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Enterprise Crowdsourcing and Organizational Culture: Lessons from an Engineering Consultancy

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Abstract. *Although enterprise crowdsourcing systems that aim to harness the collective intelligence of employees for innovation purposes are proliferating, little is known about how they may impact organisations and their culture. To shed light on this problem, this paper conducts a case study to investigate an engineering consultancy's efforts to implement an internal crowdsourcing as part of an effort to change the innovation culture of the organisation. Taking the starting point in the literature on the relationship between IT and organisational culture and enterprise crowdsourcing, this paper underscores the interplay between innovation culture and information technology. Our study finds that enterprise crowdsourcing systems can contribute to small changes of the innovation culture of an organisation along several cultural determinants, including behaviours that encourage innovation, communication and knowledge sharing, employees' relationships, support mechanisms and strategy.*

Keywords: organisational culture, innovation culture, enterprise crowdsourcing, social media, case study

Introduction

Crowdsourcing draws on the collective intelligence of the crowd to collect new ideas for innovation purposes (e.g. Malone et al., 2010; Brabham, 2010). Most of the literature investigating crowdsourcing focuses on populations that are external to an organisation and they often take a business to consumer approach (e.g. Lakhani & Kanji, 2008; Huston & Sakkab, 2006; Lakhani, 2008). Organisations that have followed this crowdsourcing model include: InnoCentive, an online platform where money is offered in exchange for the solution of problems (Lakhani, 2008); Threadless, an Internet t-shirt company, whose designs are created and selected by users (Lakhani & Kanji, 2008); and Fiat Mio, an initiative begun by Fiat through which a car can be created following the user's suggestions. However, crowdsourcing systems that try to harness the knowledge of the employees within an organisation boundary have recently flourished (Andriole, 2010) and are here referred to as enterprise crowdsourcing systems. By following Vucovic et al. (2010), we define enterprise crowdsourcing as the applicability of crowdsourcing methodology within the enterprise, thus engaging an internal network of knowledge workers. One of the studies focusing on enterprise crowdsourcing was conducted by Bjelland and Wood (2008), showing how IBM leverages its firm-wide intelligence located at geographically dispersed sites through a process called *innovation jams* to collect ideas from employees and partners for innovation. However, the successful introduction and use of IT systems such as enterprise crowdsourcing systems in an organisation may often be intertwined with the vision and culture of the organisation. Zuchowski et al. (2016) in a thorough literature review show that internal crowdsourcing may be used for management of corporate culture and change. In addition, many authors have investigated the relationship between culture and information and communication technology in different contexts (e.g. Martínez-Caro et al., 2020; Koch et al., 2013; Leidner & Kayworth, 2006; Doherty & Doig, 2003; Doherty & Perry, 2001; Pliskin et al., 1992). For example, Alavi et al. (2005) explore how organisational culture influences knowledge management practices within a large global information services company and one of its knowledge communities. Similarly, Coombs et al. (1992) argue that information is intimately linked with power-knowledge relations and suggest that the three concepts of culture, control and competition provide additional insights for the study of the development and application of information and communication technologies in organisations. Given this background, in this study we are interested in investigating how an engineering consultancy has

used enterprise crowdsourcing in an attempt to influence innovation and innovation culture and we will investigate the following research question: “How has an engineering consultancy employed an enterprise crowdsourcing system in hope to influence innovation culture in the organization?

To answer the research question we conduct an i case study of the strategic introduction of an enterprise crowdsourcing system called *IdeaExchange* at an engineering consultancy for the purpose of influencing innovation and innovation culture at the organisation; thus, contributing to the limited literature on the impact of ICT on innovation culture. Following the presentation of our theory in the next section, we then present the method, a description of the case, and the crowdsourcing process and the analysis. This paper concludes by discussing our findings, and it draws a number of theoretical and practical implications.

Theoretical Grounding

Enterprise crowdsourcing

The term crowdsourcing, derived in part from Surowiecki's (2005) notion of the *wisdom of crowds*, refers to an emerging set of approaches that take advantage of a large number of distributed users connected by online networks in order to solve problems, perform micro tasks, provide ideas, or otherwise leverage the superiority of large aggregations of people over individuals (Brabham, 2010; Howe, 2006).

Usually, the term *crowdsourcing* refers to the use of the collective intelligence of the crowd located outside the organisational boundaries, often represented by customers and users as in the case of InnoCentive@Work (e.g. Hutter et al., 2011; Andriole, 2010; Boudreau et al., 2011; Brabham, 2010).

In using crowdsourcing for innovation, a company can post a problem online and a vast number of individuals offer solutions to the problem, the winning ideas are awarded some form of a prize, and the company produces the idea for its own gain.

A number of studies have pointed out the benefits and limitations of crowdsourcing for innovation, including intellectual property management, issues related to the transfer of tacit knowledge, as well as challenges for user involvement (e.g. Pisano, 2006; von Hippel, 1994; Nambisan et al., 2008). In addition, theories of organisations as knowledge creating entities (e.g.

Nonaka, 1994) or learning organisations (Senge, 1992) have emphasised the potential knowledge that circulates within a company and is embedded in each company employee. As a consequence, a number of social media aiming at harnessing the collective intelligence internal to the corporation (Malone et al., 2010) have lately appeared on the market. This has been referred to as enterprise or internal crowdsourcing (e.g. Zuchowski et al., 2016) and is characterised by the fact that the crowd is well defined and limited to the organisational boundaries. The advantages of this approach include relieving concerns with appropriability of the ideas generated (Pisano, 2006).

Culture and innovation

Culture is defined here in terms of the core set of behaviours, values, attitudes, and practices that are shared by members of a firm (Schein, 2010; Tellis et al., 2010). Innovation culture is defined as a culture that is able to see connections, spot opportunities, and take advantage of them, leading to the unpredictable emergence of new products, new services, and organisational innovation and not only developing along established trajectories towards a well-defined endpoint (Tidd & Bessant, 2009; Svendsen, 2011). Martins and Terblanche (2003) state that the organisational culture, as measured through dimensions such as strategic vision and mission, leadership, and customer focus may influence innovation. This may be done through a number of determinants, including strategy, employee relationships, and behaviours that encourage innovation (see Table 1). Most of the literature on culture and IT investigates the impact that an organisational culture may have on the implementation and assimilation of IT within the organisation (e.g. Coombs et al. 1992; Leidner & Kayworth, 2006). However, a number of studies also suggest that there is a potential to use IT to influence innovation and cultural change within organisations (e.g. Sathe & Davidson, 2000; Leavy, 2005; Pliskin et al., 1993). For example, da Cunha and Orlikowski (2008) show how IT when used for information and knowledge sharing can influence organisational change and innovation. However, Markus (2004), even though not explicitly talking about organisational culture, argues that for radical organisational changes to take place there is a need for what she defines as techno-change, which is defined as change processes where IT solutions and organisational elements are mutually aligned to create sustaining change. During this process, Markus (2004) argues that the organisation culture may be affected; however, it is not IT per see but rather the organisational setup that creates these changes. Koch et al. (2013) aimed to shed light on social media's impact

on organisational life by investigating a global security company's efforts to implement a digitally enabled social network as part of a cultural change effort. Their study show that conflicts can arise between employees' workplace values and the values that they ascribe to social media. This can result in an IT–culture system conflict, which organisations can address using policy-based, socialisation-based, and leadership-based mechanisms aimed at bringing cultural values and social media site values into alignment. Therefore, careful change management is required in using crowdsourcing for transformation to an innovation culture that supports openness and transparency across departments and hierarchical structures In addition, it requires managers to decrease control and monitoring of employees, and rely instead on openness and social feedback as alternative coordination mechanisms (Abu El-Ella et al., 2013).

Determinants of organisational culture for innovation

Drawing on previous work on organisational culture and organisational innovation (e.g. Martins & Terblanche. 2003; Sarros, 2008; Dobni, 2010), crowdsourcing (e.g. Zuchowski et al., 2016) and Markus's (2004) work on technochange's implications for organisational culture, we develop below an overarching framework of determinants of organizational culture to guide and structure the analysis. Such framework mainly draws on the premise of Martins and Terblanche's (2003) work and identifies five determinants of organisational culture that may influence innovation and that may relate to the strategic introduction of a crowdsourcing system within an organisation.

Innovation Strategy. Previous literature has established that leaders can be the architects of culture change within organisations through the important actions or roles that they have in the organisation (Schein, 1984, 2010; Trice & Beyer, 1993). For example management can establish a shared vision and direction for innovative behaviour within a company by formulating strategies that focus on and encourage innovation; therefore, influencing the culture of the organisation (Schwartz & Davis, 1981; Sarros, 2008; Martins & Terblanche, 2003). Successful innovation has been described as chaos within guidelines in the sense that management formulates strategic goals within which employees have the freedom to unfold their ideas (Nonaka, 1991). However, it is important for the employees to understand the gap between the current situation and the vision to be able to behave in a more innovative direction.

Structure and employee relations. Employee relations including the chain of command—such as hierarchical structures, decision making, autonomy and empowerment—are important to foster a culture that is stimulating and which encourages innovation (Tornatzky & Fleischer 1990; Martins & Terblanche, 2003; Gray et al. 2011). Previous literature shows that structural characteristics such as flat organisational structures, empowerment and participative decision making promote innovation, while specialisation, formalisation, centralisation and standardisation hinder innovation (Amabile et al., 1996; Martins & Terblanche, 2003).

Support mechanisms. Support mechanisms such as intrinsic and extrinsic rewards, recognition, and availability of resources such as time and information technologies are important to foster innovation within an organisation (Martins & Terblanche, 2003; Tushmann & O'Really, 1997; Amabile et al., 1996). For example rewarding innovative behaviour will reflect an important value for the organisation and it might become the dominant way of behaving. Several researchers (Tushmann & O'Really, 1997; Amabile et al., 1996) have pointed out, however, that many organisations hope that their employees will think more innovatively but reward well proven and trusted ideas instead of rewarding risk taking and innovative ideas and behaviour.

Behaviours that encourage innovation. Another important determinant influencing a culture fostering innovation is the establishment of behaviours encouraging innovation, such as generation of new ideas, risk taking, support for change (Martins & Terblanche, 2003). In addition, a fair evaluation of the ideas would also promote innovation .However, it is important to establish channels where these ideas can easily be spotted by the decision makers in the organisation to avoid that ideas get lost in the bureaucracy and hierarchal organisational structures and that valuable ideas get implemented.

Communication and knowledge sharing. Intraorganisational collaboration and communication has often been pointed out to be beneficial for the innovative performance of firms (Martins & Terblanche, 2003; Faems et al., 2005). Similarly, sharing knowledge about work tasks, products, services, and expertise throughout the organisation is fundamental to innovation (Grant, 1996; Nonaka & Takeuchi, 1995). Kivimäki et al. (2000), for example, found that a participative climate and interaction between the personnel in R&D, marketing and production were related to perceived innovative effectiveness. Historically, organisation-wide knowledge sharing has been done by subgroups who do not generally share their knowledge throughout the organisation as,

for example, in the case of discussion forums or through a centralised process of either managers moderating organisation-wide discussions or constructing or populating repositories (Alavi & Leidner, 2001).

On the basis of this brief literature review, we expect that the strategic introduction of an enterprise crowdsourcing system in an organisation may stimulate innovation and innovative behaviour.

Table 1: Determinants of organisational culture influencing innovation

Determinant	**Explanation**	**Literature**
Innovation Strategy	Management establish a shared vision and direction for innovative behaviour within a company by formulating strategies encouraging innovation.	Schein, 1984, 2010; Trice & Beyer, 1993; Schwartz & Davis, 1981; Sarros, 2008; Martins & Terblanche, 2003; Nonaka, 1991
Structure and Employee Relations	Shared decision making, involvement of employees in decision making in relation to innovation instead of preference to centralisation within a group of key managers and hierarchical structures.	Koch et al., 2013; Martins & Terblanche, 2003; Amabile et al., 1996; Morgan, 1998; Pliskin et al., 1993; Tornatzky & Fleischer, 1990
Support mechanisms	Rewards, recognition, availability of resources such as time and information technology to support innovation activities.	Tushmann & O'Really, 1997; Amabile et al., 1996; Martins & Terblanche, 2003
Behaviours that encourage innovation	Encouraging the generation of innovation ideas in response to changes in the environment.	Pliskin et al., 1993; Tushman & O'Really, 1997; Amabile et al., 1996
Communication and knowledge sharing	The importance of collaboration and communication among employees within and across organisational departments to achieve innovation in line with overall organisational goals. This is reflected in the amount of encouragement given to sharing information and knowledge in relation to innovation activities.	Grant, 1996; Nonaka & Takeuchi, 1995; Kivimäki et al., 2000; Street & Meister, 2004; McAfee, 2006; Gray et al., 2011; Faems et al., 2005; Alavi & Leidner, 2001; Bock et al., 2005; Treem & Leonardi, 2012

Research Method

Given the type of research question ("How") and the purpose of the study, a case study of a Danish engineering consultancy (EngineeringCo) was conducted to understand how an organisation uses an enterprise crowdsourcing system to stimulate innovation and cultural changes in an organisation. A case study is considered an appropriate research method to investigate real-life contexts, such as the use of enterprise crowdsourcing where control over the context is not possible (Yin, 1997). Inspired by Yin (1997) and Ravishankar et al. (2011), Table 3 summarises the steps taken to ensure reliability and validity during the study.

Although the level of analysis is the organisation, we draw on the perspectives of the employees, managers and senior executives as key informants, an approach that has also been used in other studies (Glisson & James, 2002; Sarros et al., 2008). The main data collection method was semi-structured interviews with open-ended questions. The interviewees included key relevant employees, project managers and directors dealing with innovation and crowdsourcing at EngineeringCo as well as the crowdsourcing platform provider (See Table 3 for details about the interviews). Moreover, an ongoing dialogue with the case company has taken place in order to identify any misunderstandings and to obtain additional insights both by telephone and by e-mail.

Table 2: Reliability and validity of the data

Reliability Through		Validity Through
1. Case study protocol. Informant profiles and contact information. Representative list of interview questions. List of other potential themes to be explored in the interview.	2. Case study database. Recorded audiotapes. Interview transcripts of each unit. Transcripts of e-mail and telephonic discussions with informants.	3. Multiple sources of evidence: Interview transcripts; telephone and e-mail discussions; IdeaExchange software platform access; information available on the web sites of the company and the social media

	Company documents relating to the mixed crowdsourcing process, websites, access to IdeaExchange.	service provider; documents provided by the company. 2. Establishing chain of evidence: In the case description, we have cited extensively from the contents of the case study database. “The circumstances of each data collection activity” was carefully recorded, and the data collection closely followed the case study protocol (Kirsch 2004). Thus, the chain of evidence presented helps link the empirical material with the findings. 3. Review of case drafts and article: The initial draft of the case was reviewed by the company.

The knowledge and innovation director provided access so that we could conduct fieldwork in the company, giving us legitimacy and credibility with the interviewees. He pointed out a few of the key people to interview at first, including the marketing manager and the manager in charge of implementing the crowdsourcing process. In addition, the innovation director gave them permission to pinpoint other relevant people to interview. The respondents were all involved with the crowdsourcing process, either as planners or as users. A few *non participants* have also been interviewed to understand reasons for not contributing with ideas to the crowdsourcing

process. In total, we conducted 27 interviews, as summarised in Table 3. We combined strategic appointing of key informants through snowballing with convenience sampling to randomly appoint *average* participants. . First, we interviewed three key informants who were involved in the planning and management of the crowdsourcing process. These interviews were based on individual interview guides, which lasted 1–1½ hours each. For subsequent interviews, we requested different profiles of active and less active participants, as well as informants from the company headquarters and from regional offices. For the interviews that were conducted in the regional offices, we used Skype or the telephone. Later, we visited the headquarters and randomly interviewed employees who were present at work that day. These interviews focused on participation to the crowdsourcing process and followed a generic interview guide with semi-structured questions (a long version for the profiled interviews and a short version for the random interviews). All of the interviews were assigned a number, they were tape recorded and transcribed. Due to the respondents' wish for anonymity, in the analysis we only refer to their job title and the interview number.

Table 3: Interview data	
Number of interviews	27
From HQ	17
From Regional offices	8 (4 regional offices)
Other	1 customer 1 supplier
Duration of interviews	Normal 1–1.5 h (17) Short ca. 30 min (10)
The informants' positions	Competence manager Innovation director Innovation champion Project manager Project member IdeaExchange team members Marketing director

The knowledge and innovation director also provided internal documents such as schemes to submit an idea to the crowdsourcing platform, samples of submitted ideas, the winning ideas, and criteria for selection of the winning ideas. The authors also gained access to the

crowdsourcing system for a period of time, which gave a sense of how the crowdsourcing system was functioning. The complementary data collection methods were documentation review and field notes. Sources included corporate websites, company brochures, annual reports, videos on the crowdsourcing process and PowerPoint presentations posted by EngineeringCo, trade and specialised press articles, as well as observations and field notes taken at the company's premises.

Data Analysis

Given the limited body of knowledge about enterprise crowdsourcing and the type of our research question (i.e. *How Question*) (Yin, 1997), we rely on the case study methodto investigate how an enterprise crowdsourcing system may stimulate innovation and influence innovation culture at an engineering consultancy. The conduct of the data analysis follows Miles and Huberman (1994) instructions for analysing qualitative data and interviews using categories and themes. In the process of data collection, data coding (Miles & Huberman, 1994) and constant comparative analysis (Corbin & Strauss, 2008), the following three main themes emerged: the influence of IT and culture on innovation, knowledge management and new ways of collaborating for knowledge exchange. After looking closely to our data, the three emerged themes and a number of discussions among the authors, we decided to focus on the theme of the *influence of IT and culture on innovation* since it was the theme that emerged most clearly from the data, especially concerning the number of repetitions, similarities and differences, word co-occurrence and word lists, and keywords in context (Ryan & Russell Bernard, 2003). At this point, we analysed again the data against the organisational theories on IT, innovation and culture and looked for possible cultural determinants in the literature that could be used as a lens through which to analyse the data. This process resulted in the cultural determinants (categories) presented in Table 1. When coding for these categories, we grouped similar codes together. One challenge has been that sometimes the respondent statements could fit under several categories. This challenge has been addressed by an effort to use and allocate the most appropriate statements to each respective category.

Case description

EngineeringCo is part of the EngineeringCo Group, a leading Scandinavian consultancy company in engineering, management and information technology (IT), which had revenues of

1.4 million Euros in 2015. EngineeringCo provides many different types of services, from turnkey power plant solutions to consulting and design of buildings. EngineeringCo services include construction and design, infrastructure and transport, energy and climate, environment and water, industry and oil /gas, IT and telecommunications, management and society.

EngineeringCo Group employs about 13,000 experts in 35 countries and has a strong presence in Northern Europe, Russia, India and the Middle East. EngineeringCo in Denmark has about 3,000 employees, with 1,600 employees located at the Headquarters in Copenhagen, the capital of Denmark. Examples of projects undertaken by EngineeringCo include: a project transforming the industrial harbour of the second largest Danish city into a new and vibrant urban space; development and building of a new district in the capital city of Denmark; and, internationally, the design of the foundations of United States' first offshore wind farm.

The crowdsourcing platform: IdeaExchange

IdeaExchange is a crowdsourcing system that gives employees the opportunity to create ideas for new products or services, improving existing products or services and new uses for existing products and services.

IdeaExchange includes a number of features that enhance interaction and collaboration by supporting three main roles for the participant employees: 1) each employee can post his/her idea in the crowdsourcing system; 2) each employee can act as a *commentator* by commenting on the ideas posted by other colleagues to further develop them or by giving suggestions on how to develop them; and, 3) each employee can act as trader by buying and selling shares on the ideas contributed by others thus affecting their ranking in the list. Each employee is given an amount of virtual money at the beginning of the crowdsourcing process (which in EngineeringCo lasted six weeks), which they can invest into the ideas contributed by others. At any point in time, the spot value of an idea—together with the comments that support it—is proxied by the aggregate investment positions held on it relative to all other ideas. The ideas get ranked automatically according to their spot value. The higher the spot value at any given point in time, the higher the ranking of the idea.

The crowdsourcing process

At the beginning of the crowdsourcing process, five strategic themes had been formulated by EngineeringCo's top management as a frame for the call for ideas. Although this crowdsourcing process has been run at least three times since 2010, we only followed and collected data on the first two rounds. In both rounds, the idea collection process lasted six weeks. After the idea posting and trading period expired, prizes were given to the ideas with the highest spot value in each theme, and a prize was given to the best trader and a prize to the best commentator. These prizes were symbolic, such as an iPad or an innovation course. The highest ranked idea within each different theme was directly entered into a pool of ideas to be considered for further development and implementation. In addition, the innovation board screened the rest of the ideas (approx. 100 in each round) to select 20 ideas for further consideration. This screening process was based on a number of criteria developed by the innovation team in charge of IdeaExchange in collaboration with top management. The innovation team consisted of the innovation director and eight employees *with drive* from different divisions. The 10 selection criteria were formulated in such a way to be clear and transparent to all participants to ensure that all participants had understood the rules of the game and avoid uncertainty and dissatisfaction concerning the process. The 20 selected ideas were then presented to EngineeringCo's top management group and five of these ideas were selected for further development together with the five highest ranked ideas in the IdeaExchange. A number of work hours were then allocated to the idea owner and one to two experts from inside the company were assigned to each idea to further develop it and define the implementation needs together with the idea owner. The crowdsourcing process culminated with an innovation day, where the three winning ideas (meeting the company's strategy and commercial potential) were selected for final implementation, thus receiving support in terms of time and money to further develop the idea. This day included speeches from external innovation experts and a session with short presentations of the 10 finalist ideas. In the first and second crowdsourcing round, the employee participation (in one role or another) was about 50 per cent, considered by the innovation director as a success.

According to the innovation director, the communication element of the crowdsourcing process was very important, both internally to stimulate innovation within the company but also to the outside world because EngineeringCo wanted to improve its image as an innovative company that practices innovation itself. IdeaExchange was, thus, not just a crowdsourcing system but rather a

whole innovation concept that included such components as the strategically defined areas for contributions, criteria for evaluation, a formula for presentation, roll out plan including deadlines, log ins, articles in the internal company newsletter, information provided on the intranet, and information screens running commercials about the IdeaExchange in different locations in the company. This whole crowdsourcing concept, therefore, involved everybody in the company, from top management to new hires by giving all employees as well as the outside world the strong message that innovation was important at EngineeringCo.

Analysis and Results

To analyse the data, we used the five culture determinants presented in Table 1; that is, innovation strategy, structure and employee relations, support mechanism, behaviours encouraging innovation, and communication and knowledge sharing. The results are summarised at the end of this section in Table 4.

Innovation strategy

Traditionally, innovation at EngineeringCo has been developed and anchored in the context of consulting projects or has been going on in closed managerial forums and then communicated to the rest of the company, lacking "a clear, unambiguous and well-communicated innovation strategy" (Svendsen, 2013). However, due to fiercer market competition, the ubiquitous crisis of 2000s, and the wish to be always ahead of the competition, EngineeringCo has over the last few years increased focus on innovation and knowledge sharing as part of the company strategy to become an innovative and *holistic company* (www.ramboll.dk). To reach this objective, EngineeringCo has moved the company headquarters to a new building with t the vision "to function as a holistic and sustainable role model – with openness, knowledge sharing and cooperation as the focal points" (Ramboll, 2015).

Since 2007, EngineeringCo has established two main initiatives aiming at strengthening innovation outside the scope of specific consulting projects. The first initiative, called the *innovation bank*, was a paper-based idea competition that was internal to the company. This initiative supported interesting ideas from employees with *significant revenue potential* with some seed money and few extra hours to develop the idea. An important idea that for example emerged from the Innovation bank has been a mobile soil treatment plant, which has not only

brought the company many millions of Danish Crowns in revenues but has also given EngineeringCo the image of an innovative company. As EngineeringCo states:

> The mobile soil treatment plant has created much interest in the outside world and has meant that we have been invited to conferences and seminars because it was something completely new. It is not a value, we can read in the bottom line, but for us it is important that there will be more than just economics of innovation. (Wessel, 2009)

The second initiative, as already presented, is IdeaExchange, which is an online enterprise crowdsourcing system to collect ideas from employees and company partners. An important idea emerging from IdeaExchange is a digital tool that can save the construction industry a lot of money by providing an overview of the process, reduce material waste and provide a digital picture of the maintenance of a building (Wessel, 2009).

According to the innovation director, the purpose of IdeaExchange was to inspire and stimulate innovative thinking among the employees concerning internal processes, optimisation and new services, as well as to establish an innovative behaviour in the relationship with the customers. This could be, for example, achieved by the employees challenging themselves and the customer's wishes, thus strengthening the capabilities to provide better and more innovative solutions. Despite the innovation outcomes that were achieved and the activity levels achieved, the first two rounds of crowdsourcing showed these goals to be difficult to achieve at the level that was aimed for. Therefore, the innovation director planned a third round of crowdsourcing that had to take place at departmental level to encourage participation of more employees and establish local processes to qualify ideas as illustrated by the following:

> *Get the structured work with innovation close to middle managers and section managers. (Innovation Director, Interview No. 25)*

Structure and employee relations

EngineeringCo is characterised by a hierarchical decision making structure, with local short decision-making processes and relative informal culture within a larger and conservative organisation where management sets direction and develop strategies. In recent years, EngineeringCo has tried to develop a culture, a change in behaviour, where all employees feel responsible and get involved in innovation and innovative behaviour. The crowdsourcing process

is an attempt to slowly change such organisational structures and silos, with its potential to contribute to democratisation of innovation by involving and empowering all employees, instead of keeping it as the egalitarian activity of closed forums:

> *I believe that it has gotten some people out of the bush (..) that otherwise do not have anything to do with innovation (..) because it has been so that (innovation) has been something for a selected group of people that has thought big thoughts or special thoughts. (Project Manager, Interview No. 18)*

According to several of the respondents, IdeaExchange has the potential to collect ideas from all employees, especially ideas which previously had no place to get aired or could quickly be stopped by the closest manager. For example, in the first year of the crowdsourcing process an employee at the lowest level of the hierarchy submitted an idea concerning opening an office in an unusual, far away region of the world that was considered valuable by the company, as a manager states:

> *Without IdeaExchange that idea would never come up, because otherwise he has to go directly to the directors and say it… (and that would never happen). (IdeaExchange Team member, Interview No. 13)*

From an organisational point of view, the set up and implementation of the crowdsourcing process also provided for a high level of employee involvement and, to some extent, empowerment. The innovation director established a team in charge of the crowdsourcing process that included eight employees from non-managerial positions. These employees represented different areas of expertise, different organisational levels and different company locations, creating a sense of ownership of the crowdsourcing process across the organisation. One of the team's decisions was to involve employees at all levels of the hierarchy through the three Idea Exchange's roles: provider of ideas, idea commentator and idea *trader*. This empowerment within the context of IdeaExchange is clearly illustrated below:

> *Everybody can read about the ideas and comment whether they find it good or bad. (IdeaExchange team member, Interview No. 11)*

In addition, in IdeaExchange contact formalities such as status, function and work area are not required. Employees can only use their name, signalling that all ideas are equally important. As another manager also states:

> *There is the advantage of this shortcut between the high and the low in the system, so ideas that perhaps would never get to the director office can get inserted here. (Project Manager, Interview No. 14)*

However, many employees feel that IdeaExchange is just a new way for top management to involve the employees in tasks that are not project related. So, it is still mostly the idea champions that contribute ideas rather than the majority of the employees. This scepticism among employees is especially due to time and work pressure, as stated by an IdeaExchange team member:

> *There have also been some that came to us and said "please stop asking us things that are on top of our work"...It is also one of the challenges in such an initiative... as soon as you have a project number people are more motivated to participate... so it is very much idea champions that get involved rather than the majority as such. (IdeaExchange team member, Interview No. 13)*

Support mechanism

Traditionally, there is no praxis at EngineeringCo for formally rewarding employees for coming up with new ideas nor are there formal support mechanisms to incentivise innovations or innovative behaviour. However, over the last decade, starting with the innovation bank in 2007, the company has started allocating some seed money for the development of new ideas with innovation potential but it still does not give employees any time to dedicate to innovation or innovation activities, and there have been no formal incentives, recognition or rewards for innovation. For example, the employee coming up with the mobile soil treatment plant earning the company several millions Danish Crowns only got a pat on the back from her closest manager. With IdeaExchange, efforts are being made towards establishing some support mechanisms. In fact, the employees were rewarded for different roles: the owner of the best idea, the best commentator and the best dealer. This was also a way to engage more employees in the process and create awareness about different tasks in the innovation process, as reported by the following interviewee:

> *It is not necessarily the one who needs and gets this idea who is most innovative. It may also be the one besides saying hey what if you do this. (Marketing Manager,* Interview No. 10*)*

Intrinsic rewards include getting feedback on the ideas and the possibility of having the three finalist's ideas on the strategic plan for the upcoming year. This is the most important intrinsic reward for the participants because it increases visibility in the organisation, as the following statement shows:

> *The best ideas would be taken into the strategy process, this was the real carrot you could say. (Marketing Manager, Interview No. 10)*

Winning the crowdsourcing process could be important for the personal development and career of an employee. In fact, one of the winners of the first competition got a promotion to a managerial position, with a consequent increase in salary and responsibility. However, the most important support mechanisms of all, time to develop new ideas, was still not in place in the crowdsourcing process. The employees do not get any time to contribute to IdeaExchange. Instead, some respondents feel that as soon as they upload an idea or contribute to develop an idea, other colleagues contact them and this in their eyes is time consuming and distracting unless their idea was among the winners or finalist. Only then they could get some hours to develop the idea and get allocated some extra expertise, however, this never really corresponded to the real amount of work needed.

Finally, according to the innovation director, IdeaExchange is a technology that supports both the whole vision of becoming more innovative and the innovation process itself:

> *It is not ideas that we are missing. (..) We need to work on executing them and now we have a tool to do this. (Innovation Director, Interview No. 9)*

However, there were mixed opinions among the respondents concerning the user friendliness of IdeaExchange: some respondents stated that it was easy to use, while others stating the opposite. Nevertheless, the most important aspects of the crowdsourcing process are probably its transparency and strategic anchoring, which really communicate openness and sincerity about seeing all employees as potential innovation idea contributors, as the following quotes shows:

I think it gives something to the employees if they feel that they can come up with something (ideas) and get heard.(IdeaExchange team member, Interview No. 10)

Behaviours encouraging innovation

According to the innovation director, the basic thoughts behind IdeaExchange is to encourage the employees to take more risk and come up with solutions that are not only anchored in previous experience and solely tied to specific consulting projects but which are characterised by out of the box thinking and unusual solutions. According to the innovation director, this had been only to a limited extent achieved by the first two rounds of crowdsourcing because the employees have difficulties to relate to major society and competitions trends and change behaviour accordingly. Therefore, they initiated a third crowdsourcing process at the departmental level to get closer to the middle managers and employees. The aim of this round was to both stimulate higher employees' participation, and to raise the quality and quantity of ideas submitted. However, IdeaExchange has contributed to increase innovation awareness and has the potential to change the innovation practice, as illustrated by one respondent:

The IdeaExchange can never substitute general internal development but it can support an innovation culture... It is just the top of the iceberg... it is a way to lift it [innovation] and make it more visible. (Project manager, Interview No. 18)

Many respondents also pointed out that IdeaExchange encouraged a more widespread innovative behaviour by

Motivating people to think about ideas. (Project manager, Interview No. 15)

The crowdsourcing process also showed employees that even ideas that at first seem irrelevant may end up having great value and that may come from everybody in the company. In addition, IdeaExchange should also inspire employees that it is not only important to come up with their own good ideas but also to collaborate to help develop others' ideas. However, some respondents felt that the transparency and visibility of IdeaExchange also hindered many employees from inputting ideas because they felt that it was not good for their reputation if their ideas had the lowest ranking.

Communication and knowledge sharing

Communication and knowledge sharing is a challenge for EngineeringCo, as it is for many other consultancy companies. First, knowledge creation and sharing is anchored in the context of specific consulting projects that often are carried out under specific time and budget constraints. Furthermore, the members of a project's team are allocated to a new project team as soon as possible, leaving little time for reflection upon the project that has just been completed. Therefore, the dissemination of project-based knowledge and innovations to the rest of the organisation becomes a considerable challenge. IdeaExchange has the potential to increase communication and collaboration across different teams and departments because it provides the possibility to establish new informal relations, ties and knowledge sharing in multiple ways. The technological affordances support collaboration and teamwork in an informal way, primarily by giving users the opportunity to comment on and rate other colleagues' ideas. For example, an employee that had submitted an idea stated that the commenting function had increased his collaboration with other people in the company who had suggested improvements and refinements to his idea, even though he felt that this had been time consuming and had distracted him at times from his main tasks:

> *Because then people write an e-mail and you have to answer them… And then they write: I think that it is a good idea, but could you also do it in this way. And there you are: Yes, it sounds good. (Employee, Interview No. 12)*

Second, the allocation of a small group of experts to further develop the ideas creates an opportunity of formal team working within and across departments and hierarchical structures. An employee points out that IdeaExchange helps create a common place where people look for inspiration for new ideas and discuss ideas. Hence, IdeaExchange has the potential to become a knowledge-sharing tool where employees learn about new solutions and find peers who might help them with their work:

> *It does by involving employees in a more active dialog …we have opened [innovation] up in relation to the employees. (IdeaExchange team member, Interview No. 11)*

An unexpected side effect of the crowdsourcing process has been the increase of communication and socialisation among employees, especially in the headquarters building. IdeaExchange had become a game and employees felt that it was fun, different and interesting, and they talked

about it in the corridors, and during their lunch and coffee breaks (at least in the six weeks in which the crowdsourcing process was running). Surprisingly, the employees in more peripheral geographical regions had not been so interested or engaged in the process and felt that it was something that was too far away from their daily business and was mainly relevant to the headquarters.

Table 4 summarises the results, showing the determinants of innovation culture before and after the introduction of crowdsourcing. By organising the table around the most salient determinants of organisational culture (i.e., innovation strategy, structure and employee relations, support mechanisms, behaviours that encourage innovations, communication and knowledge sharing), the table describes and provides quotes showing EngineeringCo's culture before and after the crowdsourcing process.

Table 4: Determinants of innovation culture before and after the internal crowdsourcing		
Determinant	Culture before IdeaExchange	Culture after IdeaExchange
Innovation Strategy	Innovation, mainly identified with *development* is linked to and developed within the context and practice of each consulting project, being thus integrated into local practice. Radical innovations and organisational innovation are developed within close groups mainly consisting of top management.	Focus shifts from *innovation integrated into local practice within consulting projects* to *innovation* as a strategic priority in the company. The company formulates an innovation strategy aiming at involving all employees in the organisation in coming up with innovative ideas, thus democratising innovation and making it not only the activity of an elite group of employees, as historically was the case at EngineeringCo .
Illustrative Quotes	*"Our director group gathered for a strategy seminar for 2010. One of the conclusions… it is that we have been good at developing ... but… we became a little bit blind to look at new opportunities." (Innovation Director, Interview No. 25)* "We do not have a clear, unambiguous and well-communicated, innovation strategy - innovation is integrated into local practice."(Svendsen, 2011) "Projects are established and removed at any time, means that we are constantly forced into new situations where there is a need for new solutions or new versions and adaptations of what we can and what we know." (Svendsen, 2011)	"Our task is to define what we mean by innovation, and to create a framework so that it can be done." (Ramboll, 2011) *"It has given some debate about innovation, people think of innovation ... They use the word innovation. And it can give something to the way their mind-set is ... We hope then that they are more innovative and ... give some more ideas. We hope… that this will help to get innovation on the agenda." (IdeaExchange team member, Interview No. 11)* "Greater visibility of how innovation takes place." (Svendsen, 2011)
Structure and Employee Relations	Locally short decision-making processes and relative informal culture within a larger and conservative organisation where	Broader bottom-up employee involvement and top-down strategic focus through the three roles of idea provider, commentator and trader. Opening up for empowerment; for

	management sets direction and develop strategies.	example, through the rating feature. However, keeping final decision making with top management to ensure implementation.
Illustrative Quotes	"Structures are perfect for building silos." (Ramboll, 2011) *"We have to aim to that it is the employees that to a great extent collect and generate knowledge and then distribute it to the organisation, where it gets accumulated." (IdeaExchange team member, Interview No. 11)*	*"You might have it a little easier to make those shortcuts (to top management). Last year there was an idea to open an office in XX city and it came from a person who sits all the way down the system, he cannot say that here (in the company), otherwise he should say it up to the Director." (IdeaExchange Team member, Interview No. 13)* *"And let's put it this way... you can very well get some ideas through or thoughts through in this way. So it creates some shortcuts in the system." (Project Manager, Interview No. 18)*
Support mechanisms	Being a consulting company, it budgets and allocates all the employees' time and activities to specific projects. Any activity outside the specific consulting projects has to be done during the employees' free time. Traditionally there have been no extra time allocated to innovation nor resources.	With IdeaExchange, a few resources in terms of experts' time are allocated to develop the three winner ideas. However, employees still have to mostly use their own free time to contribute to the crowdsourcing process. In addition, with IdeaExchange the company has established rewards mechanisms for the winner idea, the best commentator and the best trader. The rewards are extrinsic (such as an IPad or an innovation course) and intrinsic (such as increased company visibility with potential career advancement).

		IdeaExchange is in itself a support mechanism to increase innovation and change the innovation culture.
Behaviours that encourage innovation	The company is characterised by incremental innovation, low level of risk taking and not much support for change.	One of the goals of the innovation director with IdeaExchange is to inspire employees to take a higher level of risk and stimulate behaviours that encourage innovation through a transparent process for idea generation, evaluation and feedback as well as increased interaction among individuals.
Illustrative Quotes	"Some pioneering spirit and risk-taking locally in the frame of a larger and more conservative organisation." (Svendsen, 2011) *"I could imagine (a future scenario) where when they meet a customer that says "I would like to build this and this" then they could ask "What do you need it for?" That they challenge the customers and themselves." (Innovation Director, Interview No. 25)* *"The biggest challenge is still that, how we can create an approach to our work that not only chooses the safe, but also explores new ways." (Innovation Director, Interview No. 7)* "We need to develop a culture, a change in behaviour, where the old model where knowledge comes from management that scrutinise the environment and relates to it strategically and then distributes the knowledge to the rest of the	*"Well it has put innovation on the agenda ... and changing ... the culture of EngineeringCo through a more innovative behaviour." (Project Manager, Interview No. 18)* *"IdeaExchange challenges the employees to challenge themselves and customers to dare something new and not fall always in the safe." (Innovation Director, Interview No. 25)* *"So that we have to have ... up with the ideas." (Employee, Interview No. 12)*

	organisation is obsolete." (Ramboll, 2011)	
Communication and knowledge sharing	The company is characterised by little communication and contact among employees, and between employees and management due to internal competition, work pressure and formal hierarchical structures. Collaboration takes place mostly within teams formed around specific consulting projects. Knowledge is shared in the context of such teams and the consulting project and, therefore, there is information and work redundancy within the organisation.	Slightly increased communication and socialisation as employees and managers talk and discuss about the ideas and how their actives are doing, at least at lunch time, coffee breaks and so on. Increased collaboration among employees from different levels and departments of the organisation through mechanisms such as the innovation team coming from different divisions and geographical locations; several meetings between top managers and employees to discuss idea selection criteria, themes for idea generation; the commentator's functionality provides the opportunity for teams to form around ideas outside specific consulting projects; the allocation of one to two experts to further develop the finalist ideas increase collaboration across teams and departmental boundaries. These activities together with increased visibility of the submitted ideas, their submitter and relative comments also contribute to knowledge sharing within and across the different divisions and geographical locations.
Illustrative Quotes	"Do not let our strengths and disciplines stand in the way (for collaboration)!" (Svendsen, 2011) *"But … it (super bike paths project) is something that is already implemented… It might as well have been an employee who did not know*	*"It really is a tool for knowledge sharing. There is one who has found out an effective way to control drawings. We have contacted him and talked about it." (Project Manager, Interview No. 18)* *"We've got some inquiries ... So we take it on to those who work with it, and then we just try to pave the way ... Something that gives*

	it was part of the business." (Project Manager, Interview No. 18) "As a knowledge-based company is a 1:1 relationship between knowledge and innovation, and as long as we continue to innovate, it creates confidence that we can overcome the crisis." (Rambøll, 2011)	*ideas for some processes." (IdeaExchange team member, Interview No. 11)* *"Well I think IdeaExchange has affected that there is more debate and discussion. So, people compete of course a little, and it has been discussed more openly, you could say. So it makes such a small boost. Not because there would be no innovation without IdeaExchange but do get something out." (Employee, Interview No. 12)* *"So the dialogue in relation to you uploading your ideas, and you can also comment on other people ... So it is possible for the interaction, while innovation previously took place much in projects and as a closed forum ... and there we have opened up and invited all staff... So it is in the interaction, one might say, between employees." (Marketing Manager, Interview No. 10)*

Discussion and Conclusion

This case study sought to investigate how an organisation may use internal crowdsourcing systems to change the innovation culture. The results of this study, as summarised in Table 4 and supported by quotes, show that the implementation of the crowdsourcing platform at EngineeringCo has brought about some changes in the organisation that illustrate the beginning of a change in the innovation culture. Some of the results are directly linked to the innovation process and ideas generated, while others are related to a more general agenda of increased collaboration, knowledge sharing and empowerment; thus, allowing the formation of new relations and access to new knowledge for the employees. For example, Table 4 shows that the implementation of IdeaExchange has supported the shift of focus from *innovation integrated into local practice within consulting projects* to *innovation* as a strategic priority in the company. The innovation strategy supported by IdeaExchange has opened the idea generation process to all of the employees in the organisation, thus democratising innovation across all levels of the hierarchy and departments**.** Therefore, IdeaExchange supplements other forums of innovation in

the organisation. By doing so, the employees' relationships have also started changing within the company. IdeaExchange helps to balance the broader bottom-up employee involvement and top-down strategic focus, thus opening up for employees' empowerment in relation to innovation and innovation ideas. In addition, IdeaExchange has also generated some radical innovations within the company, thus inspiring employees to a higher level of risk taking. For example, one of the winning ideas of the first crowdsourcing round was so radical that the company decided to fully finance a PhD scholarship to further investigate and develop the idea. Finally, our case shows that IdeaExchange has started to increase collaboration and knowledge sharing outside of the consulting projects and departmental silos by allying, for example, employees from different departments or teams on the development of ideas through the commentator function or increasing awareness about the ideas existing in the company. In answering the research question set forth in this paper, this study makes several contributions. First, this study makes a contribution to the literature on IT and innovation culture, by showing how an engineering consultancy used an enterprise crowdsourcing system to increase innovation awareness among its employees and to shift the focus from innovation understood as *development* taking place within specific consultancy projects to more radical and organisational innovation that can potentially be initiated by every employee outside specific *elite forums* within the hierarchical structures of the organisation (Erickson et al., 2012; Neyer et al., 2009). Our case study provides deep insights about EngineeringCo's intended transformation to an open and transparent innovation culture (Abu El-Ella et al., 2013) where for example top management control and decision making is combined with employee feedback as selection mechanisms of the winner ideas (Soukhorouka et al., 2012).

Most work on organisational culture assumes that cultural change is slow and difficult (Schein, 1984, 2010). As pointed out by Koch et al. (2013), organisational culture is often considered as a variable that must be taken in account during IT implementations as having an influence on how IT will be appropriated or become a force that might lead to unintended cultural change. Consequently, previous literature has mostly dealt with the impact of culture on some aspects of IT without considering how IT might potentially impact or transform organisational culture, especially innovation culture (e.g. Coombs et al., 1992; Leidner & Kayworth, 2006; Schepers et al., 1999). As shown in Table 4, our study suggests that organisations may use enterprise crowdsourcing systems to influence the innovation culture of an organisation along five cultural

determinants, however this is a slow process and it may be more useful to generate an awareness about innovation then a profound cultural change, at least in the short time.

Second, our case study provides interesting insights into how enterprise crowdsourcing can engage employees in innovation, thus contributing to the stream of literature on employee-based innovation (e.g. Boeddrich 2004; Lauto et al., 2013). While most of the literature on crowdsourcing focuses on the contribution of ideas from a big crowd external to the organisation (e.g. Lakhani, 2008; Lakhani & Kanji, 2008), our case shows that enterprise crowdsourcing systems can indeed engage employees in generating new ideas and/or contributing to further develop ideas contributed by colleagues (Bjelland & Wood, 2008; Bergendahl & Magnusson, 2014), thus resulting into new products and/or services (e.g. Soukhoroukova, 2012). IdeaExchange creates value in a number of ways: it is fun, it creates a sense of community, it provides access to valuable knowledge, it provides visibility and status in the organisation, and idea owners and commentators get direct feedback in the system. Likewise, the employees trust the crowdsourcing system as they can see what is in the system, the rules of the crowdsourcing process are clear and equal for everybody, and the outcome is taken seriously (Fairbank et al., 2003). The potential to involve the majority of the employees and making the innovation process transparent may increase the employees' willingness to participate. On the other hand, this change is a process in need of time and management. The existing culture, such as roles and identities, needs to be transformed (Erickson, 2012). Inviting everyone is one step but providing time and communicating the importance is another important element to ensure engagement.

Third, this study contributes to the literature on organisational innovation culture by qualifying five determinants of culture (innovation strategy, structure and employee relations, support mechanisms, behaviours that encourage innovations, communication and knowledge sharing) that can be used in attempts of innovation culture changes. Our case shows that the crowdsourcing process was useful in supporting and initiating small changes in all of these determinants to different extent. We, therefore, concur with the argument of Doherty and Perry (2001) and find that a particular system may help reinforce particular values, or who suggests that a given system may facilitate a change in the organisational culture. Our case does not suggest that the technology controls the innovation culture, but that it is a part of a techno-change (Markus, 2004) system that can facilitate change in combination with the right organisational changes. In the case of IdeaExchange we find that the current culture of

innovation is challenged as more employees are invited to participate, and new methods and new roles are established; thus, building up new relations and changing the existing socio-political forces (Bakker et al., 2006).

Finally our analysis shows that the crowdsourcing system was not standing alone but was embedded in a whole innovation concept, including strategically defined areas for idea contributions, evaluation criteria, a formula for presentation, roll out plan including deadlines, log ins, articles in the internal company newsletter, information provided on the intranet, and information screens running commercials about the IdeaExchange in different locations in the company. A major limitation of the paper is that we mainly interviewed managers, leaders, and technical staff that in one way or another had involved themselves with the crowdsourcing process. To overcome this bias, we also identified and interviewed employees who had deliberately decided not to contribute as well as interviewing the crowdsourcing system provider. Nevertheless, our study provides interesting insights into how organisations can use enterprise crowdsourcing systems to change the innovation culture within the company and engage employees in employee-driven innovation. As innovation is becoming increasingly important and the concept of employee innovation becomes more widespread, we hope that managers can get some useful insights from our study into how to implement enterprise crowdsourcing systems to develop the company's innovation culture and involve their employees in the innovation processes.

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