effective mechanism for understanding and accepting paradoxical tensions (Lüscher & Lewis, 2008). Through our data we show that activities aimed at experiencing the paradoxical tension – rather than just discussing it as in sparring – might have an even stronger effect on the sustainability of paradoxical thinking. Additionally, we suggest that acceptance should focus not only on creating awareness of and comfort with the contradiction (Andriopoulos & Lewis, 2009; Lewis, 2000), but also on generating a favourable attitude toward each of the elements of the tension separately. Our model offers a balanced combination of practices that aim at experiencing intuition (i.e., creating emotional equanimity, bonding) or rationality (grounding).

As to the embedding step, adding it to the dynamic management of paradoxical tensions is an important contribution of our study. Prior research suggests that the activation of a virtuous cycle of tension management can enable sustainable performance and organizational benefits (e.g., Raisch, Birkinshaw, Probst, & Tushman, 2009; Smith & Lewis, 2011; Wareham et al., 2014). However, prior research has paid little attention to the question of how to ensure that organizations stay engaged in this virtuous cycle. Continuous engagement is important, because paradox dynamics can be short-lived (Jay, 2013; Lüscher & Lewis, 2008) owing to, for example, organizational inertia or external factors that may induce actors to return to past practices and discard paradoxical thinking and its outcomes (Lewis, 2000; Smith & Lewis, 2011). By including an embedding stage in our model we provide initial evidence of how certain practices can create more enduring commitment to paradoxical thinking and its outcomes. Thus, the dynamic perspective of managing a paradox through a pattern of resolution strategies over time (e.g., through the alternation of integrating and differentiating) might benefit from including embedding efforts in specific moments of time. Our data lead us to propose *translating* as a possible embedding strategy, together with a set of related practices. We expect more embedding strategies to emerge from further research.

Our findings have shown that, for enacting the paradox management practices in each stage, design professionals often rely on diverse visual and material tools. Using such artifacts makes the mental processes through which individuals within the organization make sense of things observable and explicit (Rafaeli & Vilnai-Yavetz, 2004) and thus can be considered a "translating" activity. When visual/material tools are employed, decision approaches previously perceived as intuitive become more rational (i.e., observable and explicit), thus reducing decision makers' perception of relying exclusively on intuitive synthesis. Furthermore, visual and material tools engage decision makers emotionally, thus creating a sense of confidence in departing from sole reliance on rational decision making. In management literature, interest is increasing with respect to the role of visual and material objects for supporting group cognitive processes (e.g. Jarzabkowski, Spee, & Smets, 2013; Stigliani & Ravasi, 2012). Our findings provide initial insights into how visualizations and materialization can play a role in the management of paradoxical tensions by supporting the acceptance, use, and embedding of paradoxical thinking. Previous research has mainly focused on verbal language, communication, and discussions to support the paradoxical resolution of tensions (Lüscher & Lewis, 2008; Smith & Lewis, 2011).

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

By using the paradox perspective to examine how intuitive and rational approaches can complement each other we also contribute to the strategic decision-making literature. In contrast to prior studies looking at intuition and rationality as alternative decision-making approaches (e.g., Dayan & Di Benedetto, 2011; Dayan & Elbanna, 2011; Elbanna & Child, 2007), we do not consider intuition as an alternative to rationality, but as a complement to it. Earlier scholars have made a strong plea for an integrative approach to decision making (e.g., Elbanna, 2006; Elbanna & Child, 2007; Hitt & Tyler, 1991; Langley et al., 1995), however an empirically derived framework showing the interplay between intuition and rationality in decision making has been missing. The results of this study suggest that integration can occur through a process of departing from the preferred rational approach to decision making – as theorized by Cabantous and Gond (2011) – moving toward a more intuitive approach through the practices of preparing the ground and developing the outcome, and partially returning to the more rational approach when embedding the outcome. Thus, we concur with Cabantous and Gond (2011) on the centrality of rational approaches in strategic decision making. However, we also postulate that intuitive approaches can be effectively integrated within a rational framework, thus allowing decision makers to benefit from both approaches. While Cabantous and Gond's (2011) explanation of decision-making tensions seems to point toward cycles of defensiveness, our cases suggest a paradoxical, integrative solution of the intuitive–rational tension.

Our view that intuitive approaches can be effectively integrated within a rational framework concurs with the dual-process view on information processing prevailing in cognitive psychology (Epstein, 1994; Evans, 2003; Sloman, 1996). However, while in this tradition intuition is subservient to rationality and only represents an input for analytical decision-making processes, our framework offer a different (Salas et al., 2010), more balanced integrative solution where both mechanisms contribute equally to effective decision making and the interplay between the two occurs in different ways. In line with the work of Haidt (2001), we observed analytical decision making being used for post hoc rationalizations of intuitive decisions. For example, the embedding practice of making cause–effect relationships explicit aims at rationalizing intuitive decision making occurred earlier in a project, and the practice of combining affective and cognitive evaluations at key decision moments during the development phase follows a similar logic. Furthermore, differently from previous literature in cognitive psychology, the dynamic of the rational practice of structuring information triggering the intuitive practice of making connections offers an example of rationality becoming an input for a more intuitive way of reaching decisional outcomes. Thus, by applying a paradox perspective, we study intuition and rationality neither apart nor subservient to the other, but both functioning at full strength and driving the overall process through a variety of dynamics.

Cognitive psychology researchers have also suggested that a viable way to manage the intuition–rationality tension is to create cognitive diversity at the team level, namely by mixing individuals with different information-processing preferences (more intuitive versus more rational) in decision-making teams, even though empirical results are scant and inconclusive (Hodgkinson & Healey, 2011; Volkema & Gorman, 1998). Furthermore, from the perspective of paradox theory, this group-level solution resembles a dialectic rather than a paradoxical solution (Smith & Lewis, 2011). In line with a dialectic solution, cognitively diverse groups address tensions by finding and integrating similarities between the opposite poles (synthesis) (Volkema & Gorman, 1998), and without paying attention to understanding and leveraging the differences. When differences are not explicitly addressed in a team, the integration is suboptimal and only temporary (Smith & Tushman, 2005).

In this article, we propose a different solution. From an empirical study of seven innovation projects involving an innovating company and design professionals, we derive a three-step model that, if effectively executed within the innovation team, leads individual decision makers to a more thorough understanding of the synergies (rather than just the similarities) between intuitive and rational decision making and to their more permanent integration. Thus, in this article, the

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

collaboration between individuals with different inclinations toward one or the other information processing mechanism enables paradoxical thinking at the individual level and, subsequently, an individual's ability of combining intuition and rationality in strategic decision making.

Implications for practice

Strategic decision making is an important driver of performance. As a result, organizations are constantly looking for ways to improve their ability to make appropriate decisions. Particularly, the increasing complexity of the competitive environment and the need to rapidly and constantly innovate to survive require the frequent use of intuition for making winning decisions. The framework of this study may give organizations a direction on how to bring more intuition into their largely rational decision-making processes. Lack of knowledge of how introducing more intuitive practices (without having to give up the rational ones) can benefit strategic and innovation decision making may explain why practitioners seem reluctant to acknowledge the important role intuition can play.

Our results provide empirical evidence and practical guidelines for how intuitive and rational approaches to innovation can be combined through concrete practices – that is, preparing the ground, developing the innovation solution, and embedding the solution. Adopting the paradoxical perspective as proposed in this article can show managers with a preference for rational approaches how to integrate intuitive practices into their organizational processes, so as to benefit their strategic decision making and innovation capabilities. Similarly, practitioners with a preference for intuitive approaches can use the results of this study to develop appropriate tools and methods to make intuitive inputs to decision making more attractive and acceptable, not as an alternative but rather as a complement to rationality.

Limitations and directions for future research

The empirical setting, the exploratory method of this study, and the retrospective nature of our interviews raise some questions about the generalizability of our three-step framework and at the same time offer opportunities for further research. As to the data collection, we used several precautions to prevent biased and/or inaccurate answers regarding the information processing mechanisms used by individual informants in different moments. Still, combining retrospective interviews with other research methods (e.g., ethnographic observations) might have strengthened the validity of our findings.

Replicating the study with a different sample or in a different context would provide another direction for further research. For instance, while applying the framework to innovation projects involving different types of consultancies is possible owing to the similarity between design consultancies and other professional service firms (Von Nordenflycht, 2010), differences can occur in the way in which various types of professional service firms integrate intuition and rationality in their working practices. For example, compared to architecture or design consultancies, biotech consultancies might follow a more rational approach to innovation decision making and have a lower openness to and experience with paradoxical thinking.

Furthermore, future research could examine the effectiveness of our framework for strategic decision making in contexts other than innovation. The intuition–rationality paradoxical tension will be present in any strategic decision-making process, but innovation is by definition a process of change and of uncertain outcomes, which can make the contradiction more salient (Garud, Gehman, & Kumaraswamy, 2011; Jay, 2013; Smith & Lewis, 2011).

Given the exploratory nature of our study, we were interested in gaining an initial general understanding of the phenomenon and did not explicitly focus on identifying boundary conditions for our model. Our case study data did suggest some factors that could influence the effectiveness of our

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

three-step process, including top management commitment and organizational complexity (Table 3). However, further research, perhaps with an experimental set-up, could more systematically examine relevant boundary conditions for our model. For instance, power dependencies within the innovation team and the related co-opetition paradox at a firm level – that is, the paradoxical tension between cooperating and competing experienced by companies involved in innovation networks (Raza-Ullah, Bengtsson, & Kock, 2014) – might have implications for resolving the intuitive–rationality tension in a paradoxical manner. The InformationServices project provides an example of political dynamics and contrasting interests among the network stakeholders (i.e., the co-opetition paradox) that prevent the long-term embedding of paradoxical thinking and its outcome. In this study, we focused on strategic decision making and paradoxical thinking at the individual level, thus we did not study team-related dynamics systematically. Since strategic decision making frequently occurs in a group, future research could broaden the attention to team decision making, test whether our three-step model can also enable paradoxical cognition at a group level, and identify new group-related boundary conditions to our model (e.g., group composition, power dependencies, team cohesiveness).

The connection with the co-opetition paradox also suggests another direction for further research, namely to investigate whether and how our paradox resolution process holds in cases of multiple paradoxes – that is, different paradoxes occurring simultaneously and affecting each other (Wareham et al., 2014). The same question applies to nested paradoxes – that is, paradoxical tensions occurring at a certain level such as at the firm level, generating paradoxical tensions at another level, such as at the group level within a firm (Jarzabkowski & Sillince, 2007; Smith & Lewis, 2011). Indeed, innovation decision making triggers multiple competing demands. These demands include, for example, exploring versus exploiting (Garud et al., 2011; Smith, 2014; Smith & Tushman, 2005), creativity and flexibility versus efficiency and productivity (Lüscher & Lewis, 2008), and technological stability versus evolvability (Wareham et al., 2014) – all of which could have the intuition–rationality tension as a driving force. For instance, identifying new technological opportunities (exploring and technological evolvability) and translating them into ideas for new products or services (creativity) rely on intuitive and rational decision making. However, most managers prefer rational decision making and might opt for leveraging existing technology (exploiting and technological stability) to introduce incremental new products or services that generate short-term returns (productivity). While our empirical data hint at the relevance of the three-step process to other contexts, further research is needed to observe whether similar processes occur when managing different kinds of competing demands. Such further research could not just strengthen the generalizibility of the model proposed in this study, but also serve the broader adoption of paradox perspective to understand and manage core organizational processes.

Acknowledgements

This study was part of the Creative Industry Scientific Program (CRISP), which focused on the design of PSSs as a means of stimulating the continuing growth of the Dutch Design Sector and Creative Industries. The CRISP program was sponsored in part by the Dutch Ministry of Education, Culture, and Science.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Notes

1. As creative cognitions are the outcome of non-conscious intuitive processes (Claxton, 1998; Hodgkinson et al., 2009; Miller & Ireland, 2005), we consider quotes exemplifying creative processes representative for intuitive processes.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

2. According to Rafaeli and Vilnai-Yavetz (2004, p. 672), exposure to a physical artifact (i.e., visualizations) "is an affective event that provokes a process of affective reactions." An affective reaction is a distinguishing characteristic of intuitive decision making, as indicated by our definition. Thus, since visuals trigger affective reactions, we see them as related mainly to intuitive practices.

References

Akinci, C., & Sadler-Smith, E. (2012). Intuition in management research: A historical review. *International Journal of Management Reviews*, *14*, 104–122.

Andriopoulos, C., & Lewis, M. W. (2009). Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization Science*, *20*, 696–717.

Barnard, C. (1938). *The function of the executive*. Cambridge, MA: Harvard University Press.

Bresnen, M., Goussevskaia, A., & Swan, J. (2004). Embedding new management knowledge in project-based organizations. *Organization studies*, *25*, 1535–1555.

Brown, J. S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organization Science*, *12*, 198–213.

Cabantous, L., & Gond, J. P. (2011). Rational decision making as performative praxis: Explaining rationality's *Éternel Retour. Organization Science*, *22*, 573–586.

Callon, M. (2009). Civilizing markets: Carbon trading between in vitro and in vivo experiments. *Accounting, Organizations and Society*, *34*, 535–548.

Claxton, G. (1998). Knowing without knowing why. *The Psychologist*, *11*, 217–220.

Clegg, S. R., da Cunha, J. V., & e Cunha, M. P. (2002). Management paradoxes: A relational view. *Human Relations*, *55*, 483–503.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, *13*, 3–21.

Corley, K. G., & Gioia, D. A. (2004). Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly*, *49*, 173–208.

Dane, E., & Pratt, M. G. (2007). Exploring intuition and its role in managerial decision making. *Academy of Management Journal*, *32*, 33–54.

Dayan, M., & Di Benedetto, C. A. (2011). Team intuition as a continuum construct and new product creativity: The role of environmental turbulence, team experience, and stress. *Research Policy*, *40*, 276–286.

Dayan, M., & Elbanna, S. (2011). Antecedents of team intuition and its impact on the success of new product development projects. *Journal of Product Innovation Management*, *28*, 159–174.

Dean, J. W., & Sharfman, M. P. (1996). Does decision making process matter? A study of strategic decision making effectiveness, *Academy of Management Journal*, *39*, 368–396.

Denison, D. R., Hooijberg, R., & Quinn, R. E. (1995). Paradox and performance: Toward a theory of behavioral complexity in managerial leadership. *Organization Science*, *6*, 524–540.

Di Domenico, M., Tracey, P., & Haugh, H. (2009). The dialectic of social exchange: Theorizing corporate—social enterprise collaboration. *Organization Studies*, *30*, 887–907.

Eisenhardt, K. M. (1989). Building theories form case study research. *Academy of Management Review*, *14*, 532–50.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of management journal*, *50*, 25–32.

Elbanna, S. (2006). Strategic decision making: Process perspectives. *International Journal of Management Reviews*, *8*, 1–20.

Elbanna, S., & Child, J. (2007). Influences on strategic decision effectiveness: Development and test of an integrative model. *Strategic Management Journal*, *28*, 431–453.

Epstein, S. (1994). Integration of the cognitive and psychodynamic unconscious. *American Psychologist*, *49*, 709–724.

Evans, J. S. B. (2003). In two minds: Dual-process accounts of reasoning. *Trends in Cognitive Sciences*, *7*, 454–459.

Fredrickson, J. W. (1984). The comprehensiveness of strategic decision processes: Extension, observations, future directions. *Academy of Management Journal*, *27*, 445–466.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Garud, R., Gehman, J., & Kumaraswamy, A. (2011). Complexity arrangements for sustained innovation: Lessons from 3M Corporation. *Organization Studies*, *32*, 737–767.

Gavetti, G., Levinthal, D. A., & Ocasio, W. (2007). Neo-Carnegie: The Carnegie School's past, present, and reconstructing for the future. *Organization Science*, *18*, 523–536.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research notes on the Gioia methodology. *Organizational Research Methods*, *16*, 15–31.

Gore, J., & Sadler-Smith, E. (2011). Unpacking intuition: A process and outcome framework. *Review of General Psychology*, *15*, 304.

Gray, J. R. (2004). Integration of emotion and cognitive control. *Current Directions in Psychological Science*, *13*, 46–48.

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*, 814–834.

Hargadon, A., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, *42*, 716–749.

Hitt, M. A., & Tyler, B. B. (1991). Strategic decision models: Integrating different perspectives. *Strategic Management Journal*, *12*, 327–351.

Hodgkinson, G. P., & Clarke, I. (2007). Conceptual note: Exploring the cognitive significance of organizational strategizing: A dual-process framework and research agenda. *Human Relations*, *60*, 243–255.

Hodgkinson, G. P., & Healey, M. P. (2011). Psychological foundations of dynamic capabilities: Reflextion and reflection in strategic management. *Strategic Management Journal*, *32*, 1500–1516.

Hodgkinson, G. P., Langan-Fox, J., & Sadler-Smith, E. (2008). Intuition: A fundamental bridging construct in the behavioural sciences. *British Journal of Psychology*, *99*, 1–27.

Hodgkinson, G. P., Sadler-Smith, E., Burke, L. A., Claxton, G., & Sparrow, P. R. (2009). Intuition in organization: Implications for strategic management. *Long Range Planning*, *42*, 277–297.

Janis, I. L., & Mann, L. (1977). *A psychological analysis of conflict, choice, and commitment*. London, UK: Cassel & Collier Macmillan.

Jarzabkowski, P., & Sillince, J. (2007). A rhetoric-in-context approach to building commitment to multiple strategic goals. *Organization Studies*, *28*, 1639–1665.

Jarzabkowski, P., Spee, A. P., & Smets, M. (2013). Material artifacts: Practices for doing strategy with 'stuff'. *European Management Journal*, *31*, 41–54.

Jay, J. (2013). Navigating paradox as a mechanism of change and innovation in hybrid organizations. *Academy of Management Journal*, *56*, 137–159.

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. New York, NY: Cambridge University Press.

Khatri, M. F., & Ng, H. A. (2000). The role of intuition in strategic decision making. *Human Relations*, *53*, 57–86.

Langley, A. (1989). In search of rationality: The purposes behind the use of formal analysis in organizations. *Administrative Science Quarterly*, *34*, 598–631.

Langley, A., Mintzberg, H., Pitcher, P., Posada, E., & Saint-Macary, J. (1995). Opening up decision making: The view from the black stool. *Organization Science*, *6*, 260–279.

Lee, T. W. (1999). *Using qualitative methods in organizational research*. Thousand Oaks, CA: SAGE.

Lewis, M. W. (2000). Exploring paradox: Toward a more comprehensive guide. *Academy of Management Review*, *25*, 760–776.

Lieberman, M. D. (2007). Social cognitive neuroscience: A review of core processes. *Annual Review of Psychology*, *58*, 259–289.

Locke, K. (2001). *Grounded theory in management research*. Thousand Oaks, CA: SAGE.

Lüscher, L. S., & Lewis, M. W. (2008). Organizational change and managerial sensemaking: Working through paradox. *Academy of Management Journal*, *51*, 221–240.

Martin, R. (2007). *The opposable mind: Winning through integrative thinking*. Boston, MA: Harvard Business School Press.

Michaud, V. (2014). Mediating the paradoxes of organizational governance through numbers. *Organization Studies*, *35*, 75–101.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Michlewski, K. (2008). Uncovering design attitude: Inside the culture of designers. *Organization Studies*, *29*, 373–392.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: A sourcebook of new methods*, 2nd ed. Beverly Hills, CA: SAGE.

Miller, C. C., Cardinal, L. B., & Glick, W. H. (1997). Retrospective reports in organizational research: A re-examination of recent evidence. *Academy of Management Journal*, *40*, 189–204.

Miller, C. C., & Ireland, R. D. (2005). Intuition in strategic decision making: Friend or foe in the fast-paced 21st century? *The Academy of Management Executive*, *19*, 19–30.

Nicolini, D. (2011). Practice as the site of knowing: Insights from the field of telemedicine. *Organization Science*, *22*, 602–620.

Orlikowski, W. J. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. *Organization Science*, *13*, 249–273.

Pache, A. C., & Santos, F. (2013). Inside the hybrid organization: Selective coupling as a response to competing institutional logics. *Academy of Management Journal*, *56*: 972–1001.

Papadakis, V. M., Lioukas, S., & Chambers, D. (1998). Strategic decision making processes: The role of management and context. *Strategic Management Journal*, *19*, 115–147.

Poole, M. S., & Van de Ven, A. H. (1989). Using paradox to build management and organization theories. *Academy of Management Review*, *14*, 562–578.

Pratt, M. G., Rockmann, K. W., & Kaufmann, J. B. (2006). Constructing professional identity: The role of work and identity learning cycles in the customization of identity among medical residents. *Academy of Management Journal*, *49*, 235–262.

Pruitt, J., & Adlin, T. (2010). *The persona lifecycle: Keeping people in mind throughout product design*. Burlington, MA: Morgan Kaufmann.

Rafaeli, A., & Vilnai-Yavetz, I. (2004). Emotions as a connection of physical artefacts and organizations. *Organization Science*, *15*, 671–686.

Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, *20*, 685–695.

Raza-Ullah, T., Bengtsson, M., & Kock, S. (2014). The coopetition paradox and tension in coopetition at multiple levels. *Industrial Marketing Management*, *43*, 189–198.

Robertson, M., & Swan, J. (2003). Control–what control? Culture and ambiguity within a knowledge intensive firm. *Journal of Management Studies*, *40*, 831–858.

Salas, E., Rosen, M. A., & DiazGranados, D. (2010). Expertise-based intuition and decision making in organizations. *Journal of Management*, *36*, 941–973.

Schwenk, C. R. (1984). Cognitive simplification processes in strategic decision-making. *Strategic Management Journal*, *5*, 111–128.

Shirley, D. A., & Langan-Fox, J. (1996). Intuition: A review of the literature. *Psychological Reports*, *79*, 563–584.

Simon, H. A. (1987). Making management decisions: The role of intuition and emotion. *The Academy of Management Executive*, *1*, 57–64.

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, *119*, 3–22.

Smith, W. (2014). Dynamic decision making: A model of senior leaders managing strategic paradoxes. *Academy of Management Journal*, *57*: 1592–1623.

Smith, W. K., & Lewis, M. W. (2011). Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review*, *36*, 381–403.

Smith, W. K., & Tushman, M. L. (2005). Managing strategic contradictions: A top management model for managing innovation streams. *Organization Science*, *16*, 522–536.

Stigliani, I., & Ravasi, D. (2012). Organizing thoughts and connecting brains: Material practices and the transition from individual to group-level prospective sensemaking, *Academy of Management Journal*, *55*, 1232–1259.

Sturdy, A. (2011). Consultancy's consequences? A critical assessment of management consultancy's impact on management. *British Journal of Management*, *22*, 517–530.

Sundaramurthy, C., & Lewis, M. (2003). Control and collaboration: Paradoxes of governance. *Academy of Management Review*, *28*, 397–415.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016

Volkema, R. J., & Gorman, R. H. (1998). The influence of cognitive-based group composition on decision making process and outcome, *Journal of Management Studies*, *35*, 105–121.

Von Nordenflycht, A. (2010). What is a professional service firm? Toward a theory and taxonomy of knowledge-intensive firms. *Academy of Management Review*, *35*, 155–174.

Wareham, J., Fox, P. B., & Cano Giner, J. L. (2014). Technology ecosystem governance. *Organization Science*, *25*, 1195–1215.

Yin, R. K. (2003). *Case study research: Design and methods*, 3rd ed. Thousands Oaks, CA: SAGE.

Author biographies

Giulia Calabretta is Assistant Professor of the Strategic Value of Design at the Faculty of Industrial Design Engineering, Delft University of Technology. Giulia received a Master's Degree in Management and Marketing from Bocconi University (Italy). She also holds a PhD in Management Science from ESADE Business School (Spain), and a Post Doc from BI Norwegian School of Management (Norway). Giulia believes that using design and design practices is the best way for companies to become more innovative in nature and structure, and will prepare them to embrace the behavioural, technological and cultural revolutions of the future. Her current research focus is on understanding how design practices and capabilities can be effectively and permanently integrated into a company's innovation strategy and processes. Additionally, she is interested in what makes a great Chief Design Officer, and why each company (and institution) should have one. Her research has been published in such journals as *Journal of Product Innovation Management, Journal of Business Ethics, Journal of Service Theory and Practice*, and *Journal of Service Management*.

Gerda Gemser received her PhD in Management at the Rotterdam School of Management (Erasmus University Rotterdam). Gerda does research on design and innovation management in the creative industries. She has been a visiting scholar at leading research universities, including The Wharton School, the University of Pennsylvania (US) and the Sauder School of Business, University of British Columbia (Canada). Over the last 15 years, she has held assistant and associate professorships at different Dutch universities, including Erasmus University and Delft University of Technology (Faculty of Industrial Design Engineering). She has collaborated with Dutch government, Dutch professional design associations, and Dutch industry on different large-scale research projects to examine the role of design in the corporate world. Currently she is one of five international Professors of Design appointed by RMIT University to further strengthen the university's leadership and expansion of design research. Gerda has published in leading management and design journals including, for example, *Organization Science, Organization Studies, Journal of Management, Long Range Planning, Journal of Product Innovation Management, Design Studies*, and *International Journal of Design*. She is part of the editorial board of *Journal of Product Innovation Management* and *Journal of Design, Business & Society*.

Nachoem M. Wijnberg is Professor of Cultural Entrepreneurship and Management at the University of Amsterdam Business School and also visiting Professor at the University of Johannesburg. His research interests range from entrepreneurship and innovation to marketing and organization theory, especially in the context of the creative industries. He has published widely in scientific journals such as *Organization Studies, Organization Science, Journal of Management*, and *Journal of Management Studies*.

Downloaded from oss.sagepub.com at Bibliotheek TU Delft on October 4, 2016