

## Communications of the Association for Information Systems

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Volume 37

Article 47

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11-2015

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### Recommended Citation

Ulrich, Frank; Mengiste, Shegaw Anagaw; and Müller, Sune Dueholm (2015) "Informal Evaluation and Institutionalization of Neoteric Technology Ideas: The Case of Two Danish Organizations," *Communications of the Association for Information Systems*: Vol. 37, Article 47.

DOI: 10.17705/1CAIS.03747

Available at: <https://aisel.aisnet.org/cais/vol37/iss1/47>

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## Informal Evaluation and Institutionalization of Neoteric Technology Ideas: The Case of Two Danish Organizations

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### Abstract:

In this paper, we explore the complex process of how ideas evolve in organizations that are engaged in developing and using information technology (IT)-based systems. We put forward a framework emphasizing the interconnection between creativity and institutionalization. We argue that ideas are embedded in existing institutionalized technologies in organizations and that emerging technologies introduce neoteric ideas to them. Furthermore, we argue that, when attempting to introduce technology-based ideas, human actors will focus their attention on ideas embedded in existing institutionalized technologies while informally evaluating and making sense of these ideas. Moreover, we suggest that conflicts between competing frames of reference during this evaluation may result in the rejection, adoption, or multiplication of new technology ideas. Drawing on information systems (IS)-based theories of creativity, Scandinavian institutionalism, and empirical data from two Danish organizations, we investigate the interplay between creativity, technology, and human sensemaking in the process of translating and transforming technology ideas into full-fledged technological innovations.

**Keywords:** Creativity, Idea Evaluation, Institutionalism, Sensemaking.

This manuscript underwent editorial review. It was received 12/09/2014 and was with the authors 5 months for 2 revisions. The Associate Editor chose to remain anonymous.

# 1 Introduction

In the current hypercompetitive business environment, contemporary organizations are under constant innovation pressure, which forces them to reinvent their business models (Johnson & Christensen, 2010; Onetti, Zucchella, Jones, & McDougall-Covin, 2010; Teo, Ranganathan, Srivastava, & Loo, 2007) and come up with novel ideas for products and services by relying on information technology and creativity management (Müller & Ulrich, 2013). To achieve and sustain competitive advantage, organizations must invest in enhancing their employees' creativity through various means. Such means may include technology supported creativity techniques for employee collaboration in developing novel ideas (Shneiderman, 2000, 2002, 2007). Knowledge management and organizational learning are also central aspects of creating ideas from existing knowledge (Barrett, 1998; Leonardi, 2011; Nambisan, Agarwal, & Tanniru, 1999). Furthermore, workforce management is key to fostering individual and group creativity and ensuring employee motivation (Amabile, 1989, 1998; Couger, 1996).

Managing creativity is a daunting task due to its somewhat rebellious and chaotic nature and because it involves high levels of abstract thinking (Ackoff & Vergara, 1981; Schuldborg, 1999). As (Borghini, 2005, p. 29) argues: "Creativity implies the braking of equilibrium and order". Consequently, organizations often struggle with supporting creativity and selecting which ideas to adopt (Couger, 1996). Ideas can come from multiple sources. As Valikangas and Sevon (2010) argue, ideas socialize, escape, and organize. Ideas socialize with other ideas, technologies, and human actors as they travel across organizational boundaries. Organizations socialize with ideas during, for example, trade shows or the adoption of new technologies. Ideas escape when they are too powerful for human actors to control. In their escape, they travel from person to person and from organization to organization. Finally, ideas organize by shaping related ideas, by leading to new ideas, and by creating contexts for other ideas. Ideas also organize people and organizational activity (e.g., when dominant management principles (ideas) are created that control innovation strategies and organizational behavior).

Ideas are creative products (Amabile, 1983). For the sake of clarity, we define organizational creativity as human actors' ability to generate ideas that others consider to be novel and useful (Amabile, 1996; Couger, 1996; Couger, Higgins, & McIntyre, 1993). Furthermore, creativity requires that the activity be heuristic and not algorithmic. Hence, if a human actor is simply following a guideline or recipe, the ensuing idea is not creative. In this light, ideas are knowledge products generated through human creativity (Ward, 2004). Moreover, we follow Avital and Te'eni (2009) in acknowledging that ideas have generative properties that influence human action. From this perspective on creativity, ideas are knowledge products that inspire human actors to do something. As such, ideas can be redesigned, translated, and ultimately changed.

From an IT perspective, institutionalized technologies that human actors use in their daily practices are embedded with ideas (e.g., Valikangas & Sevon, 2010). Ideas are like cooking recipes. Cooking recipes are algorithms of which ingredients to use and meta-representations of the making, nutritional value, and serving of the food. Similarly, ideas are algorithms (Amabile, 1983) of purpose and meta-representations of form, function, and use that human actors may decide to implement into technologies or practices surrounding those technologies. Technologies are, thus, products of creative thinking (Couger & Dengate, 1992) in the sense that ideas become part and parcel of the technology and accompanying practices when implemented. Like cooking recipes, ideas may change over time. Properties of ideas may be added, removed, or changed, and existing ideas may inspire human actors to create new configurations of existing ideas or completely new ideas. In summary, we view technology ideas as generative knowledge-based algorithms and meta-representations about a given technological artifact that define its purpose, form, function, and use.

To determine their business value, one must evaluate technology ideas before adopting them in the form of innovative IT-based products, services, or business models (Couger & Dengate, 1992; Dean, Hender, Rodgers, & Santanen, 2006; Osterwalder & Pigneur, 2010). Yet, researchers have placed little emphasis on understanding the relationship between ideas, technology, and evaluation.

In this paper, we focus on the relationship between organizational creativity and technology ideas. We examine the influence of human actors' attempts to make sense of and frame technology ideas during informal evaluation processes on organizational creativity. We use the term "human actors" to describe one or more people performing creative actions individually or collectively as a group. Thus, it is important to understand how human actors make sense of technology ideas during evaluation, such as when trying to adapt ideas and use them in support of business needs. Understanding this sensemaking process is

important because human actors' (re-)actions are influenced by their ability to make sense of the incoming and chaotic flux of input (Weick, Sutcliffe, & Obstfeld, 2005; Weick, 1993) represented by new ideas about technology. By new we mean "neoteric" (i.e., ideas that are new and contemporary and different from what has previously been known to the organization's members). These neoteric technology ideas differ from institutionalized technology ideas that are implemented through existing technologies, are known by the human actors, and are accepted by the organization's members. Unless specifically referring to other definitions, we treat neoteric and institutionalized ideas as being technology-based knowledge products.

Throughout this paper, we argue that how human actors' make sense of and frame neoteric ideas when informally evaluating them influences whether and how the actors develop and adopt them. To understand the interwoven process of creativity and institutionalization, we draw on contemporary information systems (IS)-based creativity research (Müller & Ulrich, 2013) and Scandinavian institutionalism (Nielsen, Mathiassen, & Newell, 2014). We rely on their theories when investigating how institutionalized ideas influence human action and how particular ideas shape human actors' frames of reference. In essence, we explore how institutionalized ideas shape neoteric ideas and how informal evaluation influences this process.

This paper proceeds as follows: in Section 2, we describe the research perspective shaping our research question. In Section 3, we present a framework grounded in IS-based creativity research and Scandinavian institutionalism. In Section 3.4, we combine the various constructs in a theoretical framework and demonstrate the duality between creativity and institutionalization through a vignette in Section 4. In Section 5, we discuss the implications of the framework for both researchers and practitioners through two empirical case studies, and, in Section 6, we conclude the paper.

## 2 Research Perspective

This section draws on IS research to provide a comprehensive view on Scandinavian institutionalism and a state-of-the-art perspective on creativity research.

Neoteric ideas can travel between organizations through what Tiwana (2014) calls emerging technologies that generate business value. In line with Tiwana (2014), we view emerging technologies as technological artifacts imbued with neoteric ideas. Ideas travel when human actors embed them in internally developed artifacts (e.g., by following technology trends that introduce neoteric ideas to the organization). They may, however, also enter an organization through its implementing external technologies (Czarniawska & Joerges, 1995). While we focus on ideas embedded in technological artifacts, ideas also manifest themselves in processes and services (e.g., Rose, 2010). When it comes to evaluating ideas, we distinguish between formal and informal evaluation. Formal evaluation focuses on assessing quality through predefined parameters such as novelty and usefulness (e.g., Dean et al., 2006). Informal evaluation is often ad hoc and based on human actors' ability to make sense of the idea by placing value on it based on knowledge and cognitive abilities (e.g., Guilford, 1977). Because informal evaluation has largely been ignored in the IS-based creativity literature (see Müller & Ulrich, 2013), we focus on this evaluation approach in our research.

Our research perspective is grounded in contemporary Scandinavian institutionalism, which views ideas and technologies as unstable institutional entities (Nielsen et al., 2014). They travel across organizational boundaries (Czarniawska & Joerges, 1995), are translated and transformed with reference to everyday practices (Orlikowski, 2000), and are subject to negotiation between human actors (Modell, 2006). Historically, institutional theory in IS has focused on adaptation, interplay between technology and the institution, dynamic institutionalization processes, and technology fashions and trends (Nielsen et al., 2014). However, institutional theory has paid little attention to the interplay between organizational creativity and evaluation.

Researchers have used sensemaking theory in several studies of organizational change (Weick et al., 2005; Weick, 1995, 2004) and in studies of technology use in organizations (Griffith, 1999; Orlikowski & Gash, 1994). In organizational research, Ford (1996) relies on sensemaking to investigate interpretive processes in organizational creativity, and Mumford, Scott, and Gaddis (2002) draw on the notion of sensemaking to study how practitioners may better manage creative people. Other researchers focus on organizational creativity and change and use sensemaking to understand and address associated problems (Borghini, 2005; Drazin, Glynn, & Kazanjian, 1999; Ford, 2002; Weick, 1993). Weick (1993) argues from a sensemaking perspective that creativity serves as a driver for creating order out of chaotic situations, and Ford (2002) examines the differences in creative sensemaking processes between thinking

ahead versus thinking about previous experiences. Moreover, Drazin et al. (1999) use sensemaking to understand how human actors engage in creative actions during organizational crises. In a similar study, Borghini (2005) investigates from a sensemaking perspective how managers may break existing equilibriums or order in an organization to influence the level of creativity. Leonardi (2011) shows a different side of sensemaking where human actors are blinded by culturally based interpretive schemes and interpretive schemes associated with the technology, which, in turn, guide their view of how to solve technological and organizational problems. As human actors interpret technology based on these schemes, they are blind to the fact that other interpretations may exist. Though IS researchers have explored creativity against the backdrop of sensemaking (Doll & Deng, 2011; Eaglestone, Lin, Nunes, & Annansingh, 2003; Leonardi, 2011), their work is limited to understanding the impact of risk management on creativity in organizations (Eaglestone et al., 2003) and understanding creative improvisation by IT engineers (Doll & Deng, 2011). Besides the work of Leonardi (2011), IS and organizational researchers have generally made little effort to understand how sensemaking influences the outcome of informal evaluation when human actors attempt to frame neoteric ideas that, for example, are introduced to the organization through emerging technologies.

Creativity is not a new topic in IS research. However, IS creativity research has primarily focused on information systems that support creativity (Maccrimmon & Wagner, 1994; Massetti, 1996; Shneiderman, 2000, 2002, 2007) and fostering creative environments for group-based collaboration (Hailpern, Hinterbichler, Leppert, Cook, & Bailey, 2007; Kohler, Fueller, Matzler, & Stieger, 2011). Examples include group support systems that enhance both divergent and convergent thinking (Müller-Wienbergen, Müller, Seidel, & Becker, 2011), collaborative brainstorming tools (Nunamaker, 1987), and large-scale idea management portals in technology-oriented companies (Di Gangi & Wasko, 2009). IS creativity research equally emphasizes the physical and social work environment in organizations, such as management styles and practices encouraging creativity (Florida & Goodnight, 2005; Malhotra, Majchrzak, Carman, & Lott, 2001) and workforce incentives stimulating creativity (Couger et al., 1993; Couger, 1996). Moreover, research has linked creativity to management practices through the different options it affords managers as bases for their decision making (Maccrimmon & Wagner, 1994). Research has also dealt with creativity techniques in software development (Couger et al., 1993; Couger, 1996). Recently, research interest has shifted toward agile development methods that nurture creative and innovative thinking (Aaen, 2008; Rose, 2010). In their study of creative and technological artifacts, Avital and Te'eni (2009) introduce the concept of generativity in IS design. They argue that any technology has the capacity to spawn novel configurations of itself (called generative fit) through its functionality and ability to support organizational processes. This generative fit may influence employees' creative work (called generative capacity), enabling them to explore new opportunities by creating something novel and, thereby, challenge the status quo. In this process, employees develop and redevelop knowledge from existing technologies into novel solutions and design alternatives and, thereby, generate new possibilities. Moreover, Avital and Te'eni (2009) argue that one should not evaluate a technological artifact in terms of task-related performance alone but also in terms of its generative fit and stimulation of employees' generative capacity. In Section 3.3, we elaborate on the idea of generative fit and generative capacity. In addition, we demonstrate how creativity and institutionalization relate and how sensemaking during informal evaluation of ideas plays an important role in the creative process.

Little research has examined the influence of idea evaluation on creativity and institutionalization. The literature is limited to understanding idea rating based on standardized parameters. These parameters include novelty (originality, newness, and radicalness of ideas), workability (acceptance or willingness to implement ideas), relevance (ability to perform efficient problem solving), and specificity (detail level, impact, and clarity of outcomes) (Dean et al., 2006). Current formal idea evaluation practices are disconnected from creative processes (Elam & Mead, 1990) and only serve to eliminate unfruitful ideas (Blohm & Riedl, 2011; Osterwalder & Pigneur, 2010; Riedl, Blohm, Leimeister, & Krcmar, 2010). Researchers have criticized such practices for destroying incentives to being creative by installing management cultures that kill novel ideas in focusing too much on risk mitigation and by implementing reward schemes that are harmful to employees' intrinsic motivation (Amabile, Barsade, Mueller, & Staw, 2005; Amabile, 1996, 1998; Mueller, Melwani, & Goncalo, 2012). Creativity research has not sufficiently investigated the influence of informal evaluation on creative processes, although early researchers such as Guilford (1967, 1977) have shown that informal evaluation enables human actors to draw on previous practices and experiences in stimulating creative thinking. By trying to understand creativity and informal evaluation from an institutional perspective, we increase our knowledge of the interplay between ideas and technology and help explain how creativity drives institutionalization forward. Equally important, we



use an institutional perspective to help explain the human aspects of evaluation by focusing on actors' behaviors during informal evaluation rather than the effectiveness or efficiency of formal evaluation as in previous studies (Blohm & Riedl, 2011; Dean et al., 2006; Osterwalder & Pigneur, 2010; Riedl et al., 2010).

In this theory-driven paper, we move beyond previous work by creating a framework that shows human sensemaking playing an integral part in the development of neoteric ideas when human actors evaluate other actors' ideas embedded in emerging technologies. With this framework, we highlight the close relationship between human actors and the organization in which creativity and the informal evaluation of ideas take place. In doing so, we set out to bridge the knowledge gap between informal evaluation, the development of ideas, and technological innovation by honing in on the following research question: "How does the development, informal evaluation, and adoption of neoteric ideas affect organizational creativity?".

In Section 3, we provide a theory-based elaboration of our initial research question that combines the institutional perspective with creativity research.

### 3 Informal Evaluation of Ideas as Negotiated Order

Innovation is the implementation of creative ideas through organizational or technological artifacts (Govindarajan & Trimble, 2010). However, creativity is a chaotic enterprise (Schuldborg, 1999). Through creating ideas that one may implement as innovations, creativity has the potential to disrupt established activity patterns and cause bursts of transformation in an organization (Ford & Sullivan, 2004; Romanelli & Tushman, 1994; Weick, 1993). Having said that, creative processes are known to be hypersensitive to the surrounding environment (Amabile, 1996, 1998), and organizational creativity is influenced by the diversity of organizational knowledge (Sosa, 2011) and management practices (Amabile, 1998; Barrett, 1998; Couger, 1996; Eaglestone et al., 2003).

In Sections 3.1 to 3.4, we explain the interplay between sensemaking and creativity during informal evaluation. Specifically, we theorize sensemaking's influence on the development of neoteric ideas through informal evaluation (Section 3.1), institutionalization (Section 3.2), and multiplication (Section 3.3). We combine our theoretical arguments in the framework presented in Section 3.4.

#### 3.1 Creativity, Sensemaking, and Informal Evaluation of Neoteric Ideas

Creativity and sensemaking share a common starting point—chaos (Weick et al., 2005; Weick, 1993). Sensemaking is an important element in the interaction between neoteric ideas and existing equilibriums (i.e., the existing order in organizations) while human actors try to understand what other actors are doing in their attempts to create order out of the apparent chaos (Weick et al., 2005). Human actors using sensemaking organize the chaotic flux of input to comprehend "the almost infinite stream of events and inputs that surround any organizational actor" (Weick et al., 2005, p. 411). Neoteric ideas contribute to such flux in the sense that they provide a stream of inputs unfamiliar to the human actors. Drazin et al. (1999) emphasize that human actors' ability to make sense of others' creative actions determine their level of engagement in creative activities. In this endeavor, human actors socially construct cultures to collectively make sense of their surroundings (Trice, 1993). Different occupational cultures in the same organization may have different perspectives on creativity that clash during decision making processes, which forces people to resolve their issues through negotiation and adaptation (Drazin et al., 1999; Trice, 1993). For example, Dougherty (1992) describes how "interpretive schemes" from different "thoughts worlds" can become collaboration barriers when human actors are unable to make sense of how others see and interpret the world.

Moreover, sensemaking relates to technological frames. Frames are mental models of tacit and explicit knowledge that human actors use to organize meaning, motivation, involvement, and actions. They facilitate understanding of incomprehensible or confusing events and information (Drazin et al., 1999; Leonardi, 2011; Orlikowski & Gash, 1994). Framing occurs by sensemaking being retrospective through reflections of the past and presumptive through expectations regarding the future (Weick et al., 2005). Hence, when human actors attempt to make sense of new input, they reflect retrospectively on past experiences and think ahead presumptively about the future; in terms of the latter, they rely on hunches and expectations (Weick et al., 2005).

Retrospective reflections of the past and presumptive expectations regarding the future influence organizational processes, including creativity (Ford, 2002). This influence occurs when human actors attempt to interpret and label neoteric ideas according to their own frames of reference by applying knowledge from training, previous work experiences, and life events (Drazin et al., 1999; Orlikowski & Gash, 1994; Weick et al., 2005; Weick, 1995). Consequently, human actors may apply radically different frames (Davidson, 2002; Edmondson, 2001) when informally evaluating neoteric ideas. Likewise, frames are subject to change and renewal through human action (Drazin et al., 1999). As a case in point, Davidson (2002) explains how shifting frames during the requirements development of an emerging technology disrupted a research and development (R&D) process.

Ideas must undergo evaluation by human actors to be considered novel and useful (Drazin et al., 1999; Runco & Jaeger, 2012). As such, the creative outcome (ideas) becomes a product of sensemaking when human actors apply their interpretations based on, among other things, their individual roles in the organization (Drazin et al., 1999). In this light, informal evaluation depends on sensemaking. Sensemaking organizes the chaos associated with neoteric ideas and enables human actors to attach value to the ideas, which, in turn, determines whether they are simply implemented, further developed, or outright discarded.

In some situations, technological frames provide meaning in complex and ambiguous situations, while they are constraining in other situations by reinforcing established patterns of thinking, which inhibits creativity (Orlikowski & Gash, 1994). For example, formal idea evaluation uses predefined evaluation parameters (e.g., novelty and usefulness) to select only the best ideas for implementation (Dean et al., 2006; Osterwalder and Pigneur, 2010). Such predefined evaluation parameters may provide formalized brackets that discourage human actors from creating their own brackets as part of new technological frames, which can result in preferences for unoriginal ideas and technologies. Blair and Mumford (2007) demonstrate that removing such stringent evaluation parameters results in the selection of more original ideas. As Guilford (1977) argues, the ability to evaluate is central to human cognition and creativity. Informal evaluation allows people to tap into previous practices and experiences (what Guilford describes as memory storage) when engaging in creative activities. Informal idea evaluation grounded in human actors' own sensemaking capability allows them to create their own technological frames and brackets according to personal experiences and practices. It relies on human sensemaking to discover and frame the perceived value of ideas based on individual brackets. From a sensemaking perspective, human actors recognize value in ideas they engage with, and such value is subjective by nature. When human actors tap into personal memories, they recognize ideas' value at the individual level; further, when they establish common ground with others on perceptions via shared frames, they recognize ideas' value at an organizational level. Hence, informal evaluation becomes part of the creative process because value is continually recognized both individually and organizationally, which, in turn, provides a basis for developing new ideas.

### 3.2 Institutionalization of Ideas

Institutionalization is about producing and reproducing taken-for-granted behavior over time (Jepperson, 1991), while ideas are knowledge products generated through human creativity (Ward, 2004). Ideas materialize at some point in time (Czarniawska, 2009), and, once they are transformed into artifacts, documentation, and practices (Czarniawska & Joerges, 1995), they are said to be institutionalized and can survive for generations as the accepted way of doing things (Tolbert & Zucker, 1996). In other words, institutionalized ideas are human knowledge products materializing over time as social artifacts that are communally adopted and taken for granted.

However, Drazin et al. (1999) emphasize that creativity is shaped by human interaction in which human actors draw on others' interpretations to make sense of ideas and derive meaning. Because human actors' unique combinations of prior experiences and cultural backgrounds shape technological frames (Orlikowski & Gash, 1994), differences and conflicts between frames are inevitable. Addressing such conflicts requires an ongoing process of negotiation and compromise to facilitate collaboration, build partnerships, and ensure mutual learning among diverse groups of human actors with different backgrounds, knowledge, expertise, and interests. Therefore, establishing a shared frame among a group of human actors is a continuous process of interaction and negotiation. As Modell (2006) notes, what we perceive as institutionalized norms at any point in time are products of past negotiations and may be renegotiated if the context is amenable to change. It is through this ongoing negotiation and renegotiation process that new organizational practices, standards, and ideas emerge. These interactions and

negotiations between human actors influence the creative output, which results in both positive and negative outcomes. As Orlikowski (1992) notes, technologies are interpretively flexible with meaning being ascribed to them as opposed to existing independent of them. Indeed, human actors are able to construct distinct frames that guide their interpretation of, for example, an emerging technology (Drazin et al., 1999). In such situations, disagreement about the functionality of the technology may have various consequences. At times, disagreement fosters new ideas for additional functionality (Amabile, 1996), but it may also delay adoption or result in outright rejection of the technology (Di Gangi & Wasko, 2009).

Consequently, technology is “not external or independent of human action” (Orlikowski, 2000, p. 407). Technology emerges from continuous interaction between human actors and, therefore, never fully reaches an equilibrium or stable state because it is constantly being re-enacted through human action when used (Orlikowski, 2000). In other words, human actors enact technology through ongoing, situated interactions with it. Such enactment impacts the rules of appropriate behavior, social interaction among colleagues at the workplace, and the resources needed to realize work-related goals (Orlikowski, 2000). According to Orlikowski (2000, p. 402), “there can be no single, invariant, or final technology-in-practice, just multiple, recurrent, and situated enactments”. Hence, recurrent use of technology changes the practices surrounding it. A technology only temporarily reaches an equilibrium state. Technologies reach temporary “black box” states between interactions with human actors only to be re-enacted and changed at a later stage based on new knowledge (from, e.g., training) and experiences (from, e.g., other job situations) with the technology (Orlikowski, 2000).

In essence, institutionalizing ideas through technology is subject to human sensemaking. When human actors generate or informally evaluate neoteric ideas and act in accordance with their individual interpretations and frames, sensemaking provides diversity in organizations’ creative output. In this process, the informal evaluation of ideas includes negotiation between conflicting frames of reference. Some human actors in the organization may adopt the ideas, while others may reject them. In such situations of conflict, human actors rely on prior experiences and cultural backgrounds to renegotiate a new order. Such a new order may lead to a shared perception of the idea in question and, subsequently, to a decision regarding adoption or rejection.

Independent of their adoption or rejection, ideas may become institutionalized as part of an organization's tacit knowledge through employees’ experiences, identities, and training or as evolving professional norms in the organization. Informal evaluation may result in the creation of explicit knowledge in the form of, for example, documentation such as business cases and project plans. Generally speaking, adopted ideas may become institutionalized and implemented through technologies, and they manifest themselves in any documentation, practices, and norms related to the technology. Rejected ideas may become institutionalized in a similar fashion. Hence, neither formal decision making processes nor individual human actors determine whether a specific idea is institutionalized or not. Both rejected and adopted ideas become ingrained in human actors’ tacit and explicit knowledge. As Trice (1993) notes, culture allows human actors to interpret meaning collectively. In this process, rejected and adopted ideas help shape an organization's cultural mindset, practices, and appropriate ways of acting that, over time, are taken for granted. As such, organizations’ culture may change during periods of continuous flux of neoteric ideas, and, thus, break down existing equilibriums and challenging the stability of institutionalized ideas. Nonetheless, when ideas are institutionalized, they help human actors by providing frames of reference when they informally evaluate neoteric ideas through changes in their shared cultural knowledge.

### 3.3 Multiplication and Emergence of Neoteric Ideas

Human actors may frame neoteric ideas in ways that are conducive to adoption or rejection. Moreover, ideas’ flexibility makes them sensitive to changes and reframing (Czarniawska & Joerges, 1995). Like technologies, ideas tend to change over time because they are unstable entities sensitive to fluctuations in the environment that may be amplified exponentially over time (You, 1993). In situations where human actors are blind to others’ perspectives (Leonardi, 2011), creative thinking may reframe existing ideas or create neoteric ideas in an ongoing negotiation process. In the words of Weick et al. (2005, p. 410): “people organize to make sense of equivocal inputs and enact this sense back into the world to make that world more orderly”. Consequently, one positive aspect of human actors having different frames of reference is the resulting multiplication of neoteric ideas arising from existing ideas. In this and the following section, we suggest that multiplication is the translation, transformation, redefinition, and consolidation of existing ideas or knowledge into something that others may consider to be valuable.



Multiplication happens when human actors try to make sense of neoteric ideas and create additional ideas to make them fit with their own technological frames. For example, Avital and Te'eni (2009) argue that all ideas and technological artifacts contain a level of generative fit that provokes novel ways of thinking and challenges existing equilibriums. This generative fit then enables human actors to use their generative capacity to spawn usable "new configurations or possibilities" through neoteric ideas (Avital & Te'eni, 2009, p. 354). A clear example of this phenomenon is apps development for mobile devices. Only a few years after the mainstream introduction of smartphones, apps were being developed at an unprecedented rate (Ngai & Gunasekaran, 2007) with consumers being able to download apps for any need (Butler, 2011). Hence, smartphones have a high generative fit due to open platforms and development tools, which, in turn, influences the generative capacity of third party developers. Similar to private consumers, both private companies and public organizations have developed and implemented specialized apps for mobile technologies to complement their existing IT portfolios to take advantage of new business opportunities or facilitate communication between employees. Avital and Te'eni (2009) point to the Apple iPod as an example of such business opportunities. The iPod revolutionized the music industry. However, it did not allow users to generate alternative use cases and, therefore, had a low generative fit that negatively influenced its users' generative capacity. In some instances, users' generative capacity can overrule a technology's intended generative fit. Flowers (2008) and Schulz and Wagner (2008) explain how hackers bypassed the software protection schemes of gaming consoles to install new firmware that enabled them to modify their functionality. By removing the software protection schemes, hackers increased the technology's generative fit.

When human actors attempt to make sense of ideas during informal idea evaluation, their interactions may display similar patterns to those of hackers. Weick describes the dynamics of ideas by stating: "Ideas shape ideas, they lead on to other ideas, they enact their own contexts" (Weick, 2004, p. 657). In a similar vein, Nagasundaram and Dennis (1993) suggest that human actors may be animated to engage in creative activities when exposed to existing ideas. In two empirical studies of brainstorming by Kohn, Paulus, and Choi (2011) and Kohn and Smith (2011), the authors show that human actors are able to build on each other's ideas during creative processes. Røvik (2011) argues that ideas mutate when human actors translate and transform them according to their own practices by, for example, modifying the ideas to make them fit with problems in the organizational context. When ideas are translated and transformed, they multiply. Multiplication takes place when ideas are generated that support the translation or transformation. Multiplication also involves creative processes in which similar ideas and knowledge are consolidated into a new entity (e.g., Aiken & Carlisle, 1992). Finally, multiplication involves breaking existing patterns of thinking as human actors interact with and informally evaluate ideas by, for example, consolidating pieces of semantically unrelated knowledge or by radically redefining the knowledge into something new (e.g., Sternberg, 1999). As such, multiplication is best described as a mixture of convergent and divergent production (c.f. Guilford, 1967, 1977). Convergent production entails converting ideas into tangible solutions through translation and transformation. Consolidating semantically unrelated knowledge and redefining knowledge involve divergent production driven by unconventional patterns of creative thinking.

Thus, in addition to adoption and rejection, human actors' attempts to make sense of ideas sometimes result in other ideas being created (i.e., the ideas being multiplied). Such multiplication may occur when human actors experience conflict between frames created during informal evaluation. Hence, new ideas may have a generative fit that enables human actors to generate new and different ideas for new solutions to experienced problems (Avital & Te'eni, 2009). This view of generativity is closely related to Couger (1996) who argues that idea evaluation may help transform seemingly unfruitful ideas to achieve real value in terms of novelty and usefulness. Such transformation happens when evaluation is used to nurture ideas through carefully and methodologically examining the problem at hand (Couger, 1996).

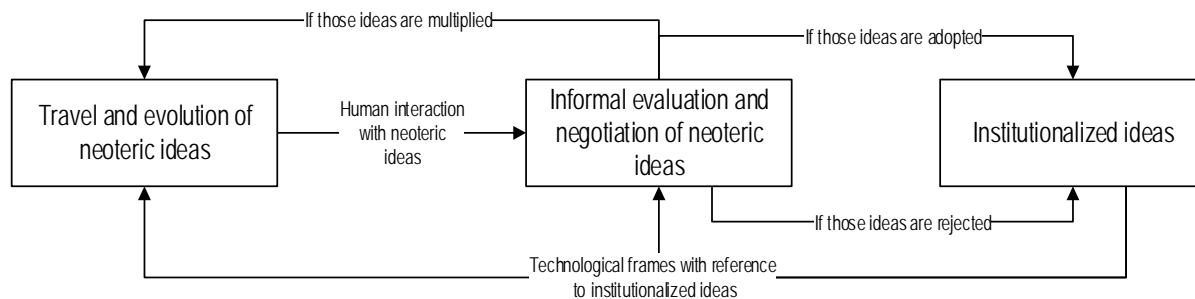
When human actors informally evaluate an idea, conflict in negotiations between human actors with different technological frames may result in their creating neoteric ideas (i.e., through multiplication). Alternatively, conflict between frames may transform the original idea through negotiation into a new state in which all human actors involved recognize its value. However, previous studies have shown that human actors produce less novel ideas in groups than individuals working alone, which may be due to "collaborative fixation" when negotiating with others (Kohn et al., 2011; Kohn & Smith, 2011). Due to their generative fit and human actors' generative capacity, informal evaluation may result in multiplying neoteric ideas. Nevertheless, the novelty of ideas may decrease over time due to the ongoing process of negotiation and compromise among human actors.

To summarize, we suggest that informal idea evaluation may have creative outcomes. We suggest that the informal evaluation of neoteric ideas leads to institutionalization when human actors reject or adopt them. In addition, we argue that informal evaluation results in multiplying neoteric ideas when human actors experience conflict during negotiations between rejection and adoption. In Section 3.4, we synthesize our theoretical discussion in an integrated framework of the interplay between creativity and technology in organizations.

### 3.4 An Integrated Framework of the Interplay between Neoteric Ideas and Organizational Institutionalization

Up until this point, we explore the close relationship between creativity, evaluation, and institutionalization by emphasizing how neoteric ideas are adopted, rejected, or multiplied. We argue that the sensemaking process is continuous—it iterates between generations of ideas and institutionalization. More specifically, human actors' creative actions and interactions establish connections between institutionalized ideas and neoteric ideas. By doing so, human actors frame new experiences based on individual backgrounds, knowledge, and values supporting their decision making capabilities. For example, when human actors transform ideas according to their frames of reference, it eases negotiations and provides needed knowledge for idea adoption or rejection. When negotiations fail, the result may be the further multiplication of ideas toward a solution that, for example, solves an identified problem.

Drawing on the theoretical perspectives that we present above, we combine the theoretical constructs in an integrated framework (see Figure 1 below) to describe the interplay between creativity and technology in organizations as an iterative cycle. The lines between the different elements show paths of influence.



**Figure 1. An Integrated Framework of the Interplay between Neoteric Ideas and Organizational Institutionalization**

In brief, when human actors informally evaluate and make sense of ideas, the ideas become institutionalized over time through sensemaking processes, or they multiply into neoteric ideas.

Initially, ideas travel to or evolve in the organization. These ideas emerge internally or externally as organizational members experiment with new technologies. When human actors informally evaluate those ideas, they draw on knowledge from previous experiences. During this informal idea evaluation process, human actors try to make sense of the incoming flux of neoteric ideas. This sensemaking is an ongoing interaction process during which human actors negotiate and bracket ideas according to existing technological frames. Negotiations between human actors may result in their adopting an idea if it fits with existing technological frames or, otherwise, their rejecting it. If adopted, the idea becomes institutionalized and reaches an equilibrium or "black box" state. If rejected, the idea also becomes institutionalized in the form of experience-based knowledge or knowledge residing in documentation. This knowledge will influence future interactions with neoteric technology ideas by providing human actors with frames of reference.

Although diversity of frames among human actors has negative consequences, such as conflict and the rejection of some useful ideas, it also has positive consequences, including the emergence of neoteric ideas as opposing perspectives collide (e.g., Dougherty, 1992). When informally evaluating neoteric ideas, human actors may experience negotiation conflicts in or between groups. Conflicts may arise due to differences in human actors' frames of reference. However, conflict may result in multiplying ideas, which can enable future renegotiations. The multiplication of ideas involves convergent translation and transformation and the divergent consolidation of semantically unrelated knowledge and redefinition of

knowledge into something new. This sensemaking process may take place over several iterations and produce new ideas until human actors reach some level of agreement. Hence, human negotiation and action in the sensemaking process may trigger their generative capacity, resulting in idea multiplication that leads to alternative solutions. Extending Avital and Te'eni (2009) who describe how ideas generate novel solutions through human action, multiplication helps explain how those ideas evolve through human action or are "black boxed" until new stimuli (organizational flux) make them resurface.

In Section 4, we illustrate the theory in practice through two case studies from the public and private sector.

## 4 An Illustrative Vignette of the Theory in Practice

To provide illustrative examples of the theory in practice, we conducted a multiple case study (De Vaus, 2001; Yin, 2003) of two IT departments in Karlstown municipality and NavalSim<sup>1</sup>. Both cases provide varied views of creativity management practices and use of technologies and offer different settings for the theory in practice. We collected data during spring 2012 through six one-hour semi-structured interviews (in which we used open-ended questions) at the two research sites (Saunders, Lewis, & Thornhill, 2003). To ensure breadth and diversity in the perspectives on creativity and technology management, we interviewed the CIO, a project manager, and a business developer from Karlstown municipality and the CIO, the head of innovation, and the head of product development from NavalSim. This diversity among interviewees provides insight into how human actors at different management levels engage with and evaluate neoteric ideas. Following the interviews, we set up an informal six-hour workshop at each case organization. During discussions at these workshops, we presented our preliminary findings and asked the participants from Karlstown municipality and NavalSim to comment on them. At Karlstown municipality, eight key informants from the IT management unit participated. At NavalSim, the entire development and management team participated.

We analyzed the data in accordance with interpretive research principles (Walsham, 1993, 2006); that is, by viewing the collected empirical data as social constructions by human actors. Hence, the social world that human actors are part of—both as private citizens and organizational members—is socially constructed through their actions (Walsham, 1993, 2006). Our role as researchers took the form of outside observers (Walsham, 1995) who witnessed human actors in their natural environment and used the collected empirical data as basis for interpreting their social reality and building new theory. In practice, we analyzed the interview data using an elaborate notation system as Bryman (2004) describe. We divided each section of each interview into different categories and used a coding scheme to capture, among other things, roles, themes, and in-depth notes on the subjects of discussion. Along with transcriptions of the empirical data, this coding scheme was instrumental to our obtaining an overview and analyzing key concepts. Moreover, we focused on decision making processes at the group rather than at the individual level. With this approach, we could identify how different groups in an organization negotiate with each other when informally evaluating neoteric ideas.

### 4.1 Knowledge, Creativity, and Experimentation in NavalSim

NavalSim is a high-tech company with headquarters in Copenhagen, Denmark. It is a business unit comprising 30 employees in an engineering company that specializes in various aspects of engineering—from development and consulting in wind energy to offshore oil platforms. NavalSim focuses on naval ship simulators for international private and public maritime customers. Among other things, they create "full-mission" bridge simulation systems imitating, for example, the bridge of an oil tanker. In addition, NavalSim is a certified research-based technology service organization<sup>2</sup> that receives Danish government funding on a three-year basis. This funding enables NavalSim to create innovative technologies and services that benefit small and medium-sized companies. NavalSim, however, mainly develops complex systems for external customers. Furthermore, they primarily develop their own technologies. They only rely on consumer technologies to a limited degree to create internal business value.

The NavalSim case illustrates informal evaluation in a different organizational setting from that of the municipality (see below). This case shows informal evaluation during requirements engineering when developing new technologies for the naval industry. With regard to the evolution of neoteric ideas, the

<sup>1</sup> We use fictitious names to ensure confidentiality.

<sup>2</sup> Also called GTS companies. For more information on GTS, see: <http://en.gts-net.dk>.

NavalSim case also illustrates the critical selection processes during informal evaluation by showing why some ideas are adopted while others are not.

To a large extent, NavalSim bases its development on previous experiences from other projects. When asking the head of product development at NavalSim about the significance of experience (related to presumptive frames) in informal evaluation of neoteric ideas, he stated:

*There are some we listen to more than others. In our development team, we will pull in the guys who have both market and development insight and the experience to back it up. They have the experience to evaluate new ideas and are part of our innovation group. Our head of innovation is one of those guys. He has been here for almost 30 years and was the father of the original version of our software. He still has many good ideas and has a real healthy approach. He is one of those guys we will listen to and is a decision-maker when new ideas are being evaluated.*

Hence, people such as the head of innovation are critical in evaluations and decisions regarding neoteric ideas. They have years of experience in the organization and with the technology being developed. From the perspective of sensemaking and institutionalization, these human actors draw on frames and norms governing software development in the organization. Depending on their role in the organization in general and the software development process in particular, they become gatekeepers in relation to how neoteric ideas travel.

Another group of gatekeepers in the evaluation process includes business developers and customers. The research participants from NavalSim argued that customer experiences play an important role when developing ideas for new software. NavalSim has two business developers who possess training, personal experience, and in-depth knowledge of customers' business domain. The knowledge base of these business developers comes to good use when developing and evaluating neoteric ideas. They stay in close contact with their customers—customer relationships that have been built up over several years of cooperation, which enable them to pick up on new trends and ideas for further creative development. As the head of product development explained it:

*Our customers are more partners than it is a customer-supplier relationship. With a lot of the customers we have close personal ties, built up over several years of cooperation. They will often visit us, or we will visit them around the world where we talk about all sorts of things, and then they have seen something new or we have seen something new, which enables the creativity to blossom between us.*

These business developers are connected to customers' technological frames. They interact with the customers and communicate those frames to the rest of the development team. Because NavalSim is continually developing on the same software products, multiplying ideas is often a question of translating and transforming ideas to customers' technological frames through convergent production. In this process, both software and business developers play important roles as they identify new technology trends. Such trends contain ideas which then travel to the organization. For example, the CIO of NavalSim often receives emails from employees having spotted something new they can use. Business developers and individual employees in the development teams find inspiration and ideas on the Internet, business trips, trade conventions, and through interactions with customers.

These traveling ideas are subject to informal evaluation in context of existing software products. Everyone we interviewed at NavalSim agreed that their evaluation and creative processes are ad hoc during software development. However, dependent on the level of experience and the type of idea, different perspectives and opinions surface during evaluation in terms of how to adopt the idea. This results in a healthy debate that ignites a creative process that determines whether an idea is the best solution to the problem at hand or whether there are other ideas and better options. Hence, the informal evaluation of neoteric ideas at NavalSim is a creative process in which human actors with competing technological frames present and negotiate ideas. As such, the business developers apply frames obtained through customer interaction, while the software developers will rely on frames from years of experience with the existing software. Conflicts between the opposing frames result in experimentation with neoteric ideas.

Experimentation occurs when neoteric ideas are informally evaluated and the development team relates new inspiration to their practices. In this process, they often supplement the neoteric idea with ideas that translate and transform the original concept to suit their own development projects. These ideas often result in new technology projects. Nonetheless, when software or business developers create ideas that transform and translate neoteric ideas, the newly generated ideas do not reach an equilibrium state



immediately due to conflicting views between human actors. Instead, the ideas go through several iterations in which they are modified and recreated through comments and suggestions by colleagues before being embedded into new product or service innovations. When we asked the head of innovation at NavalSim whether they work with idea development, he answered:

*Definitely! People will often come up with an idea, when they can see that the potential is there but that the idea still needs some further development before you can determine if it is feasible to adopt.*

Such iterations entail negotiations between human actors because those involved need to agree on the future direction of ideas. At NavalSim, approximately 30 percent of adopted neoteric ideas go through several iterations and negotiations in the development team before arriving at solutions. As the head of product development at NavalSim said:

*An idea can come from an individual or a group of people. Depending on the level of experience and the type of idea, there will always be other perspectives and opinions as to how such an idea should be adopted. There will always be a healthy debate and creativity to determine if the idea is the best solution to the problem, or if there are other approaches to it.*

Because NavalSim works on software products with a 30-year-old code base, neoteric ideas must be translated and transformed to that particular context. Hence, the negotiations in NavalSim constitute convergent processes in which business and software developers play key roles in rejecting or multiplying and selecting ideas to adopt.

However, senior management is also an important gatekeeper of neoteric ideas at NavalSim. NavalSim rejects ideas quite often using formal evaluation parameters that do not involve sensemaking on the part of human actors. When neoteric ideas are formally rejected, the main reason is mainly budgetary restrictions imposed by either business developers or senior management. Time, prioritization, and access to resources are also causes for rejection. As the head of product development at NavalSim explained:

*It happens more often that we reject an idea than we approve it. We have a certain amount of hours a year we can use, and we have to prioritize among the many ideas we receive. We have to decide if we should go with the idea this year, reject it, or save it for later. We receive a lot more ideas than we have budget to deploy.*

When neoteric ideas are rejected on budgetary grounds, the rejection is based on an investment decision rather than as the result of an evaluation of its business value (Ward, Daniel, & Peppard, 2008). NavalSim uses business cases to both formally and informally evaluate neoteric ideas. The business cases are essential in formal evaluation. Predetermined evaluation parameters such as available resources can easily be identified. However, business cases or similar evaluation methods can also be applied to informal evaluation to identify problems, solutions, and benefits (e.g., Couger, 1996). Sensemaking plays, however, an important role in informal evaluation because it is based on both retrospective reflections and presumptive expectations. Human actors bracket ideas based on experiences, knowledge, and training, which helps them determine their business value. The head of innovation emphasized that ideas of a general nature were more likely to be approved because they can be used in several business settings, which increases the likelihood of the ideas multiplying into neoteric ideas and further increases their potential business value. His comment espouses Avital and Te'eni's (2009) theory of generative fit, according to which open-ended ideas and technologies are more likely to trigger human actors' generative capacity. Using our framework as a reference, such highly generative ideas also entail a higher degree of flux, which increases conflicts in negotiations and, hence, the potential for multiplication. In the case of NavalSim, such open-ended ideas are selected because they are less risky and more likely to succeed because they can be deployed in multiple settings. When human actors at NavalSim prioritize ideas with a high generative fit that are likely to multiply over time, such prioritization reveals that the interplay between informal evaluation and multiplication is an important aspect of their innovation capability. For NavalSim, such ideas are simply more valuable. In prioritizing ideas with a high generative fit, NavalSim places value on expert knowledge and having lively discussions during informal evaluation. These practices illustrate that conflicting interests impact adoption and rejection in informal evaluation, which leads to multiplication and increased value to the organization when resources and conditions supporting generativity are available.



## 4.2 Experimenting with Emerging Mobile Technologies in Karlstøvn Municipality

Karlstøvn is one of 98 municipalities in Denmark. Situated in Jutland, it comprises approximately 62,000 citizens. Karlstøvn has 5,500 employees and 240 executives across 17 different departments and is equal in size to a large corporation. The IT department provides services to the entire municipality through its 20 employees in charge of operations and support and the 13 employees who are part of a project and digitization management group. These two units face many of the same challenges as other Danish municipalities about digitizing the public sector, including increased government pressure to bring citizens closer to the public administration and to reduce unnecessary bureaucracy and expenses. Karlstøvn municipality's challenge is, hence, to rethink the use of IT as a strategic tool. The municipal IT strategy serves to foster a creative and innovative mindset among executives and employees across the organization to rethink the deployment of off-the-shelf IT systems to create value and push digitization forward.

Karlstøvn municipality has experienced users who reject ideas. The municipality was recently involved in a project focusing on personal digital assistants (PDAs) in care for the elderly. Implementing PDAs to care for the elderly was part of a larger nationwide mobile technology project across municipalities from 1998 to 2008 (Nielsen et al., 2014). The municipality viewed it as an innovation in care due to the potential for reducing time and costs, for enhancing communication between employees, and for easing access to information about the elderly in the municipality. However, the experienced learning curve in adopting the PDA technology was steep among users. In addition, the project was marred by technical problems concerning network coverage and adapting the PDAs to existing work practices. For example, users complained about the need for time registration in that they were under the municipality's surveillance. After several implementation attempts, the IT department discarded the PDAs and the underlying idea due to lack of business value. As the business developer in the municipality explained with regard to the project's failure:

*The employees started to complain about time registration, and that they felt they got monitored, and that there was no time for the elderly. When they got a PDA, they could not figure out how to use it, and sometimes there was no network coverage. In addition, we could only use the PDAs for the specific purpose it was developed for ... In the end, it did not provide needed benefits and it was discarded.*

When the employees and people from the IT department worked with the PDAs, they interacted with the neoteric idea behind the PDA. During this interaction, the human actors attempted to make sense of it. In doing so, they informally evaluated and bracketed the idea according to retrospective and presumptive frames based on their tacit and explicit knowledge. These were existing frames from the human actors' past experiences of and future expectations about mobility, technology use, and work practices. These frames served as evaluation parameters. However, in the case of the PDAs, the frames were inconsistent with the technology and the underlying idea. For example, the idea was counterproductive to employees' work practices, which were based on autonomy and trust. Furthermore, the mobile technology was immature. Additionally, the PDAs had a low generative fit. Similar to Avital and Te'eni's (2009) example of the iPod, the PDA idea was too narrowly focused. Therefore, the idea was unable to accommodate suggested changes or lead to new and alternative configurations.

In the end, the human actors were simply unable to make sense of the idea behind the PDAs based on their existing technological frames. The low generative fit of the idea prevented the human actors from using their generative capacity. The human actors from the IT department were, therefore, not able to spawn alternative solutions through multiplication that would lead to novel solutions in elderly care. Instead, the result of negotiations between the human actors in elderly care and in the IT department was to reject the PDAs. However, as later experiments with neoteric ideas have shown, this rejection also paved the way for the IT department to successfully introduce another mobile technology idea.

In 2012, mobile technology was again on the agenda when the IT department initiated an experiment with the local politicians to increase their technology awareness. In this experiment, the politicians were given tablet computers. Meanwhile, since tablet computers were developed for leisure purposes and only offered a few apps designed for the public sector, they had limited business value to the municipality in their existing form. Introducing this neoteric mobile idea caused concern in the IT department. As the project manager explained:

*Five years ago, we would not have implemented tablet computers in the organization as they did not fit into our concept. However, we can also see that we need to be ahead of new technological advances.*

Obviously, as employees and managers in the IT department informally evaluated and discussed tablet computers, the lack of internal business value raised questions concerning the economics and reasonableness of sponsoring the technology when benefits were indeterminate. Because the IT department had historically viewed technology as organizational artifacts delivering value, lack of obvious benefits was an implementation barrier. As the CIO explained:

*We did not implement tablet computers to use them for something—because we could not use them for anything. They could use its mail and calendar. That was basically it; because they were not developed for work but private use, where they could be used for a lot of different things ... This was a barrier we had to overcome, because we used to think about technology as something that must deliver something. Here, we did not deliver anything.*

However, the tablet computers had two advantages over the PDAs. First, the mobile technology had incorporated ideas concerning usability into its design. Second, the technology was an open platform with a high generative fit. More importantly, when the IT department reintroduced the mobile technology idea through new tablet computers, they also introduced a neoteric idea about its deployment. It differed substantially from previous experiences with technology deployment by allowing for human actors to emergently discover value rather than predetermining it in advance. Instead of predetermining the business value as in the PDA case, the tablet computers were introduced as an experiment not serving specific purposes other than increasing the politicians' knowledge about digitization. To obtain approval from politicians, the CIO argued that the experiment would provide long-term benefit to the entire organization. The tablet computers would not improve business performance in measurable terms. Instead, they would enhance the politicians' understanding of contemporary technology's potential. As the CIO explained:

*It was also an experiment to encourage people to see opportunities in the technology ... The tablet computers have put new demands on the technology. But we did not establish any guidelines ahead of time regarding how it should be used.*

From the perspectives of sensemaking and the traveling of ideas, the IT department introduced and consolidated the tablet computers as an idea of mobile technology experimentation in the organization. The IT department informally evaluated the idea of using tablet computers based on existing technological frames. In their eyes, tablet computers did not constitute something substantially new because they could be related to previously created frames from their experiences with PDAs. This allowed them to identify benefits of the tablet computers above those of the failed PDA project. For the IT department, the challenge was translating and transforming the tablet computers to the organizational context and convincing the politicians of the technology's merits despite the PDAs' failure. Informal evaluation resulted in the idea of experimenting with the tablet computers. This constituted a paradigm shift for the IT department in how to evaluate technology and accepting value as emergent. The IT department had to consolidate different knowledge domains to combine value identification with experimentation and to multiply ideas from previous practices into a neoteric idea. Through divergent production, the department consolidated two semantically different ideas into one that politicians and the IT department had to make sense of.

The experiment had an overwhelmingly positive effect. Even though the politicians were skeptical from the outset, they soon began interacting with the new tablet computers and negotiated their future development with the IT department. Through these negotiations and their interactions with the tablet computers, both parties created their own frames of reference with regard to the technology. This process allowed them to generate novel ideas in terms of how to provide business value for the municipality. As a result, introducing the tablet computers entailed a multiplication effect, a translation that led to novel ideas and demands for future use of the tablet computers. As the business developer from the municipality explained:

*We gave the users the tablet computers and they said: "I can check my mail and my calendar; what else can I use it for?" Then we had to tell the users that it was all they could use it for. They could only use it for mail or checking the calendar, and maybe read a PDF or take a*

*picture. Then we got demands: "why can I not access the ESDH<sup>3</sup> system; why can I not access my casework files etc?"*

Hence, when the politicians started using the tablet computers, they informally evaluated the ideas behind the tablet computers. They bracketed the ideas in existing frames based on previous work practices by using other technologies. New ideas arose that they brought into negotiations with the IT department. For example, conflicts arose with regard to technological frames based on institutionalized ideas from experiences with, for example, the ESDH system. The politicians discovered that the technology did not fit their frames of reference with regard to work practices and existing technologies, such as casework management and the system used for document handling. This conflict in terms of technological frames came as a surprise to the IT department because it had framed the mobile technology idea as an experiment to increase the politicians' knowledge about digitization. The result was multiplication through convergent production that created new ideas that translated and transformed the tablet computers to the context of the politicians. These ideas, in turn, changed both the politicians' and the IT department's interpretation and perception of the mobile technology, which enabled them to make sense of it. As such, this multiplication had implications for mobile technology adoption in Karlstamn municipality. The business developer further elaborated on these implications:

*It actually makes it a bit difficult to follow the development because as soon as they receive the technology they put new demands on us ... This is a huge challenge for the IT infrastructure, which we have to overcome.*

By allowing experimentation with the tablet computers, the IT department triggered the politicians' ability to informally evaluate the technology when interacting with and making sense of it. During this evaluation process, the politicians generated ideas and, thus, translated and transformed the tablet computers to their existing technological frames and work practices, which, in turn, reduced the flux represented by the neoteric idea. Moreover, these ideas enabled the politicians to negotiate future technology development with the IT department. During these negotiations, the IT department had to reevaluate the ideas behind mobile technologies. This coincided with the tablet ideas challenging the IT infrastructure and the IT department in handling the constant flow of user requirements (i.e., demands for new functionality). The IT department quickly realized that the increased demand for information on different devices would require them to provide alternative mechanisms for delivering information.

Looking back on the previous PDA project, the business developer in the municipality argued that the culture surrounding mobile technologies had changed and that the project outcome would be different today if the users were provided with smartphones or tablet computers. For example, users from the failed PDA project would be able to draw on their own personal experiences with similar consumer electronics, which would render them less hostile toward using mobile technologies at the workplace. The business developer explained the changing user mindset:

*I think that if we re-think it today and provide them with smartphones, we would receive user requirements about how to use it.... Today, they would probably say: "nice that we have this smartphone" because they could make calls and use it to receive information about citizens, medicine, and stuff like that. A change in culture has happened, and tablet computers and smartphones are part of that, because people perceive it as being smart and handy. However, from an IT viewpoint it is not really mature for business implementation.*

Interpreting this change via sensemaking theory, the users gathered ideas from previous experiences with mobile technology (the PDAs) and their private use of such technologies. Even though the PDA project failed, the ideas behind it have become institutionalized in the organization as human actors interacted and negotiated with them. Retrospective reflections and presumptive expectations based on institutionalized ideas assisted the users and the IT department in generating neoteric ideas. Such sensemaking activities relate to Orlikowski's (2000) perspective on technologies that reemerge from "black box" states when human actors receive training, gain new experiences, and change their perceptions of technology use. In this process, the human actors in Karlstamn municipality bracketed the ideas in existing technological frames and, thereby, facilitated technology adoption and implementation.

The result of experimenting with mobile technologies in the municipality was a neoteric idea for a platform independent meeting and project portal that was accessible anywhere regardless of device and operating

<sup>3</sup> Electronic System of Document Handling.

system. This idea was the result of negotiations between the IT department and the politicians. In order to meet the politicians' increasing demands, the IT department informally evaluated and multiplied the flux of politicians' ideas according to their own institutionalized technological frames. As such, the platform idea incorporated knowledge from the IT department's previous experiences with inflexible mobile devices and the politicians' demand for flexible access to various information systems. As such, the platform idea enabled both the IT department and the politicians to reach consensus in their negotiations concerning the mobile technology. In turn, this consensus regarding the value of the technology provided the necessary impetus for adoption and institutionalization.

This process illustrates the inner workings of informal evaluation and the multiplication of ideas. In this evaluation and sensemaking process, the IT department drew on ideas from different knowledge domains in their negotiating with the politicians. For their part, the politicians generated new ideas during this process. Both parties informally evaluated the ideas and bracketed them in existing frames based on previous experiences with mobile technologies. The end result was multiplication, translation, and transformation of the tablet computers into an idea that both parties could make sense of; namely the neoteric idea of a meeting and project portal. This idea met the politicians' demands, eased negotiations between the stakeholders, and facilitated the adoption of mobile technology that had previously been rejected.

The process of identifying and creating value was informal throughout the evaluation. In the beginning, the mobile technology idea had little or no value in the eyes of the human actors. However, the informal evaluation process resulted in value being created as the human actors identified aspects that were inconsistent with their institutionalized knowledge, multiplied those ideas, and adopted the emerging solution.

### 4.3 Summary of the Illustrative Vignettes

Both cases demonstrate that ideas are often "black boxed" through adoption or rejection when human actors informally evaluate the ideas and are engaged in negotiations as part of the sensemaking process. Additionally, in both cases, there were clear signs of multiplication. At NavalSim, ideas multiply when software and business developers pick up on ideas from customers or technologies and translate and transform them into their own practices. Moreover, at Karlstovm municipality, the human actors involved developed neoteric ideas through social interaction that involved the approval of all parties in the sensemaking process (Hirschheim & Heinz, 1989). A neoteric idea that allowed the municipality's IT department and politicians to experiment with tablet computers quickly became a driver for divergent production in the municipality. By trying to make sense of this mobile idea, human actors created multiple neoteric ideas over time. These ideas were then institutionalized, which restarted the sensemaking process.

## 5 Discussion: Creativity and Emerging Technologies as a Duality

We begin this paper by investigating the outcome of sensemaking when evaluating ideas. We present a framework based on theoretical perspectives in the existing literature and provide three possible outcomes of informal evaluation—rejection, adoption, and multiplication. We elaborate on and exemplify these outcomes through illustrative vignettes that corroborate our theoretical presuppositions. Subsequently, in this section, we highlight our contributions, offer directions for future research, and describe the limitations of our research.

### 5.1 The Intertwining of Neoteric and Institutionalized Ideas

We argue that human actors often focus on ideas previously institutionalized through technological artifacts to make sense of neoteric ideas. As such, we propose that we can view organizational creativity as a social system of idea generation and institutionalization. This system is a continuous process of sensemaking through which ideas are constantly evolving and institutionalized in the form of novel artifacts, practices, and norms regarding their use in organizations. This theoretical interpretation addresses important knowledge gaps in the existing literature. First, it connects the institutionalization of neoteric ideas with human actors' ability to creatively act on their informal evaluation of ideas. Second, it emphasizes the recursive nature of human interaction with technology (Orlikowski & Scott, 2008) both in making sense of it on a conceptual level (the neoteric ideas) and in institutionalizing the ideas in the form of innovative technologies.



Some scholars (e.g., Ancona & Caldwell, 1992; van Knippenberg, De Dreu, & Homan, 2004) argue that involving human actors with diverse backgrounds and knowledge may actually impede creativity and limit the exchange of ideas because of conflicting interests among people. We subscribe, however, to the perspective that bringing different human actors into the sensemaking process creates opportunities for interacting with people who have varying perspectives and approaches to work (see, e.g., Amabile, 1998; Cooper, 2000; Tiwana & McLean, 2005). This diversity of viewpoints fosters novel pathways of thought and action and, ultimately, stimulates creativity—such as linking ideas from multiple sources and seeking innovative ways of performing tasks. Both case studies demonstrate that previous and new experiences play a major role in developing neoteric ideas. The case of Karlstown municipality demonstrates that the culture of organizations can be amenable to change and display flexibility between periods of change and stability. Karlstown went from a period of the mobile technology idea being relatively stable, "black boxed", and rejected to seeing it remerge from its "black box" state in a neoteric form, which changed human actors' perspective of delivering IT. During this period of change, human actors generated ideas about how to digitize work practices by experimenting with tablet computers and by allowing employees to share institutionalized ideas and integrate them with new input from others. The ability of human actors to reflect on their own practices and experiences is an important factor affecting their ability to evaluate and generate additional ideas. When human actors receive new input from the world around them, they reflect back on previously institutionalized ideas, which helps them organize the incoming flux (Weick et al., 2005). The case of NavalSim corroborates this observation because sensemaking and technological framing has enabled business developers, executives, and customers to find common ground in informally evaluating neoteric ideas and translate and transform them to fit the development of software. The case also demonstrates that the customer interaction at NavalSim was a driver in generating such ideas.

## 5.2 Adoption, Rejection, and Multiplication through Sensemaking

Both research and practice are dominated by a view of evaluation as a process that is separate from creativity (Blohm & Riedl, 2011; Elam & Mead, 1990; Elfvengren, Kortelainen, & Tuominen, 2009; Girotra, Terwiesch, & Ulrich, 2010; Osborn, 1953; Osterwalder & Pigneur, 2010; Sawyer, 2003). However, as Sawyer (2003) points out, conscious and preconscious evaluation may work in parallel with creative performance and is isomorphic to social processes when creative people adopt them. Similar to Sawyer (2003), we challenge this dominant perspective on idea evaluation from a sensemaking perspective. Sensemaking helps human actors understand their surroundings by drawing on frames, which are shaped by past ideas having become institutionalized and that are part of experiences, knowledge, professional norms, and training. By doing so, we challenge the dominant view of seeing idea evaluation as being separate from the creative process. Instead, we demonstrate that evaluation is flexible and fosters creativity when it is informal. Moreover, we argue that informally evaluating neoteric ideas based on existing frames determines whether those ideas are rejected, adopted, or stimulate creative action (multiplication) in the face of conflict. During this process, we argue that sensemaking in informal evaluation plays an important role in whether organizations institutionalize and continuously develop ideas.

In summary, our framework describes three scenarios: when human actors use sensemaking to bracket neoteric ideas in existing frames of institutionalized experiences, knowledge, professional norms, and training, those ideas and technologies 1) reach a temporary equilibrium state through adoption, 2) are rejected, or 3) are multiplied into new ideas. However, this is a complex and dynamic process of interaction, communication, and negotiation involving different human actors that eventually leads to adoption or rejection. When different human actors cannot bracket novel ideas in existing frames, ideas risk being rejected before they are institutionalized. For example, the ideas behind tablet computers in Karlstown municipality acted as a catalyst for creative thinking when users required additional information to make sense of them. The IT department responded to user demands by embedding those ideas in a meeting and project portal. Hence, the sensemaking process associated with using the tablet computers resulted in multiplication, which led to new requirements, novel ideas, and the institutionalization of those ideas in the organization.

Multiplication may occur when human actors experience conflict in deciding between adopting or rejecting an idea. Such conflict may come from lack of information about the idea. At NavalSim, groups translate and transform ideas through conflicts during software development. Business and software developers bring neoteric ideas to the table, which developers and managers then discuss, modify, or are inspired by, and later include in new software products. Many ideas are rejected. They have directly implemented some, while others have gone through several iterations of multiplication before managers and developers could make sense of them. Thus, when multiplication occurs, human actors attempt to negotiate or



renegotiate an idea until they are able to bracket it in known frames. This process creates neoteric ideas supporting the original idea by further developing it, which makes it meaningful to the human actors. Such a process may lead to two outcomes. First, the iterative development process plays out over time, leading to institutionalization to the extent that human actors adopt or reject the idea or technology, which removes sources of conflict. Regardless of an idea or technology's generative fit, the actors' generative capacity may be reduced during this process (i.e., their capacity to spawn novel configurations of the idea). The generative capacity is reduced through institutionalization along with the diminishing flux—and, hence, the potential source of conflict—that the idea represents. This may happen when existing ideas and emerging technologies are transformed into new technology structures through continuous design, development, adoption, and mediation. Hence, ideas stay “black boxed” until human actors enact them once again due to new input (Orlikowski, 2000). Metaphorically speaking, if the generative capacity is a car and the flux imposed by neoteric ideas is the fuel that powers the car, then the car will stay put when out of gas until refueled by the driver. For example, the sensemaking process may be restarted when an idea is transferred to a new department in the same organization or to a new organization. After having been “black boxed” for years, the failed PDA project reemerged in Karlstov municipality. Technological frames from the PDA project enabled human actors in the IT department to make sense of a neoteric mobile idea (the tablet computers) and guided them in deciding what to do and what not to do. Second, multiplication results in something completely new as human actors generate, consolidate, and integrate neoteric ideas into emerging technologies, which replaces existing patterns of thought and creates new flux that refuels the sensemaking process. For example, NavalSim has often implemented open-ended ideas because these ideas increased the likelihood it would create technologies with novel properties. Karlstov municipality has integrated ideas that were generated during the mobile technology experiment into a platform independent meeting and project portal. During this process, Karlstov municipality developed new ideas and, thereby, created new flux that fuelled the sensemaking and multiplication process. In both cases, idea multiplication and technological innovation were iterative processes of informal evaluation, sensemaking, creativity, adoption, and institutionalization.

Distinguishing between generative fit, generative capacity, and multiplication is important. An idea's generative fit is its ability to provoke new ways of thinking and challenge existing equilibriums, which enable the generative capacity of human actors to spawn novel configurations (Avital & Te'eni, 2009). Thus, multiplication connects generative fit and generative capacity, which is just as important for creativity as the available resources in the organization. Multiplication for its part sheds new light on negotiations between human actors as an integral part of sensemaking processes.

Correspondingly, multiplication helps managers in various ways:

- It provides an in-depth understanding of how organizations prepare themselves for receiving neoteric ideas by experimenting with, for example, technologies without any predefined value.
- It facilitates knowledge sharing among human actors. We provide an understanding of how to use such knowledge to channel conflicts between human actors into organizational creativity.
- It may help practitioners in their innovation management planning by suggesting that ideas are part and parcel of innovative product and service technologies. Hence, experimenting with technologies embedded with neoteric ideas may facilitate creative thinking and multiplication of those ideas.
- It encourages managers to view resistance to neoteric ideas as a source of inspiration rather than an implementation obstacle that needs to be overcome. The tension between rejection and adoption stimulates creative thinking and technological development, and resistance helps managers identify ideas and opportunities for adoption and technologies for further development.

### 5.3 Future Research Directions

In paper, we discuss the concepts of informal evaluation and multiplication. We present an integrated framework of the interplay between neoteric ideas and organizational institutionalization. Though we do not claim it to be a parsimonious theory, we believe the multiplication concept to advance our understanding of the isomorphic relationships between creativity and creative products (i.e., innovative technologies). Our framework may advance research into how ideas travel between and in organizations by consolidating various attributes of organizational creativity into one multiplier. Multiplication sheds light on the dynamics of creativity and institutionalization in organizations (Ulrich & Mengiste, 2014) and helps researchers better understand the role of informal evaluation in creativity and innovation. Knowledge of

idea multiplication may help researchers create models for resource allocation to creative activities (Seidel, Müller-Wienbergen, & Rosemann, 2010) or promote future studies of creativity and technology development practices (Aaen & Jensen, 2014; Aaen, 2008). Furthermore, understanding multiplication in creativity and innovation helps researchers address the negative aspects of formal idea evaluation (e.g., prematurely eliminating ideas (Girotra et al. 2010) and subverting task motivation (Amabile, 1996, 1998)). Such research is easily extended to group creativity support systems (Di Gangi & Wasko, 2009; Müller-Wienbergen et al., 2011) or other information systems, such as idea rating systems in creative communities that continually evaluate novel ideas and other creative products (Blohm & Riedl, 2011).

We encourage future research to further empirically validate our claims. Such research may include in-depth case studies of high-tech organizations (Walsham, 1993, 1995, 1997, 2006) or additional experiments with idea generation using creativity support systems (DeRosa, Smith, & Hantula, 2007; Elam & Mead, 1990; Massetti, 1996). Moreover, the presented framework is an interpretation of organizational creativity that adds the time aspect and the traveling of ideas to similar management perspectives on organizational creativity (e.g., Amabile, 1983). Hence, we suggest developing creativity-assessment tools (Amabile, Conti, Coon, Lazenby, & Herron, 1996) that provide quantitative data for measuring idea and technology multiplication. Such tools may be combined with other assessment tools such as Amabile's (1989) creative environment scale or modified versions of the technology acceptance model (Venkatesh & Davis, 2000). Such tools may help researchers and practitioners measure the potential for multiplication in specific ideas and technologies by assessing their generative fit and generative capacity (Avital & Te'eni, 2009), available resources (Seidel et al., 2010), and conflicts between stakeholders (Brody, 2003; Robey, Smith, & Vijayasarathy, 1993).

In addition to the proposed suggestions for future research, our own research in progress includes an application of the presented framework. This research has three aims. First, the research includes an in-depth systems theory analysis (Dhillon & Ward, 2002; Dhillon & Fabian, 2005; McBride, 2005) of evaluation frameworks supporting formal and informal idea evaluation. We seek to elaborate in detail on the inner workings of multiplication during informal evaluation and explain why formal evaluation is unable to support multiplication. Second, we have conducted a prototypical laboratory experiment (Malaga, 2000) of formal and informal idea evaluation to test whether they motivate creative thinking. Third, we have conducted a field experiment (Bryman, 2004) using a creativity support systems prototype. This external research provides practice-based evidence that supports the framework we present in this paper. We synthesize the contribution in a design theory (Gregor & Jones, 2007) for group creativity support systems. Our research in progress is currently being reviewed for publication.

## 6 Concluding Remarks

In this paper, we demonstrate the importance of making sense of ideas during informal evaluation in organizations. We highlight sensemaking's pervasive influence in the iterative process of framing novel ideas and institutionalizing them in practices and emerging technologies in organizations. Grounded in state-of-the-art IS-based creativity research and Scandinavian institutionalism, we establish a theoretical framework that promotes an understanding of the isomorphic relationship between creativity and informal evaluation in organizations. The framework suggests that neoteric ideas face adoption, rejection, or multiplication and, eventually, reach an equilibrium state through institutionalization when human actors engage in sensemaking. This framework helps address important issues in IS and organizational research, including group creativity support Systems, idea evaluation, and resource allocation.

Our research asks a fundamental question about the nature of creativity and ideas by exploring the implications of sensemaking and technological frames. Hence, our framework raises new questions for future research to address. For example, is future technology development conditioned by the multiplication of neoteric ideas as human actors interact with and make sense of them when those ideas travel between organizations? Our theoretical framework provides an opportunity for future institutional research to explore this and other questions. For IS researchers, this study paves the way for creating new models of creativity and technology development. Researchers may establish new assessment tools for organizational creativity and technology development practices based on the concept of multiplication. Furthermore, our framework indirectly opens for new questions and research opportunities regarding the evaluation of ideas and emerging technologies. For example, the massive multiplication of ideas may influence the negotiated order of organizations and hinder the diffusion of useful technologies. Overall, this study addresses an important issue in IS and organizational research that is ripe for further exploration.

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